SCIENCE AND TECHNOLOGY
STATUS REPORT OF SRI LANKA - 2022

National Science and Technology Commission
Ministry of Education

SCIENCE AND TECHNOLOGY STATUS REPORT OF SRI LANKA - 2022

(Prepared based on the data collected from 46 Public Sector S&T Institutions)

National Science and Technology Commission

(Ministry of Education)

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National Science and Technology Commission

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MESSAGE FROM THE MINISTER OF EDUCATION

The National Science and Technology Commission (NASTEC) is mandated to prepare the Science and Technology Status Report of Sri Lanka in accordance with the S&T Development Act No. 11 of 1994. Thus, one of the national responsibilities of the Commission is to compile such a report by analyzing the S&T activities conducted in Sri Lanka in the year prior and submitting it to the government every year. This report benchmarks with international indices to assess the state of the inputs and outputs for national research and development initiatives. It would make it possible for the regional system to monitor the stocks in line with the yearly global policy commitments.

The conclusions of the report offer a basis for well-informed policy development and decision-making to advance science and technology in Sri Lanka. The recommendations of the report play a key role in maximizing economic development and societal well-being by identifying areas that require support, investment, or governmental interventions.

I commend NASTEC for their efforts in gathering and analyzing information related to the status of science and technology in Sri Lanka. Additionally, I express appreciation to the Chairpersons and CEOs of science and technology institutions who contributed in providing data for this report. Their cooperation has been instrumental in the successful completion of this task.

Dr. A.D. Susil Premajayantha (M.P.)

Hon. Minister of Education

Leader of the House, Sri Lanka Parliament

July 01, 2024

FOREWORD

The National Science and Technology Commission (NASTEC), established by the Science and Technology Development Act No. 11 of 1994, functions under the purview of the Ministry of Education. One of the mandatory functions of the commission is to compile and submit a report annually to the government, reviewing the Science and Technology (S&T) activities of the country in the preceding year. To investigate the Science and Technology (S&T) activities of 2022, a survey was conducted to collect pertinent data from public sector S&T institutes. Based on information received from 46 public sector S&T organizations that completed the survey, this report was created. The report reflects the performance of those public sector institutions under the sub-categories of (i) Effectiveness of public spending on S&T, (ii) Use of S&T developments, (iii) Services provided by national S&T institutions, and (iv) Development of human resources. The information obtained from this survey will be a valuable resource for determining the present capacities of institutions for S&T. It will also help to find gaps in the corresponding institutes and the relevant institutes can be improved by following the suggestions made in this report. These interventions can take the form of policies, R&D initiatives, capacity building, etc.

This report is considered a groundbreaking work that provides an additional viewpoint on the scientific environment at S&T organizations in the public sector. We are optimistic that the analysis will help in generating the data required for public sector S&T organizations to make decisions and that it will also offer pertinent guidance for improving performance.

I would like to take this opportunity to express my gratitude to the Chairmen, Directors, and CEOs of the public S&T institutions who provided the necessary data and information in order to complete this report and to congratulate the NASTEC staff for their dedication to producing the S&T status report for the year 2022.

Prof. Veranja Karunaratne
Chairman
NASTEC
May 15, 2024

PREFACE

The National Science and Technology Commission (NASTEC), by its mandate under 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 to the Government of Sri Lanka. Accordingly, NASTEC is mandated to review the Science and Technology (S&T) activities conducted in Sri Lanka during the previous year, regarding the effectiveness of public spending on S&T, the performance of science and technology institutions, the effectiveness of human resource development initiatives, and the utilization of these initiatives by public and private sector enterprises. Within this context, the NASTEC reviewed the status of 46 public-sector S&T institutions through a survey for the year 2022.

The information was collected across five broad areas from the institutions: i) Human resources, ii) Physical resources, iii) Research inputs, iv) Research outputs, and v) Institute services and the collected data were analysed to determine the national contribution to the sector from each institute. The inferential findings of the report are useful in identifying appropriate activities that could be implemented to improve the performance of the sector.

We are grateful to the Chairpersons/Director Generals/Directors of the institutions that participated in the survey by giving institutional data and the liaison officers of each institute for their support in data gathering, which allowed us to compile this report. We appreciate the valuable advice and direction provided by the Commission-appointed sub-committee, the Acting Director, and the NASTEC staff in generating this publication.

Seyed Shahmy
Senior Scientist
May 15, 2024

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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

DBMS – Data Base Management System

DCS – Department of Census and Statistics

DOM – Department of Meteorology

DNBG – Department of National Botanical Gardens

DEA – Department of Export Agriculture

DMUSS – Department of Measurement Units, Standards & Services

DMC – Disaster Management Centre

EOLSS – Encyclopedia of Life support Systems

FCRDI - Field Crops Research & Development Institute

FD – Forest Department

FMRC – Farm Mechanization Research Centre

FORD – Fields of Research and Development

FRDI – Fruit Research and 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

IPS - Institute of Policy Studies of Sri Lanka

ISCED – International Standard Classification of Education

IT – Information Technology

ITI – Industrial Technology Institute

LB – Lower Bound

LKR – Sri Lankan Rupees

MRI – Medical Research Institute

NAICC - National Agriculture Information & Communication Centre

NAQDA - National Aquaculture Development Authority of Sri Lanka

NASTEC – National Science and Technology Commission

NARA – National Aquatic Resources 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

NIPO – National Intellectual Property Office

NPQS – National Plant Quarantine Service

NPD-– National Planning Department

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 Regional Cooperation

S&T – Science and Technology

SCI – Science Citation Index

SCI – Expanded- Science Citation Index Expanded

SCPPC – Seed Certification and Plant Protection Centre

SCS – Seed Certification Services

SDCSL - Sustainable Development Council of Sri Lanka

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

SLIC - Sri Lanka Inventors Commission

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 Nations Conference on Trade and Development

VRI – Veterinary Research Institute

EXECUTIVE SUMMARY

Innovation, research, and development are crucial drivers of economic growth and societal improvement. It shapes the global competitiveness of a country while fostering its standing and performance on the international stage. Nevertheless, the global economy was severely impacted by the COVID-19 pandemic, particularly affecting developing countries such as Sri Lanka. Nationwide lockdowns threatened research and development institutions, stifling innovation during an economic downturn. This emphasized the proneness of developing countries to such crises and underscored the significance of continuous efforts to achieve long-term resilience and progress.

Amongst uncertain conditions, the Science and Technology (S&T) Status Report of Sri Lanka for 2022 was compiled based on data gathered from 46 public sector S&T institutions. The report aims to evaluate S&T activities in these institutions, aligning with the objectives outlined in the S&T Development Act of 1994/11.

According to the survey findings, more than 94% of staff in public-sector S&T institutions work on a permanent basis. Women constitute 55% of the scientific workforce, exceeding the global average of 46% in the public sector[1]. Nonetheless, the representation of women in the engineering and technology sector was relatively lower at 38.5%, highlighting the need for measures to attract greater female participation.

The findings also indicate that a significant portion of researchers focused their academic expertise on social sciences. Each institute employed average number of 43 researchers, most of them were in the 41-50 age range, and only 10% held a PhD. In 2022, the turnover rate among employees in the institutes was reported as 5.06%, markedly lower than the global average of 14% in 2021[2]. However, there are concerns raised by the Human Flight and Brain Drain Index, pointing to a significant brain drain problem with an average value of 6.60 index

[1] World bank Blog: https://blogs.worldbank.org/governance/five-facts-gender-equity-public-sector
[2] Global turnover rate: https://explodingtopics.com/blog/employee-turnover-statistics#factors

points in Sri Lanka. It's imperative to tackle this elevated brain drain to retain talented individuals within the system.

The surveyed institutions possess a total of 413 research laboratories, 84 workshops, 44 libraries, and 103 auditoriums. Basic ICT facilities and internet access are available in almost all institutes, with 29 of them having dedicated databases for R&D services. Furthermore, all research staff members are equipped with sufficient ICT facilities.

Most of the funding for these institutions originated from the Government of Sri Lanka (GoSL), with significant allocations directed towards research projects and subsequent direct infrastructure development. The received R&D fund totaled LKR 4429.47 million, with the agricultural and veterinary sciences sector receiving the largest portion. The fund utilization rate (FUR) stood at 91.1%. However, the national investment in gross expenditure on research and development is predicted as 0.42 in billion (USD)[3], falling below that of major economies in the South and Southeast Asian region[4].

The institutions conducted 889 research projects, predominantly multi-year activities with a 49.6% annual completion rate; 65.46% of these projects focused on agriculture and veterinary sciences. They produced 65 products, 99 processes, and 55 technologies, alongside 1363 scholarly works, 36.61% were abstracts in conference proceedings. The scholarly publications per capita in Sri Lanka were 180.63, which is lower than Bhutan, India, and the Maldives in the SAARC region. Notably, Sri Lanka's scholarly publications per unit GDP, at 45.22, closely followed the global average (54.01) but trailed behind the SAARC average (77.46) in 2022. Establishing a national framework for research excellence, along with financial incentives, could address this long-standing issue.

Among the surveyed institutions, 36 awards have been received in recognition for the scholarly achievements, with 12 receiving international honors. Nationally in 2022, out of 164 applications submitted, 80 resident patents were granted[5]. The survey revealed that 7 (8.7%) of

[3] Predicted GERD in Sri Lanka 2022: https://www.statista.com/statistics/1346196/apac-gross-expenditure-on-research-development-by-country/

[4] National gross expenditure in R&D: http://data.uis.unesco.org/index.aspx?queryid=74

[5] Residential patents granted: https://www.nipo.gov.lk/web/index.php?option=com_content&view=article&id=8&Itemid=130&lang=en

these patents originated from the institution under study. As part of the commercialization process, targeting initial consumer groups involved 4 products and 17 processes. Additionally, 48 recommendations were adopted, and 63 technologies were transferred.

Although the research projects yielded numerous innovative products, processes, and technologies despite the challenges posed by the pandemic, there remains scope for enhancing the dissemination of scholarly publications in indexed journals and translating generated knowledge into practical applications. Furthermore, there is a need to enhance transparency regarding the quality of work.

Hence, strategic interventions are necessary to amplify the contributions of R&D towards achieving the national targets of SDG 2030, including commitments to gender equity, facilitating more career openings and to retain researchers. To prevent duplication of efforts and streamline information sharing, establishing a robust central platform to host diverse institutional R&D datasets within an IP framework is imperative.

INTRODUCTION

The National Science and Technology Commission (NASTEC), established under the Science and Technology Development Act No. 11 of 1994, serves as the primary policymaking and advisory body on Science and Technology (S&T) for the Government of Sri Lanka. Mandated by the Act, NASTEC is required to produce an annual report to the government, evaluating the S&T status in Sri Lanka in the preceding year as per the objectives outlined in Section 2 of the Act. This report assesses various aspects, including the development of human resources, the performance of S&T institutions, the effectiveness of public spending on S&T, and the utilization of S&T by public and private sector entities[6]. The aim of this report is to provide stakeholders with information that could potentially influence decisions at the intersection of science and policy.

The national research and innovation ecosystem of a country comprises research institutions, universities, knowledge-based services, innovative businesses, and other entities involved in generating scientific knowledge, supporting higher education, fostering industrial innovation, cultivating scientific expertise, and advancing national strategic objectives[7]. An essential practice for leveraging science and technology (S&T) to achieve socio-economic development is periodically evaluating the status of S&T. Hence, assessing the performance of S&T institutions is crucial as it greatly influences the effectiveness of the national research and innovation ecosystem.

To achieve this goal, NASTEC considered two aspects. Firstly, data on the activities of major S&T institutions in Sri Lanka were collected through a questionnaire-based survey. Secondly, information on relevant topics was gathered from resources provided by prominent global and local learned societies and agencies, including the World Bank, UNESCO, World Intellectual

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

[7] National Innovation system, OECD; https://www.oecd.org/science/inno/2101733.pdf

Property Office (WIPO), National Intellectual Property Office (NIPO), University Grants Commission (UGC), and the Central Bank of Sri Lanka (CBSL).

The survey methodology involved distributing a pre-defined questionnaire to 65 public sector S&T institutes to gather data for the year 2022. The questionnaire covered aspects such as human resources, physical resources, research planning, research inputs (funds), research outputs, and services provided to industries, peer institutions, and the public. Each institution appointed a liaison officer responsible for providing the institution's data. The questionnaire had a deadline of four months for completion, and 46 institutions responded with complete data within the specified timeframe.

Based on the information gathered using a descriptive and comparative analysis, 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 report is structured into six main sections: Human Resources, Physical Resources, Research Planning, Research Funding, Research Outputs, and Institutional Services. Each section provides a detailed description accompanied by appropriate graphical representations of the work conducted in 2022, along with trends observed from 2012 to 2022. Run charts were extrapolated by calculating the average figures distributed per institute, considering variations in the number of institutes surveyed from 2012 to 2022. Some assessment results cannot be verified with global and regional indices for the reporting year due to limited data availability at the time of report writing. However, the report validates these claims wherever possible. The recommendations and conclusions drawn from the survey can serve as a valuable reference for improving institutional performance.

Although NASTEC is tasked with preparing the annual S&T status report on a national level, the effort faces several limitations. It does not include assessments of the private-sector

institutions or offer comprehensive coverage of the higher education sector. Moreover, while the primary aim of the report is to evaluate the national S&T status, it relies on data from a subset of 46 institutes, primarily focusing on R&D activities within the broader S&T ecosystem. It's worth noting that Sri Lanka has a limited number of private-sector institutions with specialized R&D facilities among the surveyed establishments. As a result, generalizing the findings of this report to reflect the overall national S&T status may not be appropriate.

Nevertheless, the public sector institutions included in the report are significant contributors to their respective sectors and possess a great deal of impact over the national S&T ecosystems. Therefore, the report could aid in informing policy decisions regarding policy directives, strategic interventions, human resource requirements, research planning, and funding priorities for these institutions.

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

Sector	Number of Institutes	%
Agricultural & Veterinary Sciences	22	48%
Engineering & Technology	7	15%
Medical & Health Sciences	1	2%
Natural Sciences	7	15%
Social Sciences	9	20%
Total Institutes	**46**	**100%**

From the 46 S&T institutes surveyed, the highest number of institutions were included in the sector of Agricultural and Veterinary Sciences sector (n =22), and the lowest number was included in the sector of Medical & Health Sciences sector (n=1). A list of institutions belonging to each sector is given in Table 02.

Table 2: Sector-wise categorization of public sector S&T Institutions 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)	Department of Census and Statistics (DCS)
Department of Measurement Units, Standards & Services (DMUSS)	Centre for Defence Research and Development (CDRD)		Department of Export Agriculture (DEA)	Institute of Policy Studies of Sri Lanka (IPS)
Department of National Botanical Gardens (DNBG)	Farm Mechanization Research Centre (FMRC)		Field Crops Research & Development Institute (FCRDI)	National Intellectual Property Office (NIPO)
Gem &Jewellery Research and Training Institute (GJRTI)	Industrial Technology Institute (ITI)		Forest Department (FD)	National Research Council (NRC)
National Institute of Fundamental studies (NIFS)	National Building Research Organization (NBRO)		Fruit Research and Development Institute (FRDI)	National Science Foundation (NSF)
Natural Resources Management Centre (NRMC)	National Engineering Research & Development Centre (NERDC)		Hector Kobbekaduwa Agrarian Research and Training Institute (HARTI)	Sustainable Development Council of Sri Lanka (SDCSL)
Sri Lanka Atomic Energy Board (SLAEB)	Sri Lanka Institute of Nanotechnology (SLINTEC)		Horticultural Crop Research and Development Institute (HORDI)	Sri Lanka Accreditation Board for Conformity Assessment (SLAB)
			Department of Irrigation (DI)	Sri Lanka Inventors Commission (SLIC)
			National Aquaculture Development Authority of Sri Lanka (NAQDA)	Sri Lanka Standards Institute (SLSI)
			National Aquatic Resources Research & Development Agency (NARA)	
			National Institute of Postharvest Management (NIPM)	
			National Plant Quarantine Services (NPQS)	
			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)	
			Sri Lanka Council for Agricultural Research Policy (SLCARP)	
			Sugarcane Research Institute (SRI)	
			Tea Research Institute (TRI)	

Statutory Functions of the institutes:

The statutory functions of the institutes related to science and technology are categorized into eight 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
7. Training of Personnel
8. Innovation

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	34	81%
Research funding	6	14%
S&T Services	27	64%
Innovation	22	52%
S&T Policy formulation	10	24%
Technology Transfer	34	81%
Science popularization	20	48%
Training of Personal	31	74%

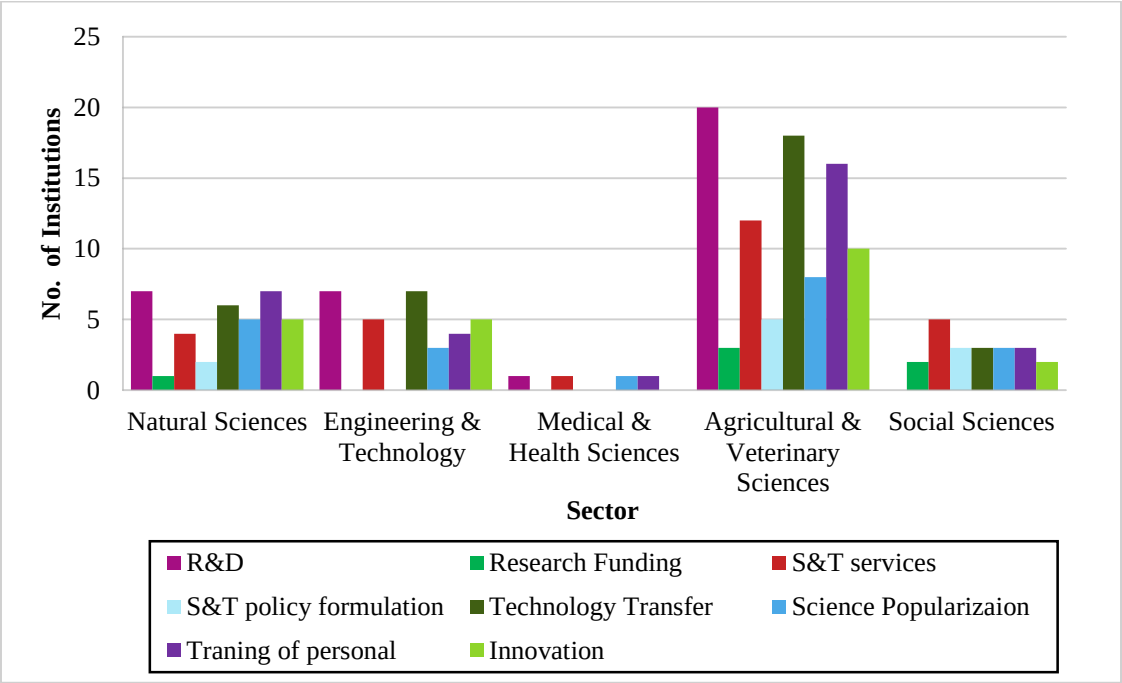

Figure 1.1: Sector-wise distribution of S&T institutions carrying out statutory functions

According to the OECD Frascati Manual, research and experimental development (R&D) involve systematic and innovative work aimed at expanding knowledge of humankind among various fields, including culture and society, and exploring new applications of existing knowledge. R&D represents the initial phase in the development of potential new services or production processes. Eighty-one percent (n=34) of surveyed institutions identified R&D as one of their primary statutory responsibilities.

Research funding involves the allocation of financial support for R&D activities, spanning basic research, applied research, and prototype development. As such, six institutes (14%) engage in research funding, namely Department of National Botanical Gardens (DNBG), National Aquatic Resources Research and Development Agency (NARA), Palmyrah Research Institute (PRI), Sri Lanka Council for Agricultural Research Policy (SLCARP), National Research Council (NRC), National Science Foundation (NSF).

Services such as analytical testing, quality assurance, laboratory accreditation, instrument calibration, personnel training, and other specialized S&T-related services offered by institutions are categorized as S&T services. Out of the 46 surveyed institutes, 27 (64%) provided at least one of these services.

In a period marked by swift technological advancements, policy-making bodies must recognize and formulate policies for emerging science, technology, and innovation[8,9].Twenty-four percent (n=10) of the institutes surveyed were engaged in S&T policy formulation activities.

Technology transfer (TT) involves the dissemination of scientific and technological research outcomes, along with associated skills and procedures, to the marketplace and society, playing

[8] The Impact of Rapid Technological Change on Sustainable Development (2019); UNCTAD; https://unctad.org/system/files/official-document/dtlstict2019d10_en.pdf
[9] A Framework for Science, Technology and Innovation Policy Reviews (2019); UNCTAD; https://unctad.org/system/files/official-document/dtlstict2019d4_en.pdf

a vital role in the innovation process[10]. During the survey period, thirty-four institutes (81%) engaged in technology transfer activities.

Science popularization entails making science accessible to the general public, disseminating scientific knowledge, and fostering a scientific mindset among people. This involves promoting public understanding of science and communicating research projects to the public[11]. Among the surveyed institutes, 22 (52%) are involved in science popularization activities as part of their mandates.

Training of personnel refers to the process of enhancing the skills, knowledge, and competencies of employees to improve their performance and productivity within an organization[12]. Among the surveyed institutions 31 (74%) conduct training of personnel programs.

Innovation is the process of creating, developing, and implementing new ideas, products, services, processes, or methodologies that bring about positive change and provide value to individuals, organizations, or society as a whole[13]. Within the surveyed institutions 22 (52%) involved in the innovations. It's noteworthy that many institutes perform multiple statutory functions.

[10] Knowledge for policy, European Commission; https://knowledge4policy.ec.europa.eu/technology-transfer/what-technology-transfer_en
[11] Public understanding in Science: https://www.encyclopedia.com/science/encyclopedias-almanacs-transcripts-and-maps/public-understanding-science
[12] Personal Training: https://bizfluent.com/facts-6797726-meaning-personnel-training-.html
[13] Open Innovation: The New Imperative for Creating and Profiting from Technology20041Henry W. Chesbrough. Open Innovation: The New Imperative for Creating and Profiting from Technology, Boston, MA: Harvard Business School Press 2003.

1. HUMAN RESOURCES

Human resources play a crucial role in driving economic development of a country and require significant government investment in their development to ensure effective utilization[14].

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[15].

Globally, countries are transitioning towards knowledge-based economies, leading to an increased demand for Human Resources in Science and Technology (HRST). It's imperative for knowledge-driven countries to cultivate a substantial pool of well-trained professionals while aligning tertiary education with international standards outlined in the International Standard Classification of Education (ISCED) and OECD sector classifications from 1995.

The report categorizes all personnel within S&T institutions into two groups: scientific and non-scientific. The scientific category encompasses researchers, research support/technical staff, and librarians/information officers, while the non-scientific category includes accounting, administrative, and other staff (Definition 1.1). The analysis in the HR section extensively examines areas of studies of researchers, their highest level of education, age and gender demographics, and staff turnover rates, training initiatives, and provided incentives.

[14] The Effect of Human Resource Development on Organizational productivity: (2013) http://dx.doi.org/10.6007/IJARBSS/v3-i10/295

[15] 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

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 2022, a total of 9464 employees were working in the institutes surveyed, with 8914 (94%) being permanent, while 550 (6%) were on a contract basis.

The lowest number of employees reported was 11, working for National Aquaculture Development Authority of Sri Lanka (NAQDA), while the highest number of employees reported was 1304 who have been attached to Department of Census and Statistics (DCS). Among the total, scientific staff accounted for 51.32%, n = 4857. Figure 1.2 depicts the distribution of scientific and non-scientific personnel by sector.

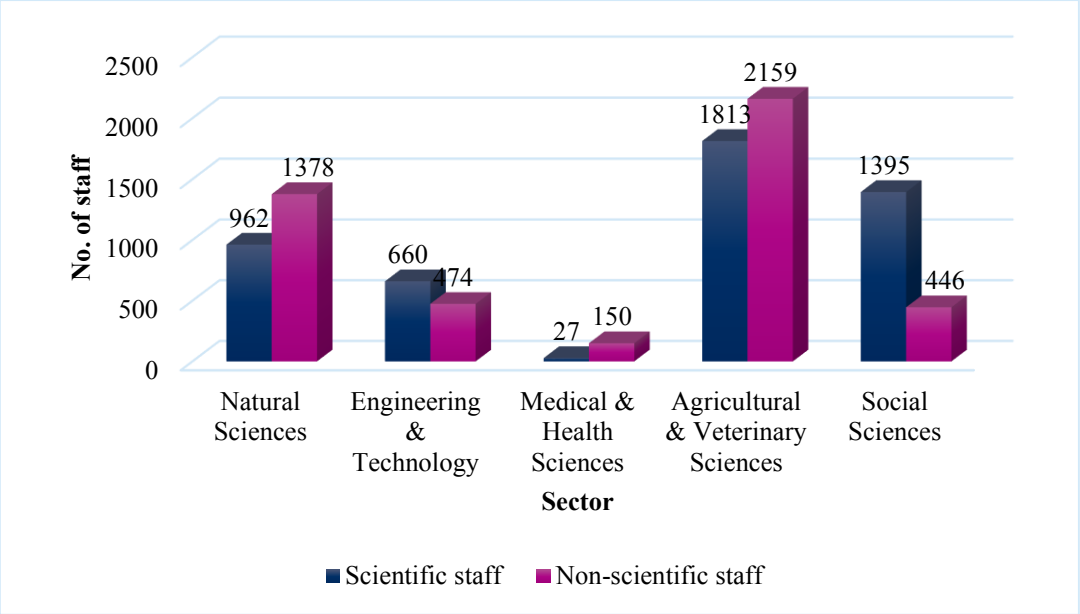

Figure 1.2: Sectorial breakdown of scientific and non-scientific staff

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

Non-scientific staff outnumbered scientific staff in the Natural Sciences, 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	644	1143	26	18	115	70	1246	710	3972
Engineering & Technology	382	270	8	14	41	92	169	158	1134
Medical & Health Sciences	20	7	0	0	0	1	0	149	177
Natural Sciences	104	853	5	11	46	37	491	793	2340
Social Sciences	833	550	12	14	77	38	114	203	1841
Subtotal	**1983**	**2823**	**51**	**57**	**279**	**238**	**2020**	**2013**	**9464**
Total	**4857**			**336**		**2258**			

Figure 1.3 shows the distribution of the number of researchers in the institutions. The lowest number of researchers were working in the Forest Department (FD) and Plant Protection Service (PPS) (n = 2), and the highest number was 637 attached to Department of Census & Statistics (DCS).

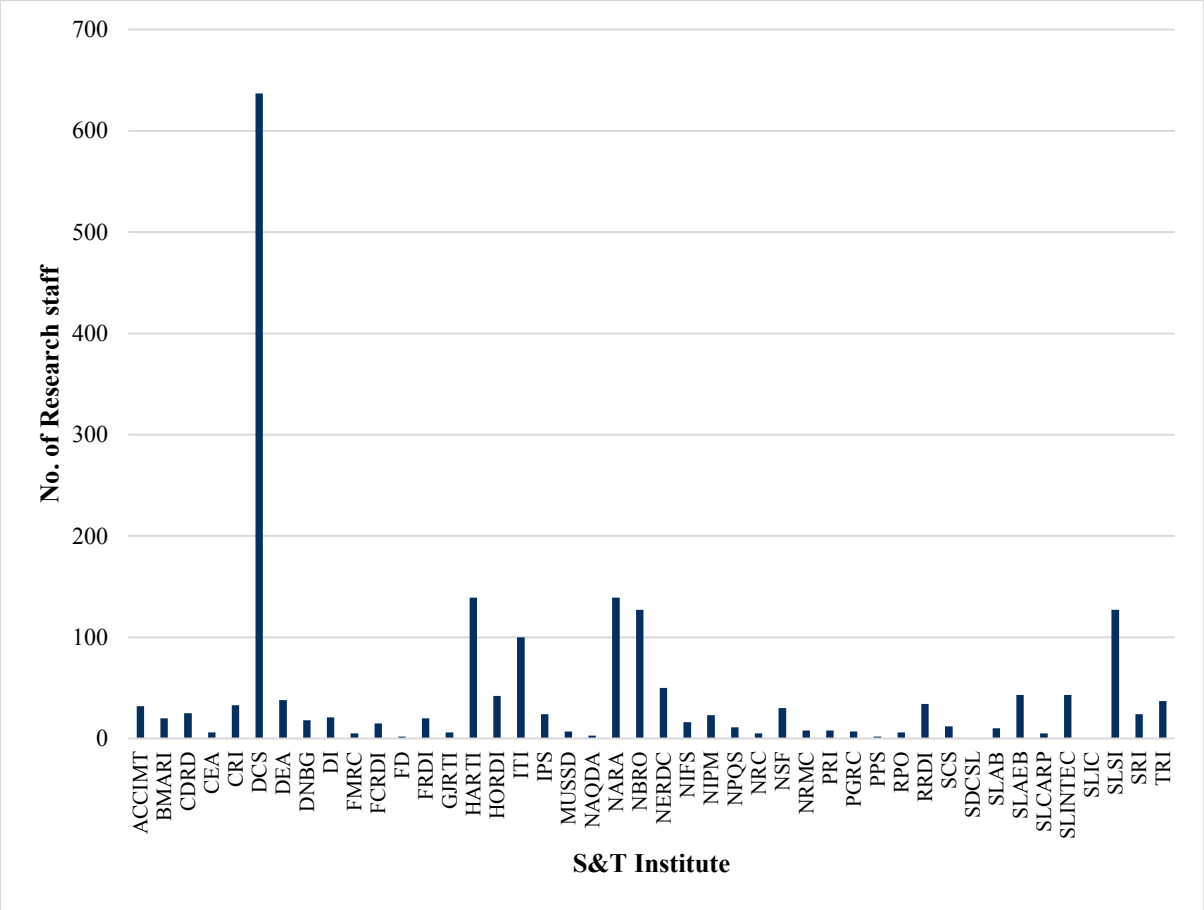

Figure 1.3: Distribution of research personnel among S&T institutions

The average number of researchers working per institute was 43, and 13 out of 46 S&T institutions (28.26%) have researchers less than 10. Figure 1.3 depicts the spectrum of research staff attached to the institutes. There were seven institutes (15.21%) that employed more than 50 researchers.

Figure 1.4 illustrates the trend of researchers working per institute from 2013 to 2022. Overall, there is a slight decline over the specified period, but a recent upward trend indicates a positive sign for the field of research.

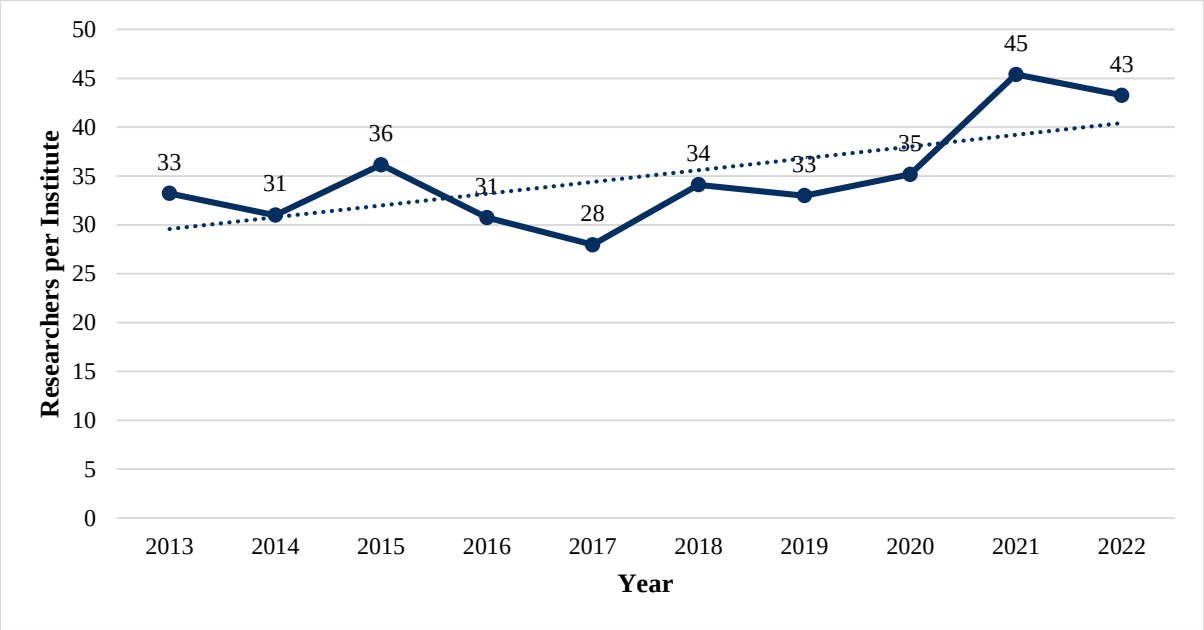

Figure 1.4: The average number of researchers working per institute during 2013-2022

A slightly same scenario can be observed at national-level norms via UNESCO statistics at a different matrix, such as researchers in R&D per million populations. In 2014, there was a decline in the trend which resulted a low number of researchers. From 2015 to 2018, the value was slightly similar. And, it shows a slight upward trend in recent years, respectively. According to the UNESCO statistics, the data has been updated until 2020 only. Therefore, the values are forecasted with upper and lower confidence bounds and presented as figure 1.5 and table 05. For 2021, the forecasted number of researchers (per million people) is 103.206 (LB: 102.347, UB: 106.400), and for 2022, it is 102.961 (LB: 101.963, UB: 105.523).

Table 5: Forecasted values for 2021/2022 – Researchers in R&D per million populations.

Year	No. of Researchers (per million people)	Forecast (No. of Researchers (per million people))	Lower Confidence Bound (LB)	Upper Confidence Bound (UB)
2012	108.64			
2013	107.99332			
2014	97.08263			
2015	104.08262			

2016	105.03859			
2017	104.71218			
2018	104.06004			
2019	-			
2020	104.55117			
2021		103.2062847	102.3475096	106.4006759
2022		102.9618598	101.9631184	105.5232582

Source: UNESCO Institute for Statistics – 2016-2020[16]

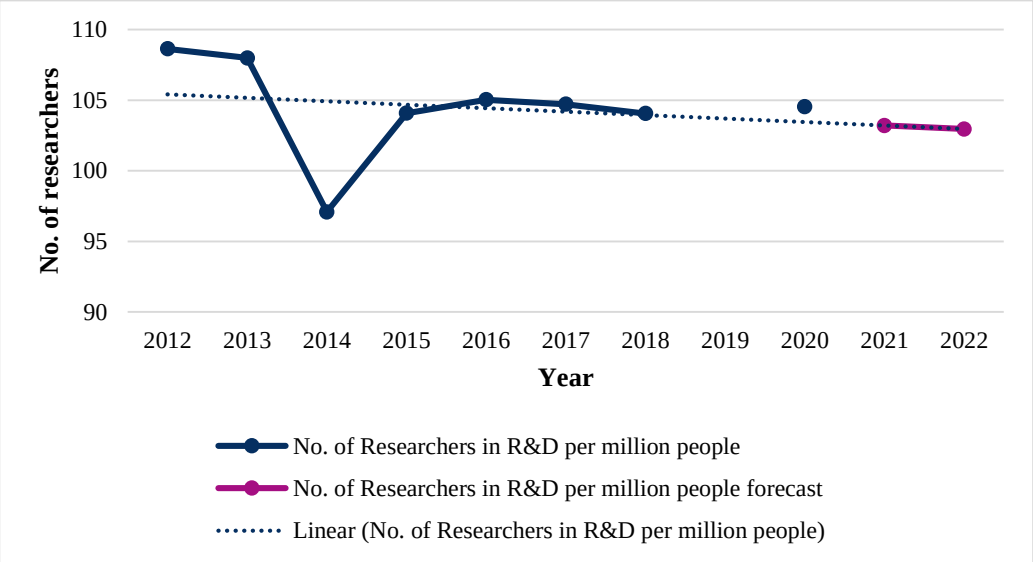

Figure 1.5: The Researchers in R&D (per million people) in Sri Lanka

[16] Researchers per million inhabitants; http://data.uis.unesco.org/index.aspx?queryid=3685

1.2. Gender parity in Research staff (Researchers)

When considering the whole researchers (n = 1983) of the institutes surveyed, 55% were females (n = 1081) while 45% were males (n = 902), as shown in Figure 1.6. 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 2022, the representation of women researchers in Sri Lanka was 55%, higher than the global estimation of 33.3%[17].

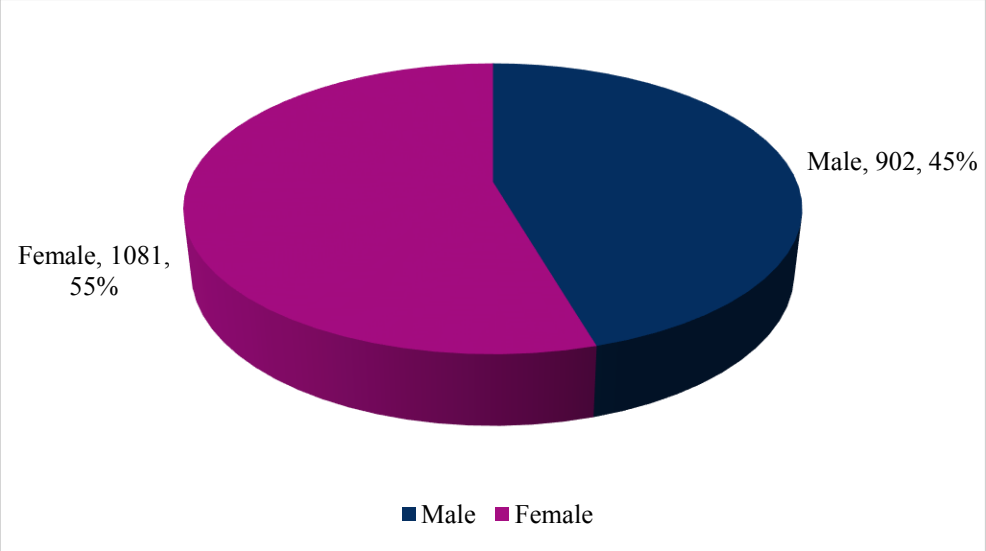

Figure 1.6: Gender distribution of research staff

According to UIS data, less than 33.3% of the world's researchers are women.

[17] L'Oréal-UNESCO for Women in Science: https://www.forwomeninscience.com/

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

In terms of affiliated institutes and researchers, female representation was notably higher in Natural Sciences, Medical & Health Sciences, Agricultural & Veterinary Sciences and Social Sciences sectors. However, the trend was opposite in Engineering & Technology sector, indicating a need for greater encouragement of female representation in these fields.

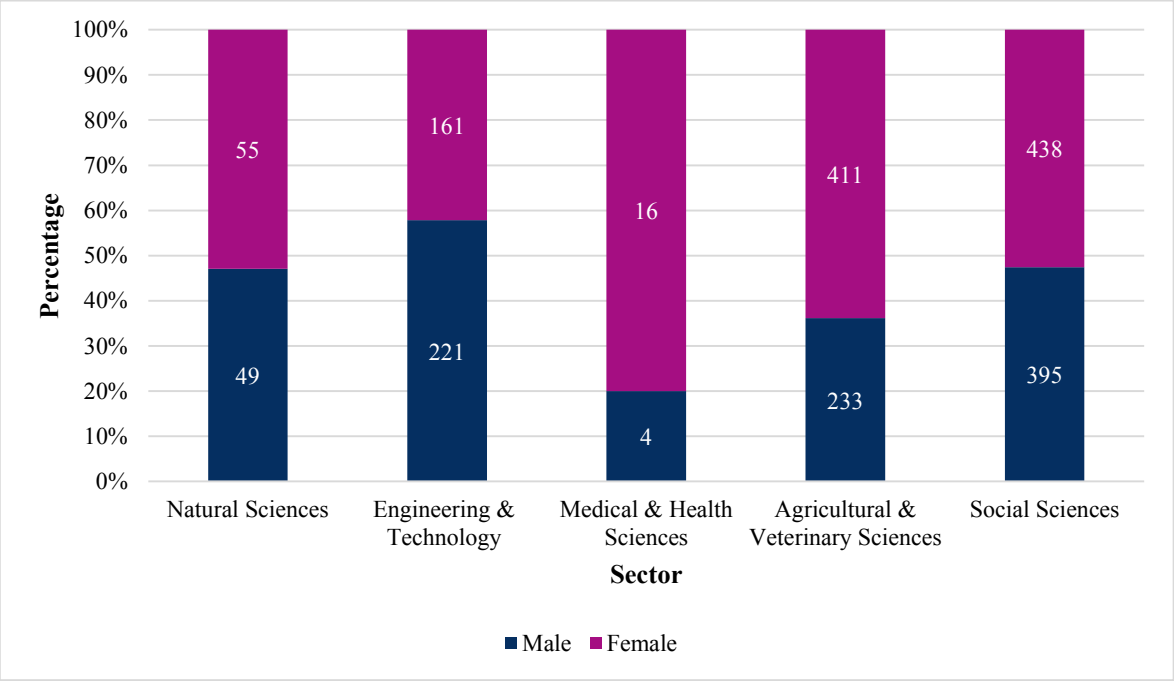

Figure 1.7: The gender distribution of research staff in different sectors

N*: Total number of researchers=1983

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 Social Sciences (n = 686, 34.5%), while Medical and Health Sciences were the least specialized (n = 6, 0.3%) (Table 6).

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

Field of Expertise	Male		Female		Total
Agricultural & Veterinary Sciences	155	31.4%	338	68.6%	**493**
Engineering & Technology	198	61.5%	124	38.5%	**322**
Medical & Health Sciences	1	16.7%	5	83.3%	**6**
Natural Sciences	145	38.0%	237	62.0%	**382**
Social Sciences	353	51.5%	333	48.5%	**686**
Other	50	53.2%	44	46.8%	**94**
Total	**902**	**45%**	**1081**	**55%**	**1983**

Other*: Not specified

In 2022, 28.63% of engineering graduates in Sri Lanka were woman (Sri Lanka University Statistics 2022-UGC).

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

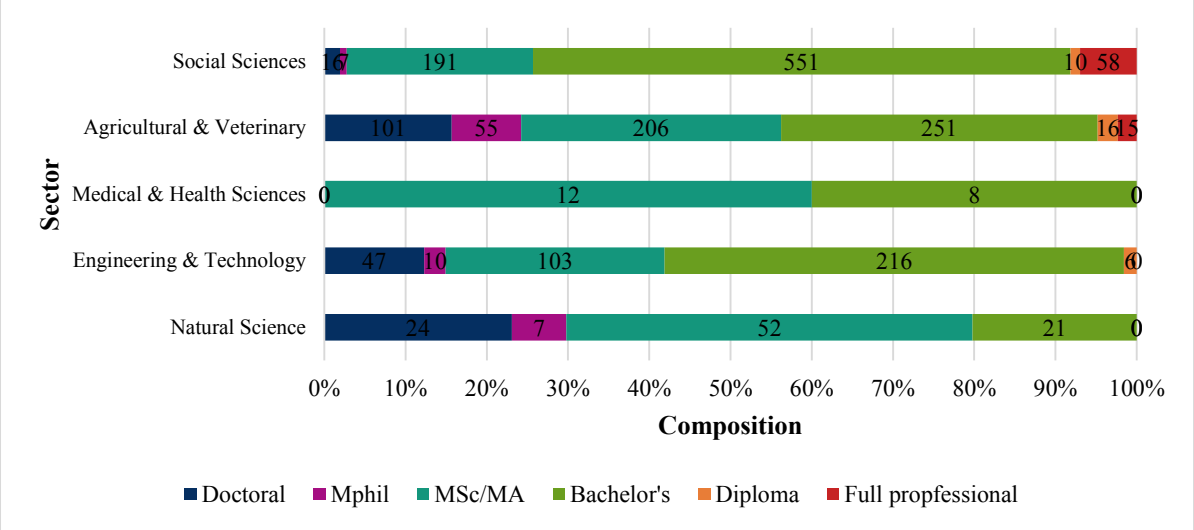

Figure 1.8: Composition of research staff based on the highest qualifications held by them (Sectorial Distribution)

1.5. Research staff Age distribution

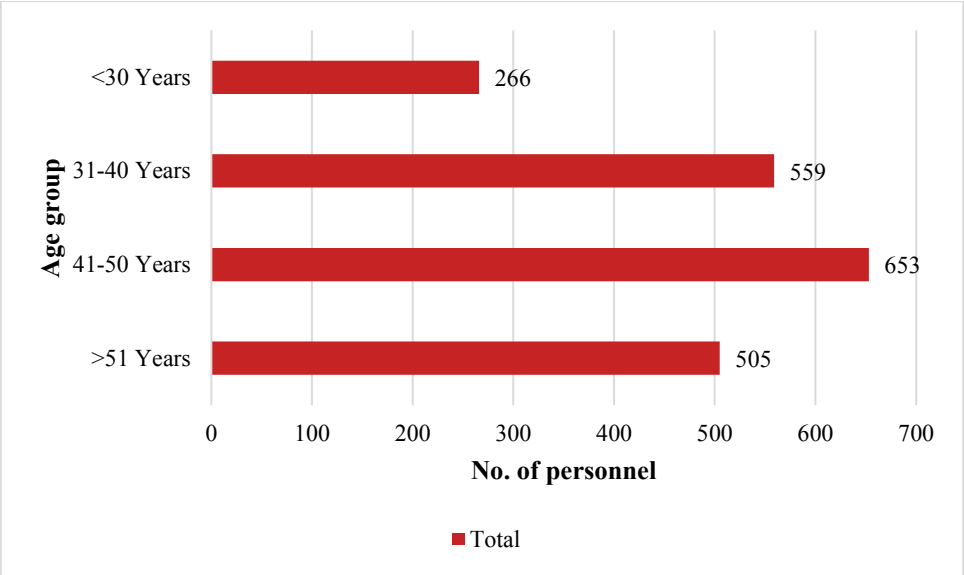

Figure 1.9: Research staff Age distribution

Young scientists and researchers are widely acknowledged as some of the most innovative and dynamic contributors to the field. They often possess high mobility and superior training, representing a vast global talent pool that has the potential to reshape the landscape of knowledge. These early-career researchers are pivotal in knowledge-based economies as they serve as key innovators and creators, providing the intellectual capital necessary for robust national research and innovation systems to thrive. Given the array of emerging challenges faced by nations globally-including rapid economic globalization, aging populations, increased demand for highly skilled labor, and the expansion of higher education systems-the imperative to nurture and support young researchers is more pressing than ever[18,19].

[18] The Global State of Young Scientists; Global Young Academy; https://globalyoungacademy.net/wp-content/uploads/2015/06/GYA_GloSYS-report_webversion.pdf

[19] 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

The sample survey shows the majority of the researchers were in their 41-50 years range (n = 653, 32.90%). Also, a significant representation of 28.18% was in the mid-career stage (31-40), and only 13.41% 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[20] (Figure 1.10).

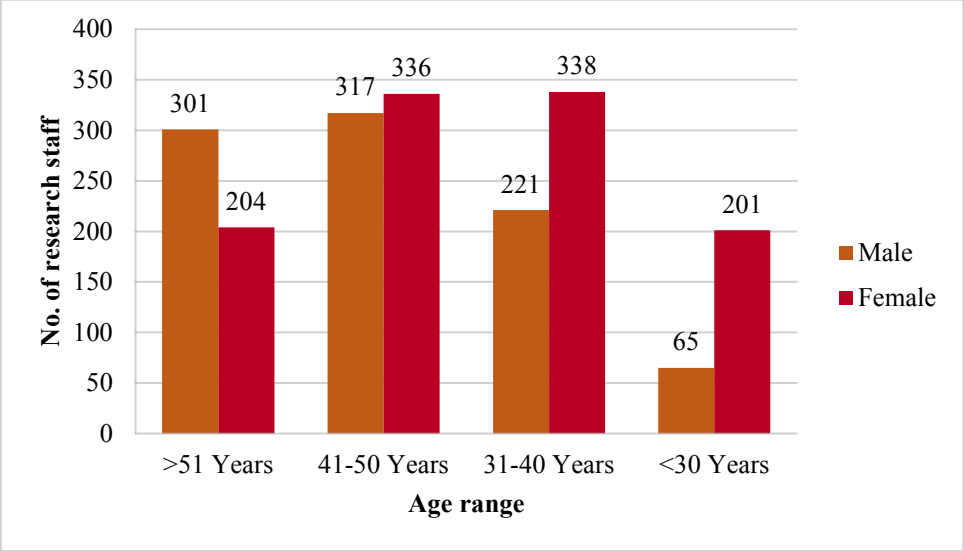

Figure 1.10: Age and gender distribution of research staff.

[20] 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 included Ph.D., MPhil, MSc/MA, BSc, and Diploma. Figure 1.11 depicts the distribution of research staff based on their highest educational qualifications.

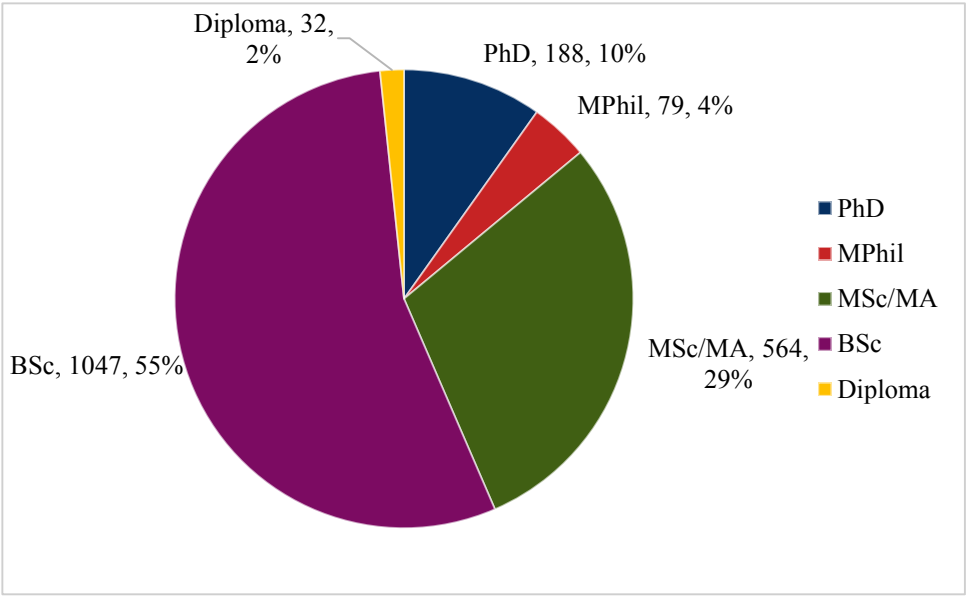

Figure 1.11: Distribution of research staff based on their highest educational qualifications.

Most of the researchers held either a Bachelor's Degree (BSc) (n = 1047, 55%) or a Master's Degree by course work (n = 564, 29%) as the highest qualification. Only 4% had research-based Masters (MPhil) (n = 79), and 10% (n = 188) 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.

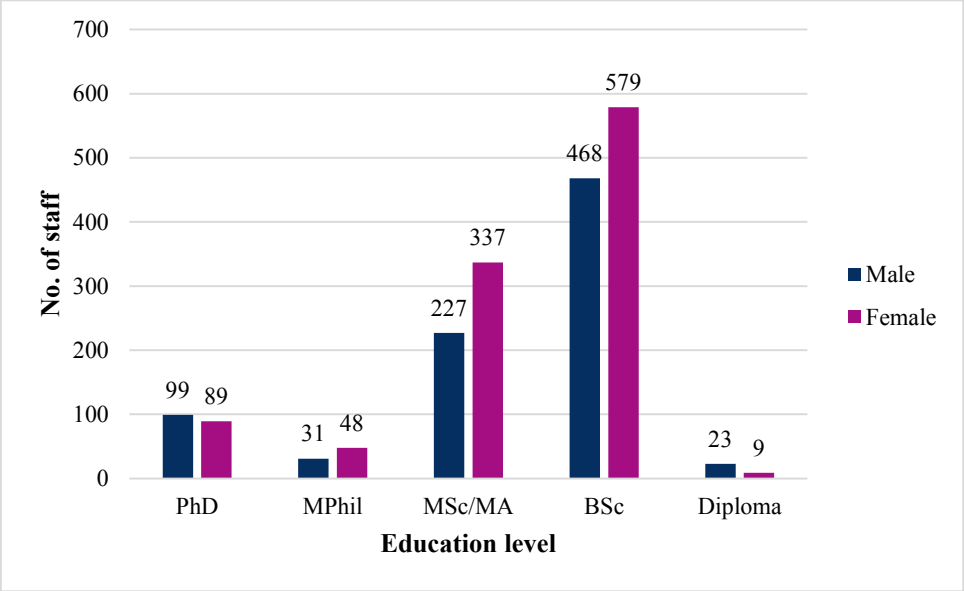

Figure 1.12: Distribution of research staff by highest level of education and gender

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 2022, a total of 1794 scientific staff participated in 152 local training (n = 152, 44.05%) and 193 foreign training (n = 193, 56%) programs, respectively.

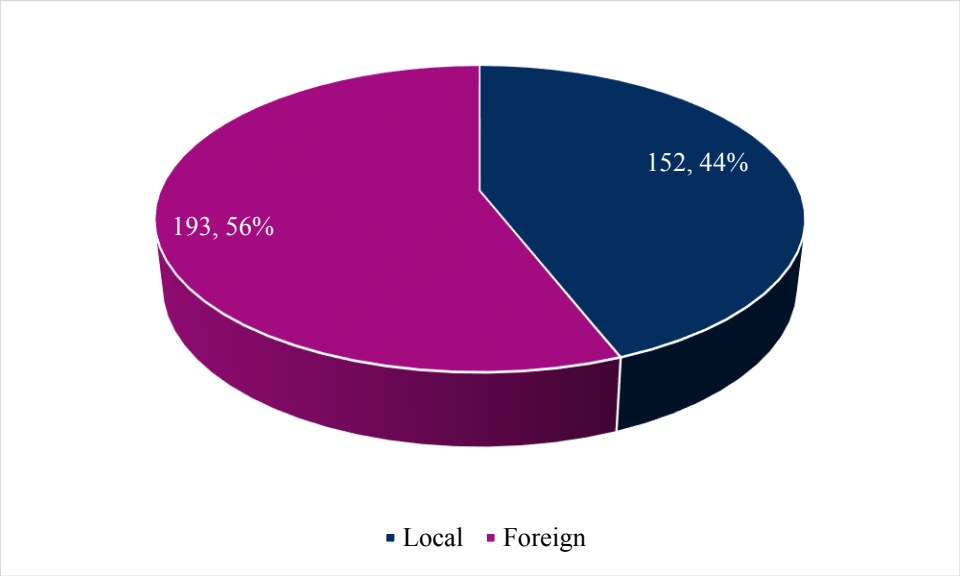

Figure 1.13: Composition of staff training programs (local and foreign)

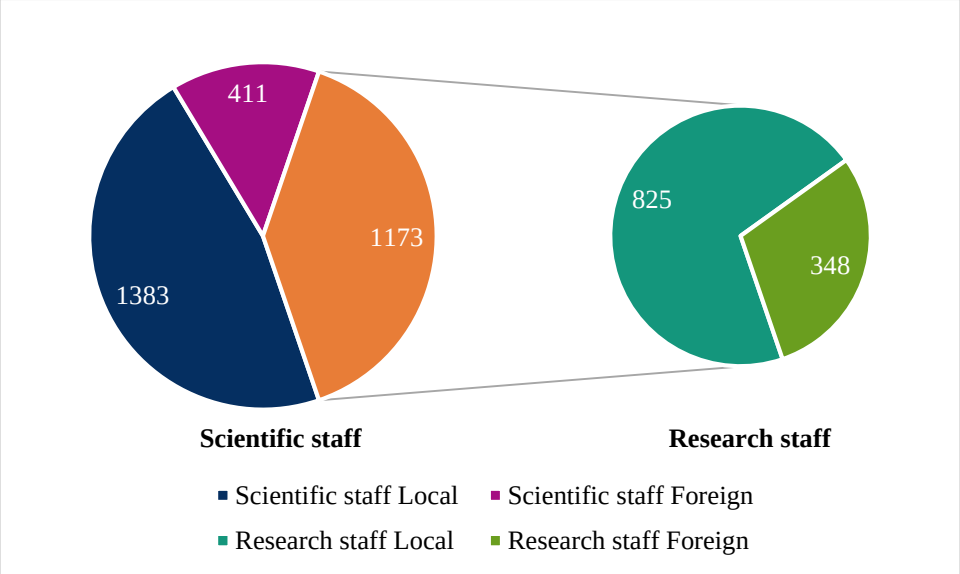

Figure 1.14: Composition of scientific staff training programs (local and foreign)

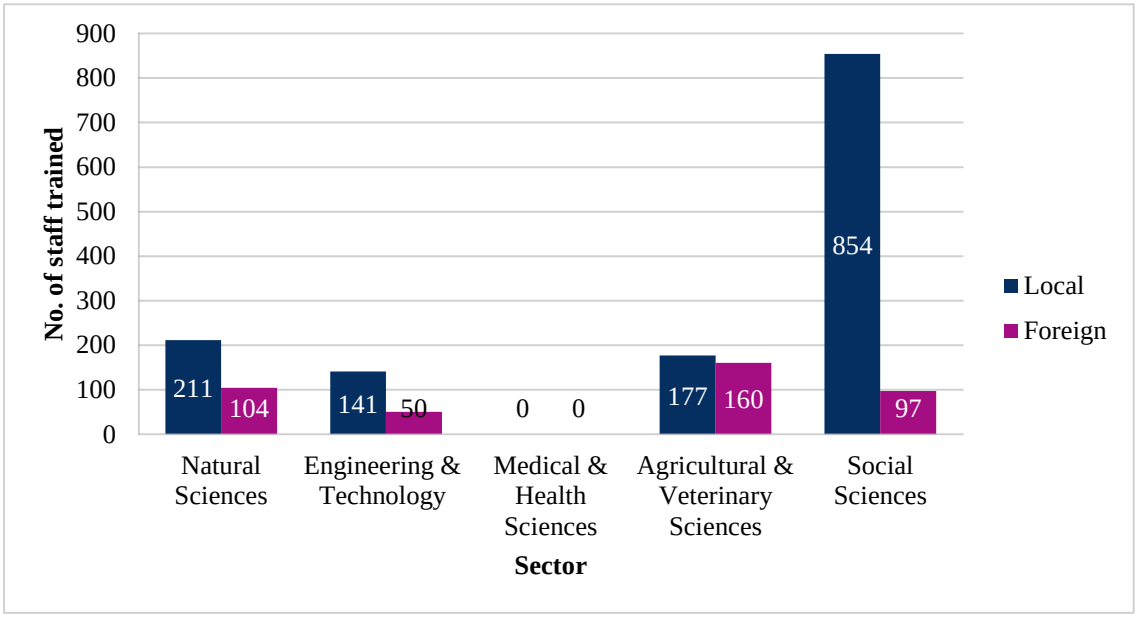

Figure 1.15: Sector-wise distribution of training programs participated by the scientific staff

A number of 1794 scientific staff attended training programs, with 1383 (77.09%) receiving local training and 411 (22.91%) receiving international training. The trained scientific staff was comprised of researchers (n = 1173), research support personnel (n = 576), and librarians/information officers (n = 45) (Fig. 1.16).

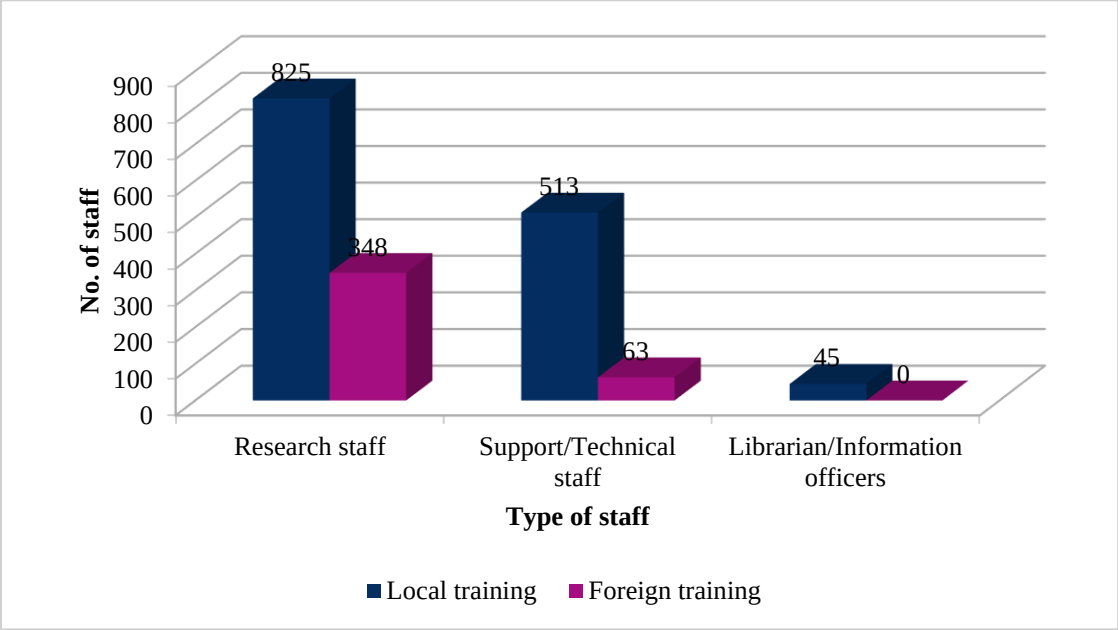

Figure 1.16: Training opportunities received by different scientific staff categories

Figure 1.17 illustrates the distribution of scientific staff attending local and international training programs by sector.

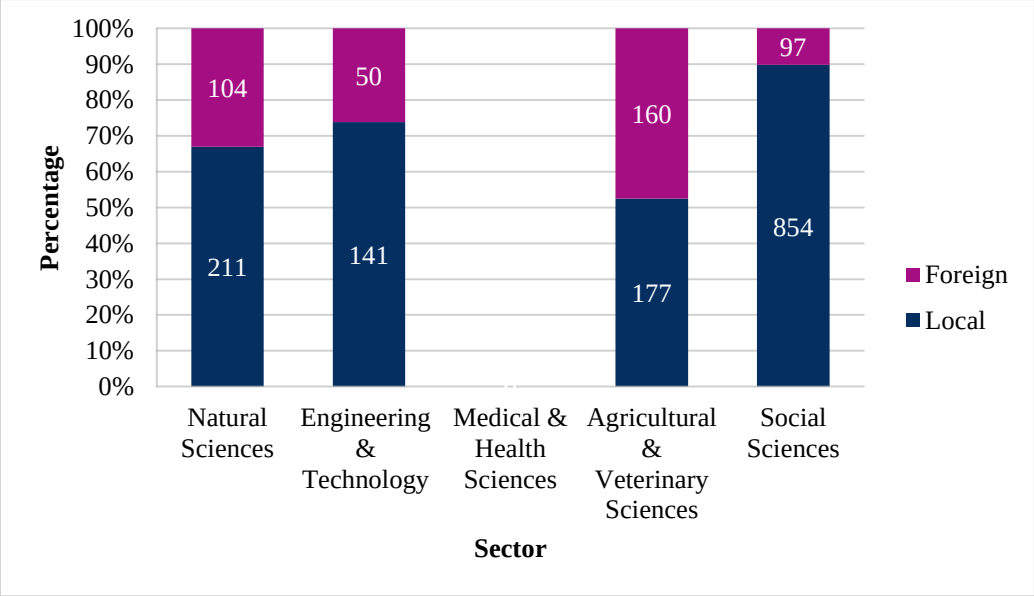

Figure 1.17: Sector-wise distributions of staff training.

1.7.2. Employee turnover in the scientific staff

Employee turnover is the count or proportion of staff departing from an organization within a specified timeframe and being substituted by new hires. In 2022 alone, the S&T institutes surveyed hired 135 scientific workers, comprising 67 research & academic staff, 70 research support staff. During the same period, 252 scientific staff left the S&T institutes, comprising 179 research & academic staff, 74 research support staff, and 4 librarians and information officers. Transitioning to a different career, pursuing further education overseas, and reaching retirement age are some of the main factors contributing to employee turnover. In 2022, the scientific staff surveyed had an estimated turnover rate is 5.06% which was lower than the estimated average global rate of 14% (2021) in the previous year[21]. According to the Human Flight and Brain Drain Index, the average value for Sri Lanka during 2022 was 6.60 index points[22], which raises serious concerns about brain drain. It underscores the crucial necessity of tackling the existing brain drain at higher levels.

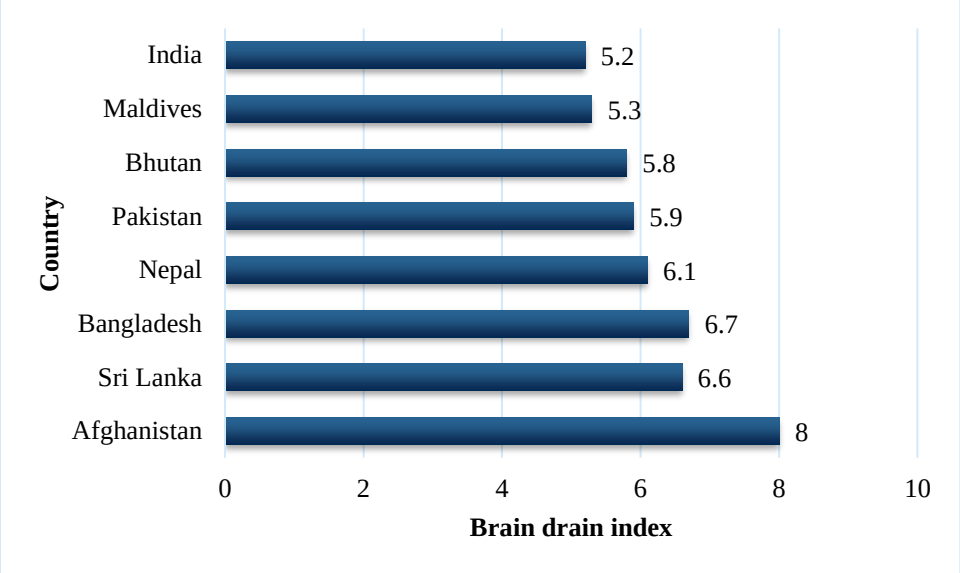

Figure 1.18. The Human Flight & Brain Drain index -2022 (comparison with SAARC countries)

[21] Global employee turnover rate: https://explodingtopics.com/blog/employee-turnover-statistics
[22] The Global Economy.Com: https://www.theglobaleconomy.com/Sri-Lanka/human_flight_brain_drain_index/

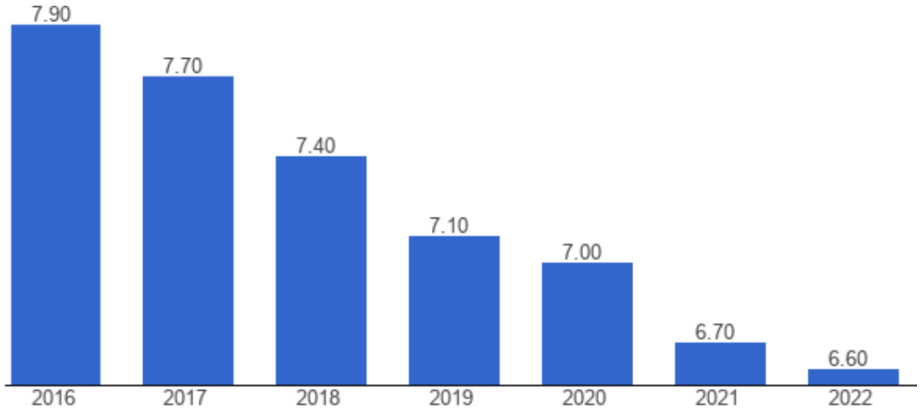

Figure 1.19: The Human Flight & Brain Drain index 2016-2022

Tables 07 and 08 illustrate the number of scientific staff hired and the number of employees who left the S&T institutes surveyed in 2022.

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

		Scientific Staff Category			Total
		Research/Academic Staff	**Support/Technical Staff**	**Librarian/ IT**	
Sector	Agricultural & Veterinary Sciences	11	55	0	**66**
	Engineering & Technology	42	15	0	**55**
	Medical & Health Sciences	0	0	0	**0**
	Natural Sciences	7	0	0	**7**
	Social Sciences	7	0	0	**7**
Total		**67**	**70**	**0**	**135**

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

		Scientific Staff Category			Total
		Research/Academic Staff	**Support/ Technical Staff**	**Librarian/ IT**	
Sector	Agricultural & Veterinary Sciences	57	42	4	**103**
	Engineering & Technology	66	7	0	**73**
	Medical & Health Sciences	0	0	0	**0**
	Natural Sciences	17	16	0	**28**
	Social Sciences	39	9	0	**48**
Total		**179**	**74**	**4**	**252**

EMPLOYEE TURNOVER ESTIMATED (RESEARCHERS) RATE IN 2022= 5.06%

**Average global employee turnover in 2021* = 14%
(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	9	1	2	0	6	**18**
	Engineering & Technology	1	0	5	0	0	**6**
	Medical & Health Sciences	0	0	0	0	0	**0**
	Natural Sciences	20	61	20	0	0	**101**
	Social Sciences	0	2	8	2	0	**12**
Total		**30**	**64**	**35**	**2**	**6**	**137**

In 2022, a total of 137 scientific staff were funded by their affiliated institutions to pursue postgraduate studies. These included 2 postgraduate diplomas, 35 MSc degrees, 64 MPhil degrees, and 30 Ph.D. degrees. The highest number of degrees offered to employees was from the Natural Sciences sector (n = 101).

1.7.4. Incentives for the scientific staff

The incentives offered by institutions benefit both employees and employers alike. Recognizing outstanding performance and productivity boosts employee morale, job satisfaction, and engagement in organizational activities, leading to improved efficiency and productivity for employers. Additionally, providing incentives helps in retaining qualified staff within the institute. Table 10 illustrates the incentives provided to scientific staff, with medical insurance and transportation facility/allowance being the most prevalent, followed by housing/quarters, professional allowance and research allowance.

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

Perks	No. of institutions
Research allowance	18
Medical insurance	59
Transport facility/allowance	47
Professional allowance	37
Housing/Quarters	41
Other	18

2. PHYSICAL RESOURCES

2.1 Infrastructure facilities

Basic infrastructure comprises essential facilities required for the operation of an institute, encompassing laboratories, libraries, auditoriums, workshops, scientific equipment, archives, and ICT facilities like networks, databases, internet access, 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	155	20	62	23	9	88
Engineering & Technology	81	14	13	5	1	5
Medical & Health Sciences	6	0	3	1	0	0
Natural Sciences	164	41	13	11	0	7
Social Sciences	7	9	12	4	0	18
Total	**413**	**84**	**103**	**44**	**10**	**118**

Common infrastructure considered in the survey included laboratories (n = 413), workshops (n = 84), auditoriums (n = 103), and libraries (n = 44). The "other" infrastructure (n = 118) included institutional website, database on research/services and internet with free access to journals.

2.2. IT-related facilities

Forty-three S&T institutes surveyed have institutional websites and internet facilities. Only 29 of them have a database on research and services. Table 12 depicts the institutes' IT infrastructure. From all 46 S&T institutes surveyed, the Farm Mechanization Research Centre, Palmyrah Research Institute and Bandaranaike Memorial Ayurvedic Research Institute don't have institutional websites.

Table 12: Number of Institutes with IT-related facilities

Sectors	Website	DBMS	Internet	Free access to Online Journal	Other
Agricultural & Veterinary Sciences	20	12	20	3	1
Engineering & Technology	6	2	7	1	0
Medical & Health Sciences	0	0	1	0	0
Natural Sciences	7	7	7	1	1
Social Sciences	9	8	9	4	3
Total	**43**	**29**	**45**	**9**	**5**

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 3555 and 1358, 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 2022

Sectors	Computers/Laptops		Printer		Scanners		Video Conference Equipment		Other	
	Scientific staff	Non-scientific staff	Scientific staff	Non-scientific staff	Scientific	Non-scientific staff	Scientific	Non-scientific staff	Scientific	Non-scientific staff
Agricultural & Veterinary Sciences	1192	692	496	337	84	42	26	9	13	63
Engineering & Technology	966	359	204	122	32	36	1	2	134	18
Medical & Health Sciences	6	3	3	2	0	1	0	0	0	0
Natural Sciences	389	193	95	54	12	8	1	2	9	6
Social Sciences	1002	111	273	32	53	7	49	3	15	5
Total	**3555**	**1358**	**1071**	**547**	**181**	**94**	**77**	**16**	**171**	**92**

3. RESEARCH PLANNING

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

In planning R&D activities, the source documents referred to in the preparation of the Annual Action Plan of the institute were queried. Institutes referred source documents such as the National Science and Technology Policy, the National Research and Development Framework (NRDF) established by NASTEC, and sectoral master plans/strategies pertinent to the respective line ministries/authorities.

3.1.1 The National Research and Development Framework (NRDF)

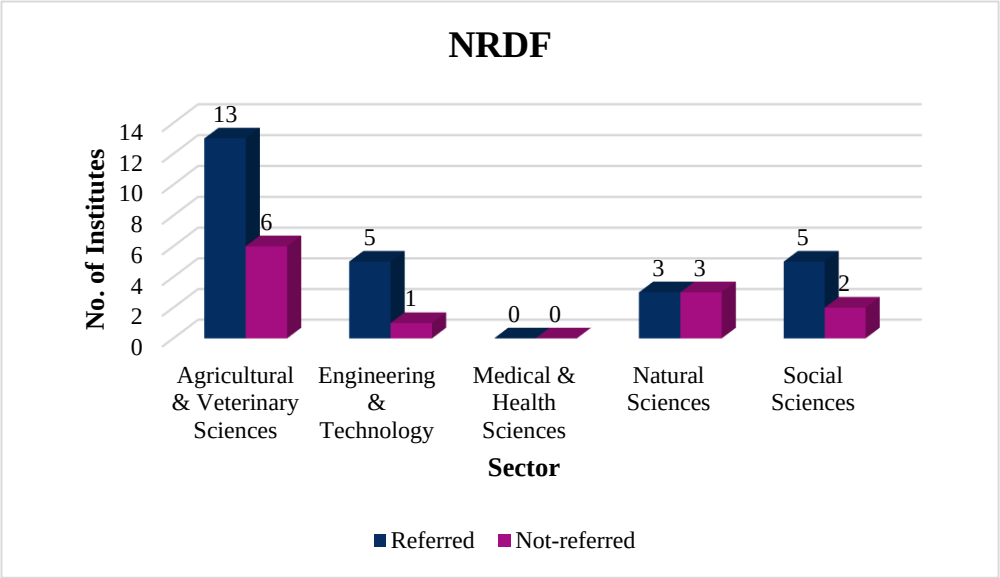

Figure 3.1: NRDF refer to the Annual Action Plan

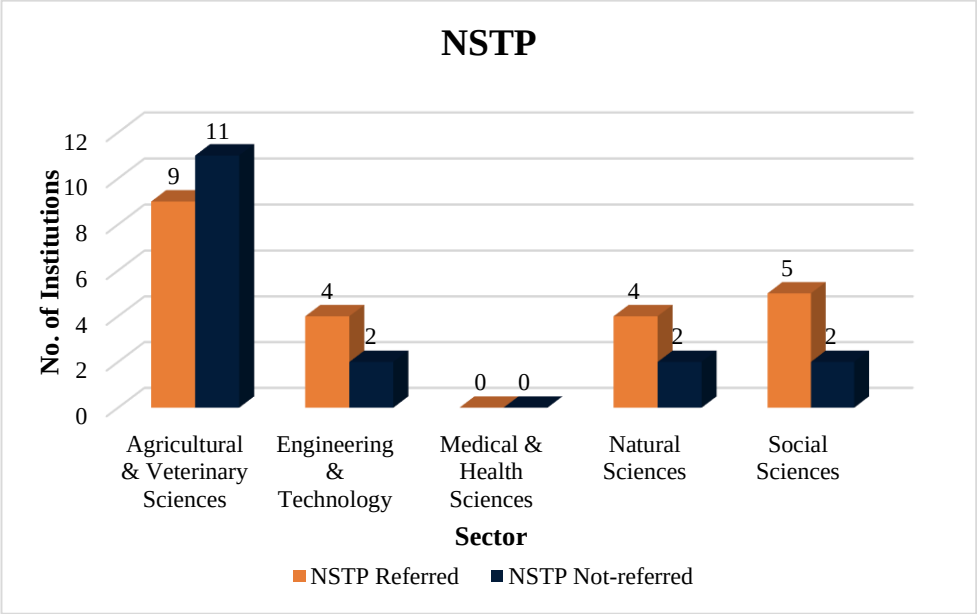

Figure 3.2: National Science and Technology Policy (NSTP) refer to the Annual Action Plan

The NRDF, a thorough and cabinet-endorsed R&D framework, directs the scientific and technological community to align their research and development endeavors with national priorities. It outlines 10 focus areas requiring urgent R&D interventions, organized in a 10 x 10 matrix representing 100 potential combinations of these areas. 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[23]. Since 2017, numerous state-funded research and development

[23] National Research and Development Framework (2016); http://www.nastec.gov.lk/reports/nrdf

institutes have extensively utilized NRDF initiatives to prioritize the allocation of research funds to institutes and projects.

Out of the 46 surveyed institutes, 26 institutions (57%) utilized the NRDF, while 22 institutes (48%) referred to the National Science and Technology Policy as source documents for preparing their annual Action Plans. Figure 3.1 provides a visual representation of the distribution of institutes across sectors involved in interventions related to the focus areas outlined in the NRDF.

The highest number of institutes carrying out the interventions related to NRDF is for the focus areas of environment (n = 20), followed by the basic sciences, emerging technologies, and indigenous knowledge (n=19), food, nutrition & agriculture (n = 18), and water (n = 16).

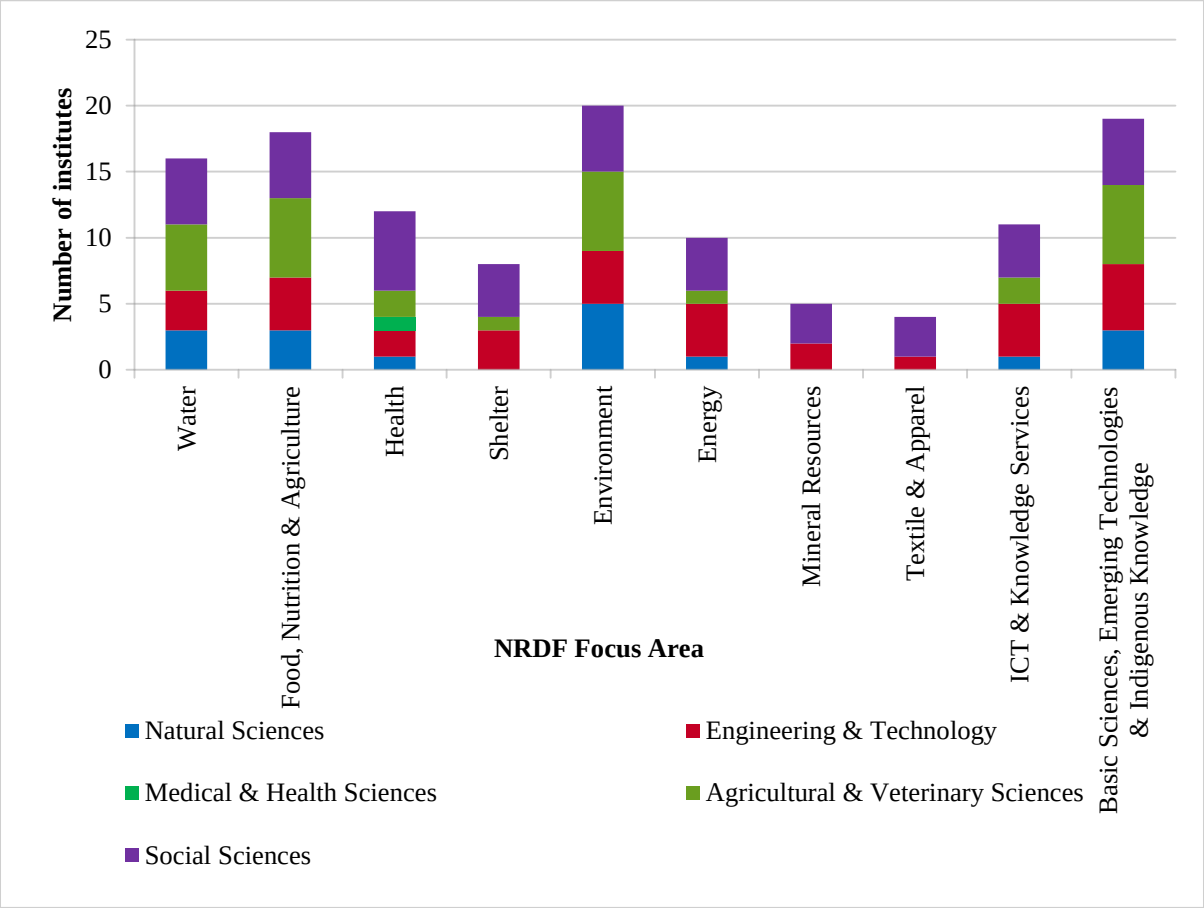

Figure 3.3: Institutes carrying out Interventions related to the NRDF's 10 Focus Areas

3 .2. Other Source Documents

In addition to the NRDF, the action plans of relevant institutes were typically influenced by policy directives and guidelines provided by the corresponding line ministries and sectoral master plans. For instance, in the agriculture sector, institutes may adhere to the National Agriculture Research Policy, while the Forest Department may follow the Forest Policy, and the Geological Survey and Mines Bureau may abide by the Mines and Minerals Act, and etc.

4. RESEARCH FUNDING

Securing sufficient research funding for science and technology institutes is essential for promoting innovation and stimulating economic development. These institutes are instrumental in conducting advanced research, innovating new technologies, and tackling pressing societal issues. By ensuring adequate allocation of resources to research funding, governments and organizations can cultivate a conducive environment for institutes to excel and make notable contributions in scientific progress.

Investing in research funding for science and technology institutes offers various advantages. It enables institutes to recruit and retain top talent, promote collaboration with industry partners, and upgrade their research infrastructure. Sufficient funding empowers researchers to explore new horizons, expand the scope of knowledge, and apply their discoveries to real-world scenarios, benefiting society. Moreover, research funding fosters the creation of inventive solutions, propels technological progress, and stimulates economic growth and employment opportunities. By emphasizing research funding, governments and organizations showcase their dedication to cultivating a dynamic and competitive scientific landscape that fuels advancement and propels communities toward progress.

For numerous countries, there exists a direct link between research and development (R&D) and economic advancement. Governments frequently integrate R&D incentives into their economic strategies to boost productivity. Worldwide, gross domestic spending on R&D has surged around 2.718% of GDP, with the Israel and Korea leading in this domain[24]. When groundbreaking discoveries and innovations occur, particularly those that notably enhance the lives of marginalized communities, the tangible benefits of R&D can produce transformative effects on a global level.

The institutes acquired funding from different sources, such as the Treasury, National Science Foundation, 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

[24] Gross domestic spending on R&D: https://data.oecd.org/rd/gross-domestic-spending-on-r-d.htm

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 2022, the S&T institutes surveyed received LKR 4861.65 million from the source of funders, of which LKR 4429.48 million (91.1%) was spent. The highest amount was funded for research projects (LKR 3203.96 million, 72.33%). The Treasury was the core funding source for research-based activities. The Agricultural & Veterinary Sciences sector received the highest funding for research projects (LKR 2488.72 million). Table 14 shows the fund utilization by different sections, and Table 15 shows funds provided by various funding sources.

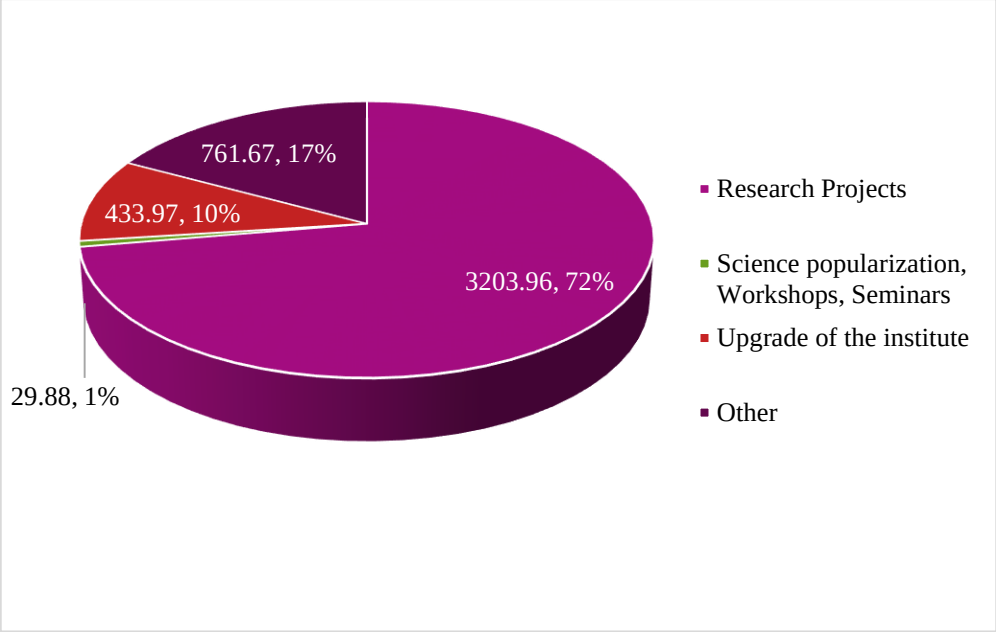

Figure 4.1: Disbursement of funds (Rs. Mn)

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

Sector	Funds Received / Mn. LKR	Funds Spent/ Mn. LKR	% Utilization
Agricultural & Veterinary Sciences	2488.72	2074.94	83.4
Engineering & Technology	263.09	264.74*	100.6
Medical & Health Sciences	0	0	0
Natural Sciences	396.161	501.85*	126.7
Social Sciences	1713.67	1587.93	92.7
Total	**4861.65**	**4429.47**	**91.1**

Table 15: Funds received and spent by different funding source

Funding source	Funds Received / Mn. LKR	Funds Spent / Mn. LKR	% Utilization
Foreign	199.61	174.05	87.2
Multilateral	56.7	50.01	88.2
NRC	0.00	0.00	0.00
NSF	30.53	25.06	82.1
Other	507.89	635.78*	125.2
Treasury	4066.91	3544.48	87.2
Total	**4861.65**	**4429.48**	**91.1**

**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.*

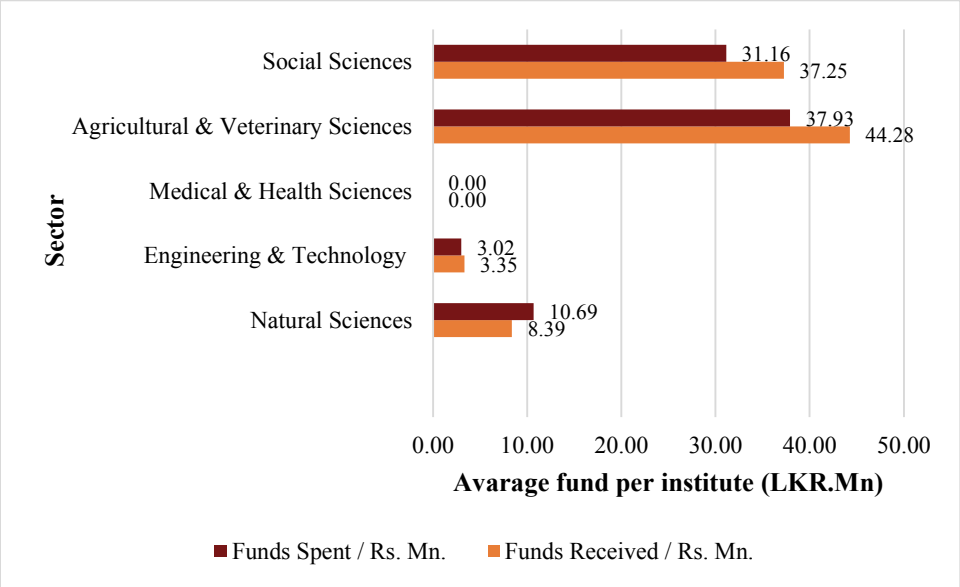

Figure 4.2: Average funding (received and spent) for institutes, broken down by sector

As per the table 14 and figure 4.2, in 2022, highest fund utilization was recorded from Natural Sciences sector (126.7%) followed by Engineering & Technology sector (100.6%) and Social Sciences sectors (92.7%). The lowest utilization was resulted from Agricultural & Veterinary sector (83.4%).

Figures from 4.3 and 4.4 indicate the amounts of funding received and spent for different activities by the institutes.

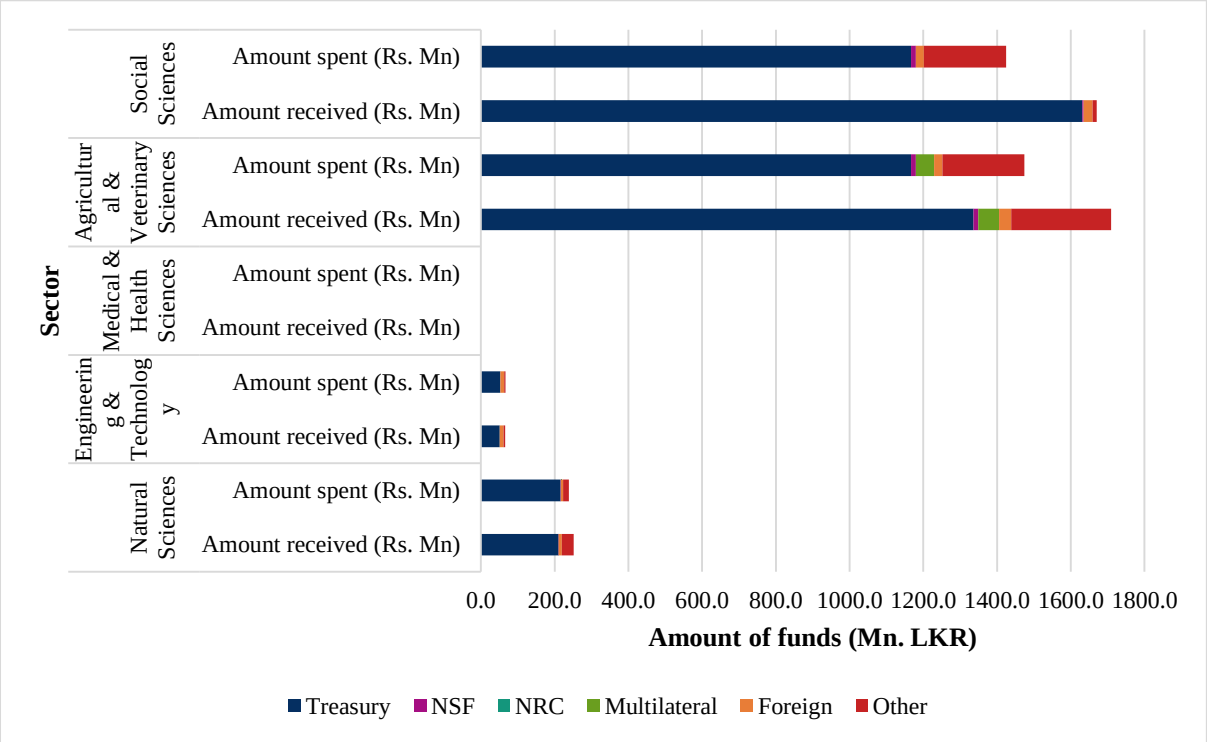

Figure 4.3: Funds received and spent by S&T institutions for research projects

According to table 15 and figure 4.3, in 2022, highest amount of funds for the research projects has been received by Treasury (LKR 4066.91 million) and LKR 3544.48 million (87.2%) has been utilized, respectively.

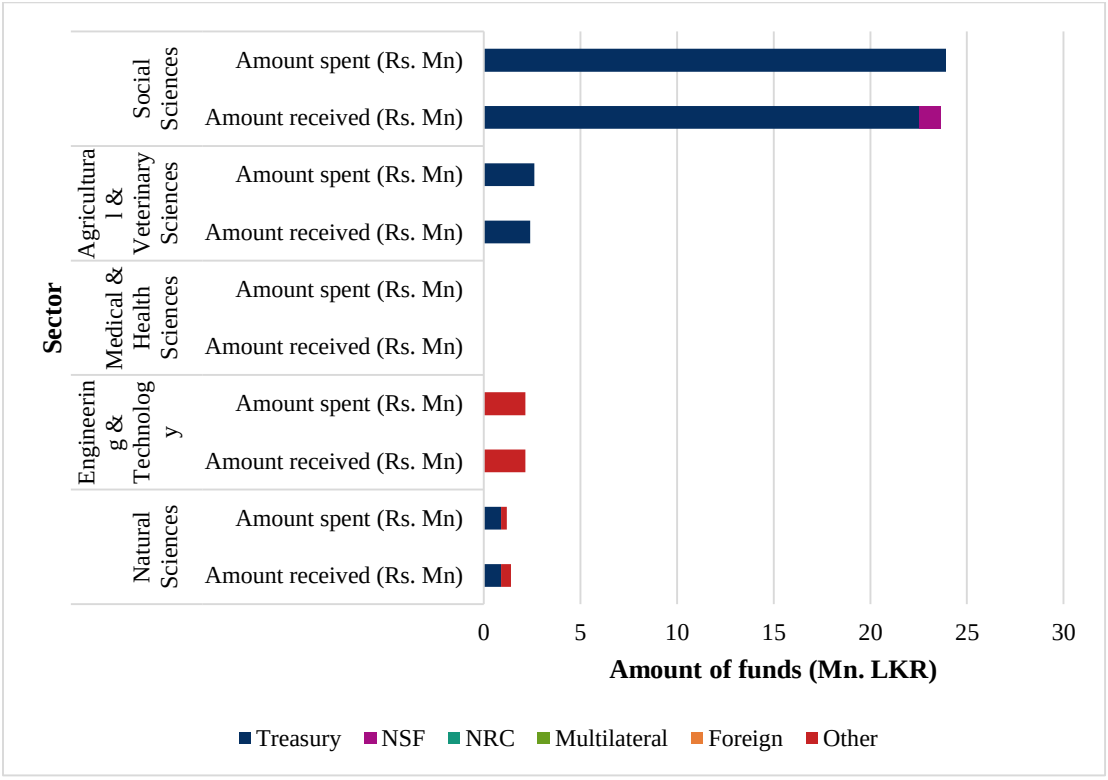

Figure 4.4: Funds received from various funding sources for science popularization, workshops, and seminars.

According to figure 4.4, in 2022, Treasury was the highest funding source (LKR 26 million) for science popularization, workshops and seminars activities, while Social Sciences sector received the highest portion (LKR 23 million, 88.46%) from the Treasury funds.

Trends in research funding at public-sector institutes (distributed by the institute), 2012-2022

Based on the sample survey data from 2015 to 2022, a slight upward trend in research funding per institute with a remarkable increase in 2020 and 2021, and a gradual increment can be noted in recent years (see Fig. 4.5).

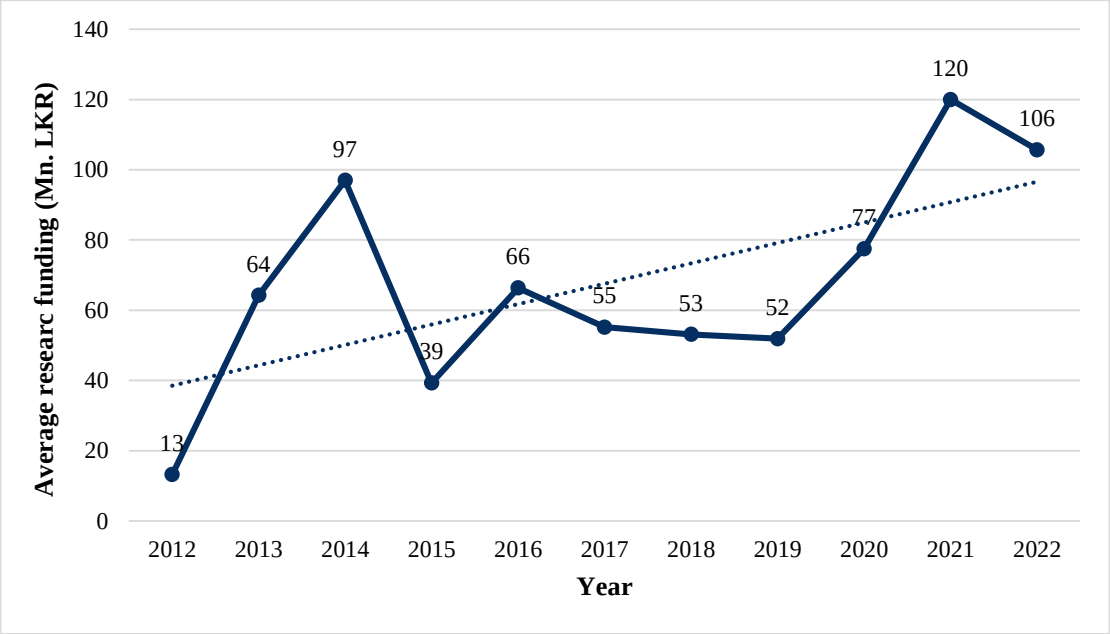

Figure 4.5: Average research funding per institute (Mn. LKR)

Return on R&D Investment

Over the last twenty years, there has been substantial growth in global research and development (R&D) expenditures. Between 2000 and 2022, total global R&D spending has surged, more than tripling to reach a remarkable $2.47 trillion in 2022[25]. The increase is indicative of a growing awareness of the significance of R&D serves a fostering innovation and advancing the economy.

Furthermore, the percentage of global GDP allocated to R&D has increased, climbing from 2.01% in 2010 to 2.61% in 2021, illustrating a dedication to promoting scientific progress on a global scale[26]. However, despite the overall upward trend, disparities in R&D investments persist across different regions. Israel, Korea and China stand out as leaders, with spending 5.56%, 4.93%, 3.46% of their GDP on R&D, representing the highest levels globally[27]. In contrast, Sri Lanka has shown R&D expenditure annually according to the statistics for 2016-2022 of 0.12% as a constant rate[28]. 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[29]. Sri Lanka ranks lowest in R&D investment proportion compared to reported countries in the region. These findings underscore the importance of sustained efforts to enhance R&D investments in Sri Lanka, fostering innovation and propel economic development.

[25] Total global spending on research and development (R&D) from 1996 to 2022, in billions PPP U.S. dollars ; https://www.statista.com/statistics/1105959/total-research-and-development-spending-worldwide-ppp-usd/#:~:text=Research%20and%20development%20(R%26D)%20spending,billion%20U.S.%20dollars%20in%201996

[26,25] The World bank; https://data.worldbank.org/indicator/GB.XPD.RSDV.GD.ZS

[27] Gross domestic spending on R&D: https://data.oecd.org/rd/gross-domestic-spending-on-r-d.htm

[28] The Global Economy; https://www.theglobaleconomy.com/Sri-Lanka/Research_and_development/#:~:text=Research%20and%20development%20expenditure%2C%20percent%20of%20GDP&text=The%20average%20value%20for%20Sri,from%202020%20is%200.12%20percent

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

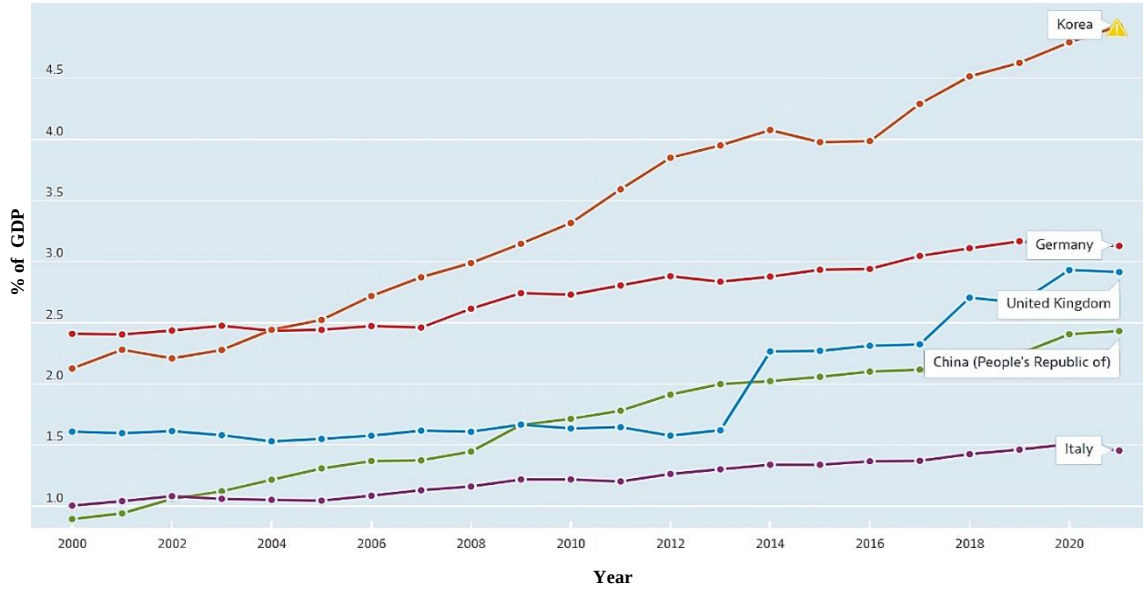

Figure 4.6: Gross Domestic Spend in R&D, % of GDP of Selected Countries, 2000 -2021 (OECD)[30]

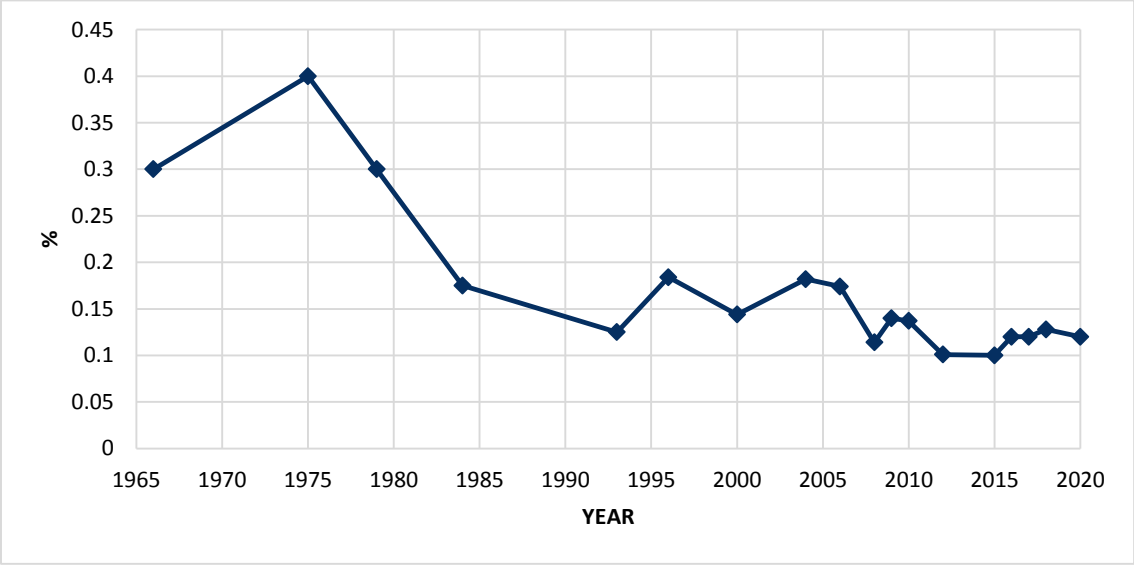

Figure 4.7: R&D Expenditure% of GDP- Sri Lanka (1965-2020)[31]

[30] Gross Domestic Spend in R&D, OCED: https://data.oecd.org/rd/gross-domestic-spending-on-r-d.htm
[31] R&D Expenditure % of GDP – Sri Lanka: https://data.worldbank.org/indicator/GB.XPD.RSDV.GD.ZS?end=2020&locations=LK&start=1996

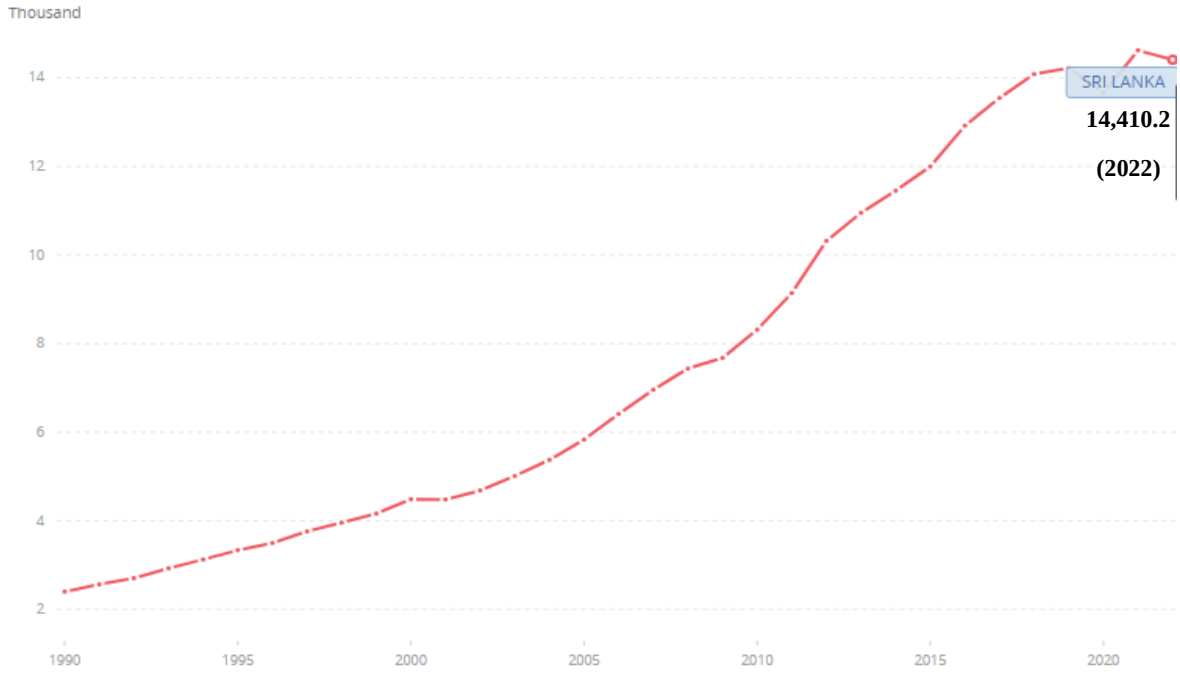

Figure 4.8: Sri Lanka GDP per capita PPP 2014-2022 (Source; World Bank)[32]

According to figure 4.8, from 2014 to 2022, GDP per capita based on purchasing power parity (PPP) of Sri Lanka increased steadily, reflecting improved living standards and economic productivity. This growth is closely linked to investments in research and development (R&D), which drive innovation and competitiveness, contributing to economic progress and higher GDP per capita. Hence, continued R&D investment is expected to further enhance economic performance of Sri Lanka.

[32] Sri Lanka GDP per capita PPP 2014-2022: https://data.worldbank.org/indicator/NY.GDP.PCAP.PP.CD?locations=LK

5. RESEARCH OUTPUTS

5.1 Research projects

In 2022, the institutions surveyed carried out 889 research projects (Annexure 3), with a completion rate of 49.6% (n = 441), 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.

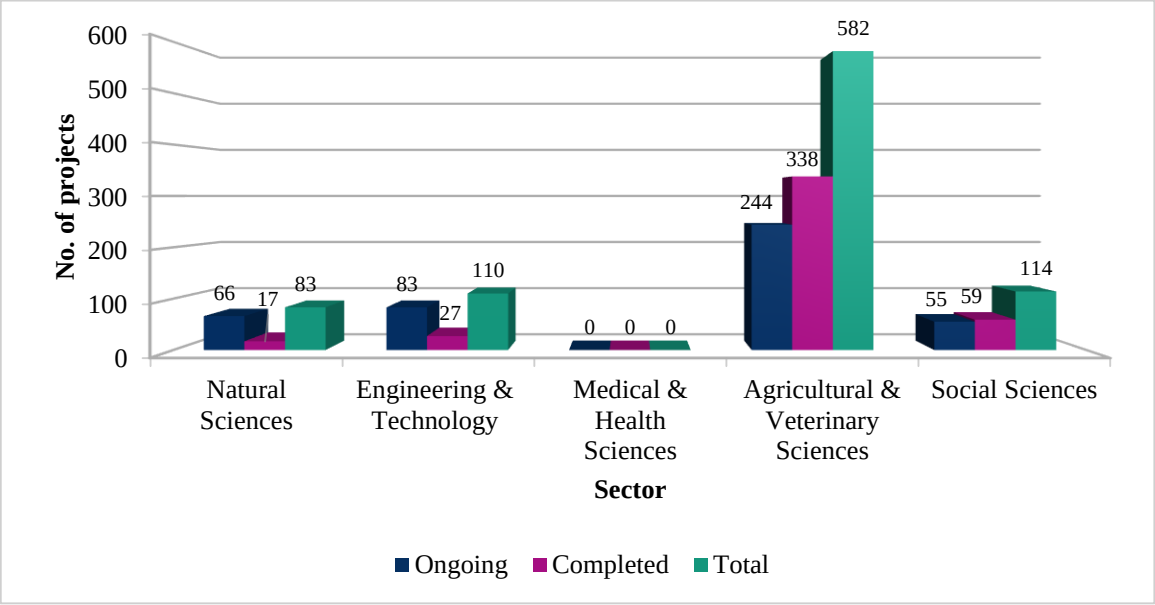

Figure 5.1: Research projects conducted by S & T institutions in 2022.

The sector of Agriculture and Veterinary Sciences carried out the highest number of research projects (n = 582, 65.46%), of which 244 were ongoing and 338 were completed in the fiscal year, respectively. The institutes that carried out the highest number of research projects were Tea Research Institute (TRI) (n =112, 12.6%), followed by the Horticultural Crop Research & Development Institute (HORDI) (n = 110), and Field Crops Research & Development Institute (FCRDI) (n = 109).

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

As the global population is expected to surpass nine billion by 2050, societies are facing various intricate challenges such as climate change, poverty, and rapid urbanization[33]. Acknowledging the critical need to tackle these issues, the United Nations launched the Sustainable Development Goals (SDGs) in 2015[34]. Comprising 17 goals, this framework aims to address poverty eradication, environmental protection, and the promotion of peace and prosperity for all by 2030.

As part of the UN agenda, every member country has pledged to pursue national objectives tailored to their specific societal contexts[35].This necessitates leveraging innovation, knowledge, technological progress, and financial means to promote sustainable development. By aligning their initiatives with the SDGs, countries aim to address poverty and inequality, encourage inclusive economic advancement, improve environmental sustainability, and enhance social welfare.

The SDGs offer an extensive blueprint for worldwide cooperation, urging governments, civil society groups, businesses, and individuals to unite in pursuit of a shared vision. Accomplishing these objectives demands creative approaches, policy changes, and investments in critical areas like education, healthcare, renewable energy, infrastructure, and sustainable farming.

Through the implementation of the SDGs, countries can tackle interrelated challenges comprehensively, paving the way for a fairer and more sustainable future for current and upcoming generations. The UN agenda promotes collective accountability, underscoring the

[33] World Urbanization Prospects: https://population.un.org/wup/Publications/Files/WUP2018-Report.pdf

[34] UN Sustainable Goals: https://www.un.org/sustainabledevelopment/news/communications-material/

[35] The 2030 Agenda for Sustainable Development: https://sustainabledevelopment.un.org/content/documents/21252030%20Agenda%20for%20Sustainable%20Development%20web.pdf?ref%E2%80%89=%E2%80%89truth11.com#:~:text=URL%3A%20https%3A%2F%2Fsustainabledevelopment.un.org%2Fcontent%2Fdocuments%2F21252030%2520Agenda%2520for%2520Sustainable%2520Development%2520web.pdf%3Fref%25E2%2580%2589%3D%25E2%2580%2589truth11.com%0AVisible%3A%200%25%20

significance of global solidarity and collaborations to build a world where everyone thrives and where prosperity is attained while respecting the limitations of the resources of our planet.

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 = 100, 21.14%) were integrated to make contributions towards the SDG targets set out for Decent Work and Economic Growth, followed by Zero Hunger (n = 98; 20.71%), and so on.

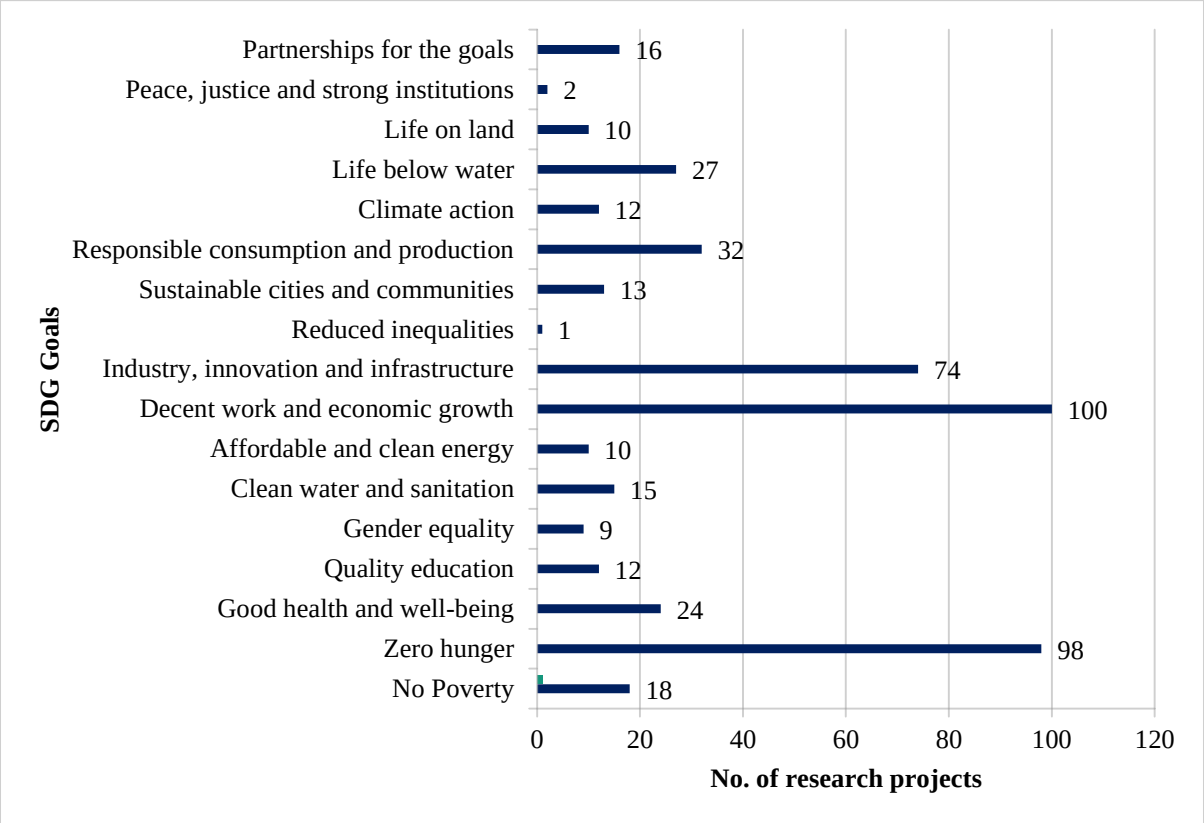

Figure 5.2: Line of Sight –Number of activities (planned) in Alignment with SDGs

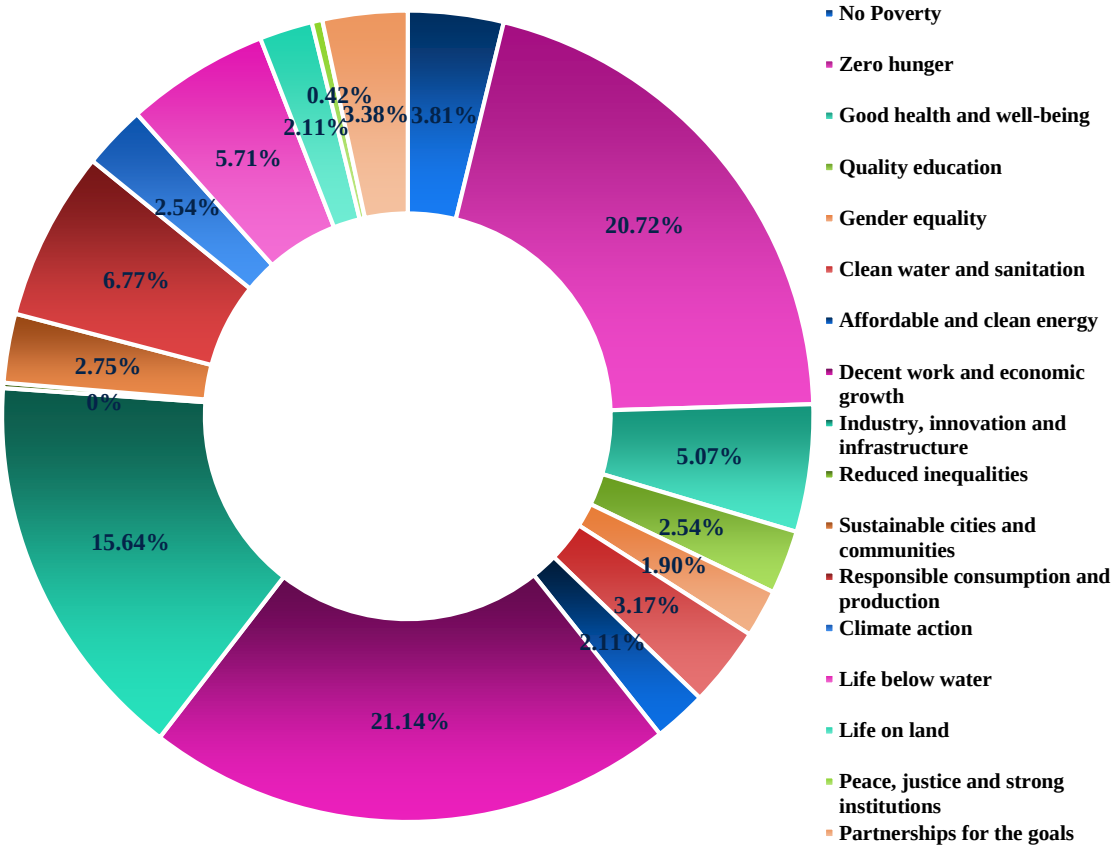

Figure 5.3: Line of Sight of Intended Project Contributions to SDGs

The Paris Agreement that was adopted in 2015, holds immense importance for Sri Lanka, a nation susceptible to the effects of climate change. Sri Lanka actively participates in the Agreement, showcasing its dedication to combating climate change and advancing sustainable development. As a signatory, Sri Lanka has presented its Nationally Determined Contributions (NDCs) to reduce emissions and address climate change impacts[36]. These endeavors are in line with the goals of agreement, which include shifting to renewable energy sources, improving energy efficiency, and embracing sustainable land management practices, all aimed at fostering a low-carbon economy resilient to climate change.

[36] Nationally Determined Contributions: https://www.undp.org/srilanka/publications/nationally-determined-contributions

Several S&T institutes have actively engaged in activities aligned with the Paris Agreement on climate change, yielding significant results. These include the deployment of real-time climate monitoring stations in tea plantation areas, initiatives in disaster risk reduction, establishment of a Center of Excellence focusing on environmental pollution monitoring and mitigation, research and mitigation efforts related to landslides, construction of disaster-resistant housing for resettlement, participation in a National Thematic Research Program addressing Climate Change and Natural Disasters, and accreditation of Green House Gas Validation and Verification Bodies. These endeavors contribute to the reduction of greenhouse gas emissions, enhancement of adaptation and resilience, promotion of sustainable practices, and mitigation of climate-related challenges. Through these actions, our institutes actively uphold the goals and principles of the Paris Agreement, fostering a more sustainable and resilient future.

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

Through their research projects, S&T institutes developed 65 new products, 99 new processes, and 55 new technologies during the year 2022 (Annexures 4–6). Figure 5.4 indicates the sector-wise development of products, processes, and technologies.

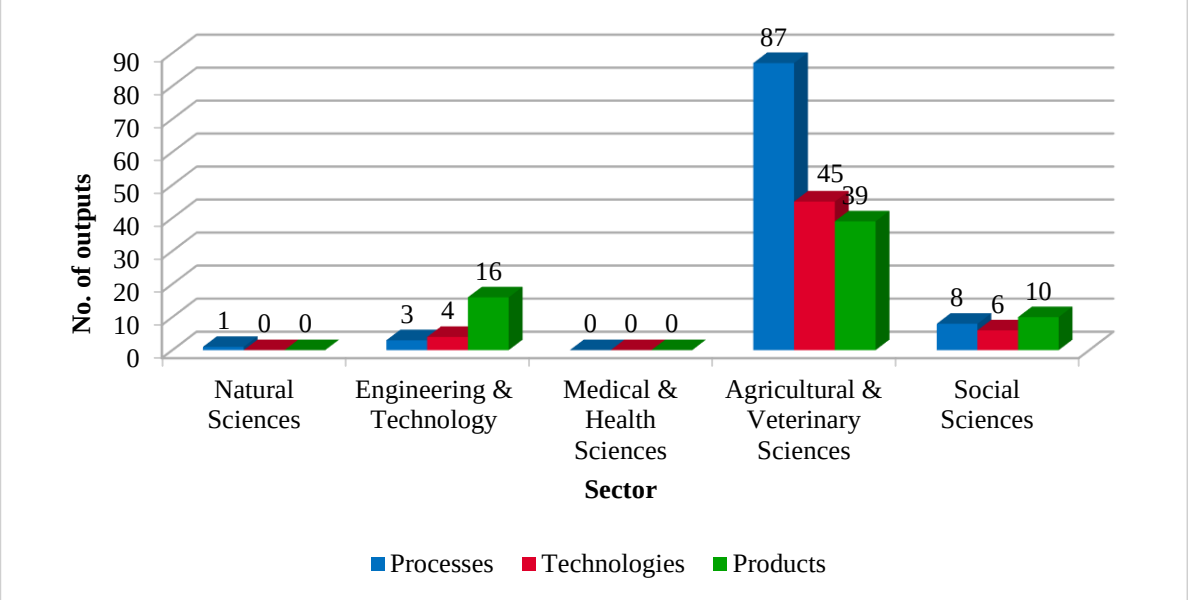

Figure 5.4: Development of new processes, technologies, and products in 2022

5.4 Trend in research output (products-processes-technologies developed) across public sector institutes (distributed per institute), 2012-2022

As shown in the graph below, the number of product-process-technologies developed per institution fell over a ten-year period from 2013 to 2022.

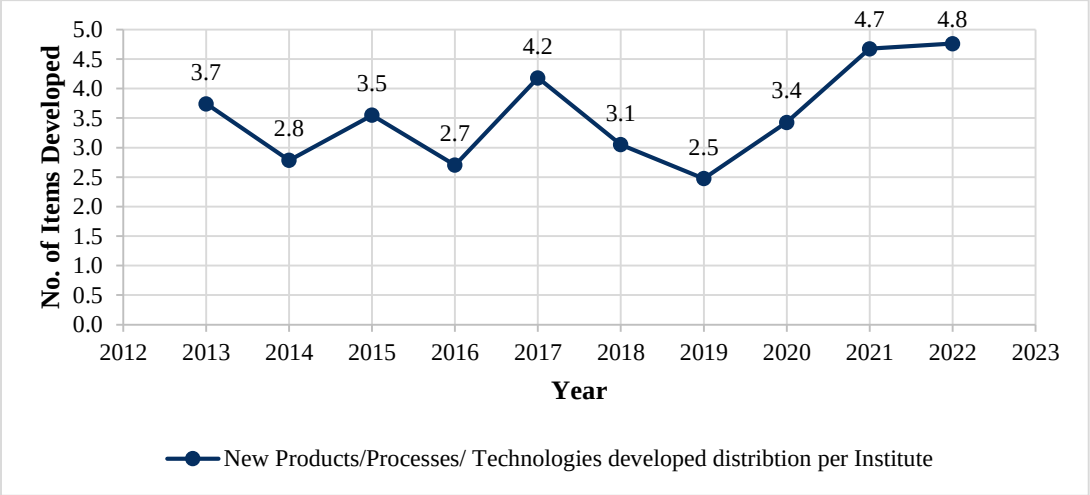

Figure 5.5: New products, processes, or technologies developed by the institutes surveyed between 2013 and 2022

5.5 Number of Publications

Research results are commonly communicated through research publications and conference presentations, and are crucial for disseminating scientific knowledge. Conference presentations are frequently documented in conference proceedings, augmenting the body of published research. The quantity of published literature serves as a gauge of scientific engagement and mirrors the scope of international research collaborations. Moreover, scrutinizing the citations garnered by published research offers valuable perspectives on the influence and significance of the research output.

In 2022, the global publication output reached an impressive 5.14 million articles, with the majority, over 90%, originating from countries classified as high-income and upper middle-

income economies[37]. 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.[38]

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 2022 is shown in Table 16.

Table 16: Various scientific publications produced by S& T institutions in the year 2022

Sector	No. of Publications									Total
	SCI Journals	SCI extended journals	Refereed Journals	Citations	Abstracts of papers presented at conferences/symposia	Monographs	Books	Chapters in Books	Other	
Agricultural & Veterinary Sciences (n = 22)	45	31	79	29	152	0	36	4	148	**524**
Engineering & Technology (n = 7)	8	2	48	0	67	0	0	0	8	**133**

[37] Number of academic papers published per year: https://wordsrated.com/number-of-academic-papers-published-per-year/
[38] Publication output: https://ncses.nsf.gov/pubs/nsb20214/publication-output-by-country-region-or-economy-and-scientific-field

Medical & Health Sciences (n = 1)	0	0	0	0	0	0	1	0	0	**1**
Natural Sciences (n = 7)	7	66	49	0	134	0	7	6	31	**300**
Social Sciences (n = 9)	37	4	7	0	146	0	5	9	197	**405**
Total	**97**	**103**	**183**	**29**	**499**	**0**	**49**	**19**	**384**	**1363**

*n = number of institutes

A total of 1363 publications were outreached through various scientific outlets by these institutions. The majority of them were conference proceedings abstracts (n = 499). The highest number of publications were from the Agricultural and Veterinary Sciences sector (n = 524) and the Social Sciences sector (n = 405).

5.6 Trend in Research Publications (Distributed per institute), 2012-2022

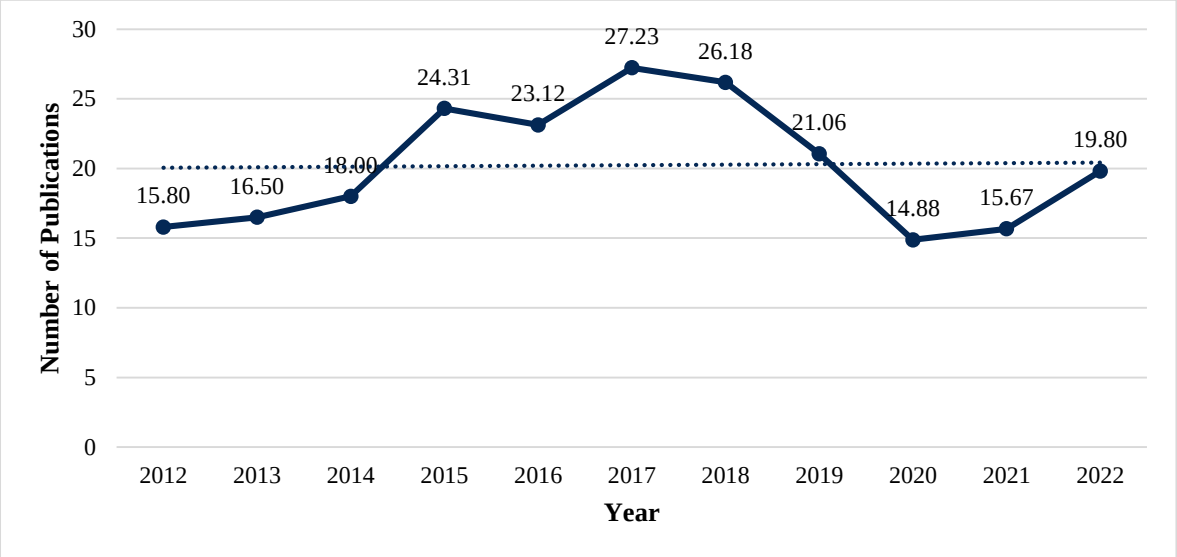

Figure 5.6: Research work is published and distributed per institute
*(*Only the number of published articles in the Journals and the Conference proceedings were considered in this analysis)*

5.7 Number of Scholarly publications per unit GDP and GERD- Regional, world comparison with Sri Lanka (2022)

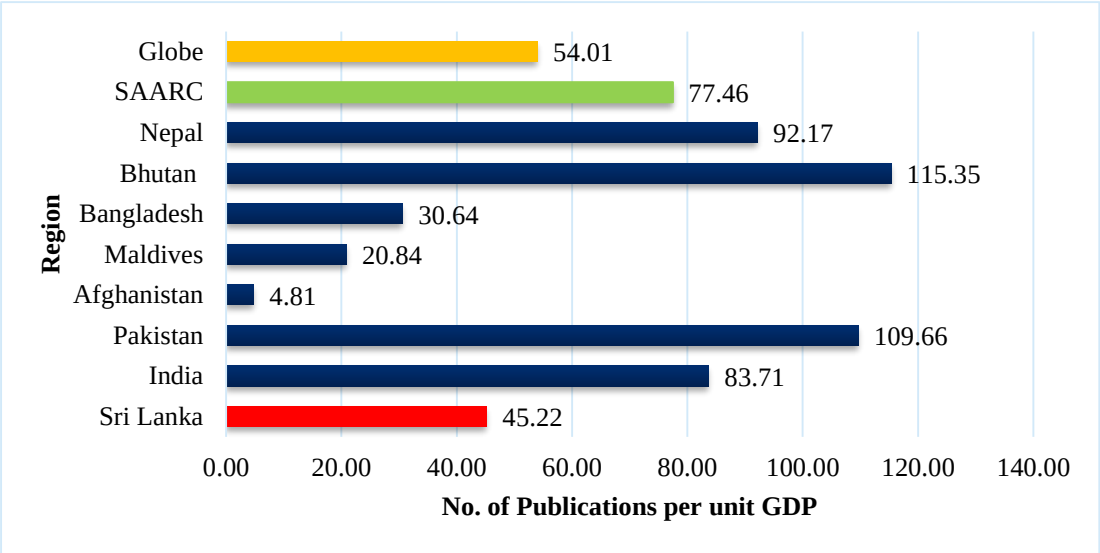

Figure 5.7: Scholarly publication per unit GDP in 2022 (Regional, world comparison with Sri Lanka)

Figure 5.7 depicts the scholarly publications per unit GDP in South Asian countries in comparison to the globe (2022). Sri Lanka (45.22) generates just below the global (54.01) and SAARC averages (77.46).

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.

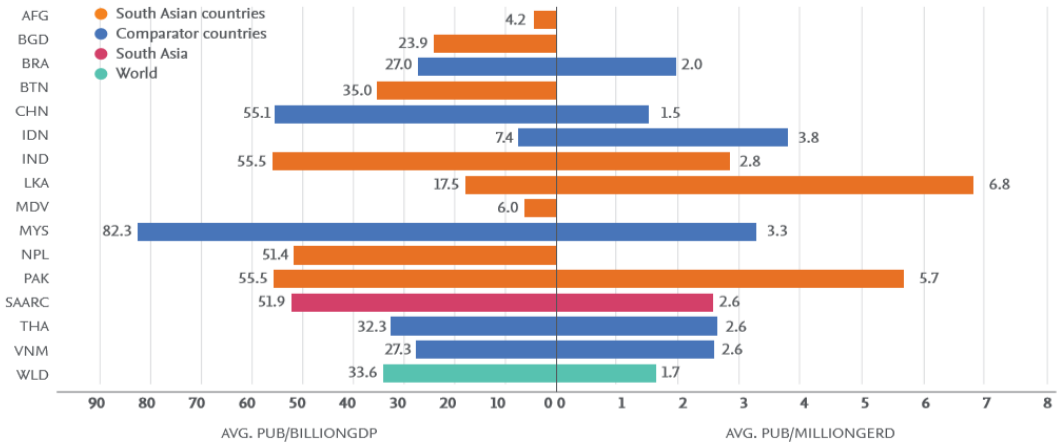

Figure 2

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 diverse region[39])

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).

[39] 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 (2022)

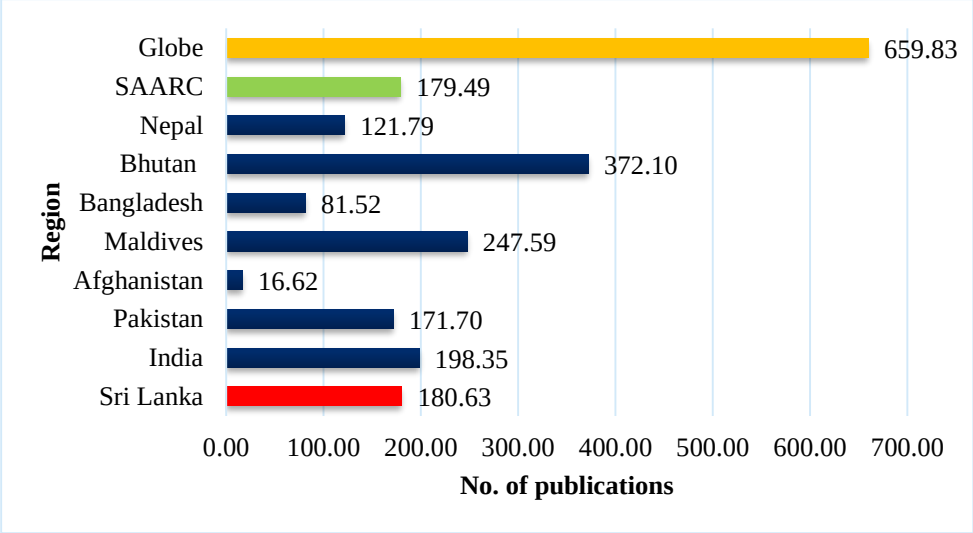

Figure 5.9: Scholarly Comparison of Sri Lanka with Global and Regional Statistics

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

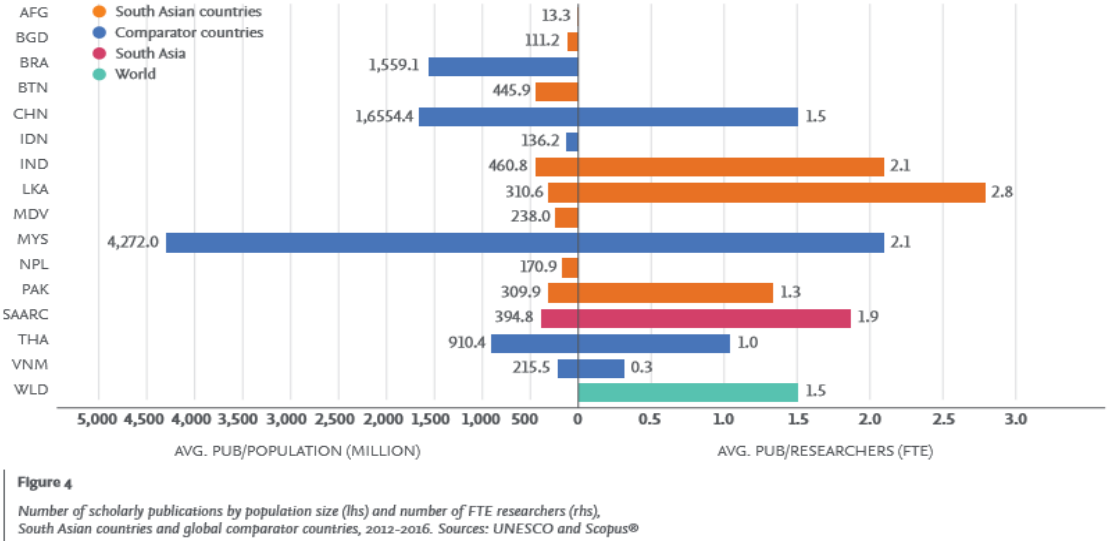

Figure 4

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[1])

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[40]. As per the survey, a total of 7 patents, including 7 national patents were granted to the institutes. Two of them were put into practice (Table 16). The institutes that acquired the patents with respect to the numbers are ITI (1 patent), NERDC (3 patent) and NRC (3 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	0	0	0	0	0	0
Engineering & Technology	1	3	0	0	0	0	4
Medical & Health Sciences	0	0	0	0	0	0	0
Natural Sciences	0	0	0	0	0	0	0
Social Sciences	1	2	0	0	0	0	3
Total	**2**	**5**	**0**	**0**	**0**	**0**	**7**

5.9.1 IP Fillings in Sri Lanka

[40] https://www.patent-pilot.com/en/industry-studies/worldwide-industry-study-patent-law-firms-2016/patents-filed-per-one-million-inhabitants/

Table 18: IP filling and economic growth of Sri Lanka (2012-2022)

Year	Patent	Trademark	Industrial design	GDP (current US$ Billion)
2012		7211	678	243.80
2013	445	6899	295	253.68
2014				269.86
2015	265	7440	405	281.21
2016	316	9351	309	295.42
2017	331		485	314.51
2018	382	9161	487	321.77
2019	412	7990	606	321.06
2020	412	1669	459	306.21
2021	329	7717	227	316.97
2022	189	3642	96	292.17

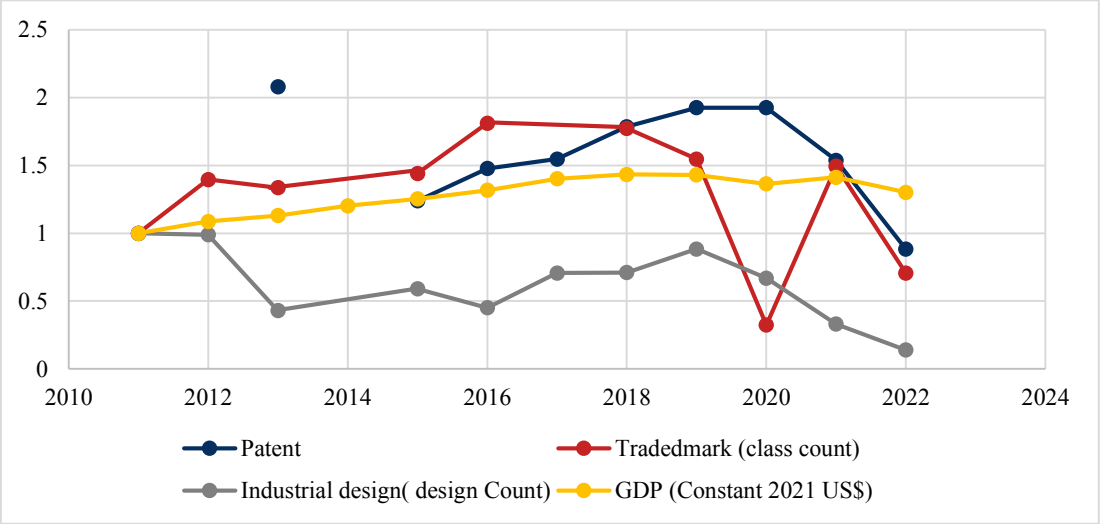

Figure 5.11: IP Filling & Economic Growth (2012-2022) (first available year to 1)[41],[42]

[41] NIPO Statistics Data Centre; https://www.nipo.gov.lk/web/index.php?option=com_content&view=article&id=8&Itemid=130&lang=en#patent

[42] Statistical Country profile WIPO; https://www.wipo.int/ipstats/en/statistics/country_profile/countries/lk_content.html

5.9:2 The Patents filed and granted between 2012 to 2022

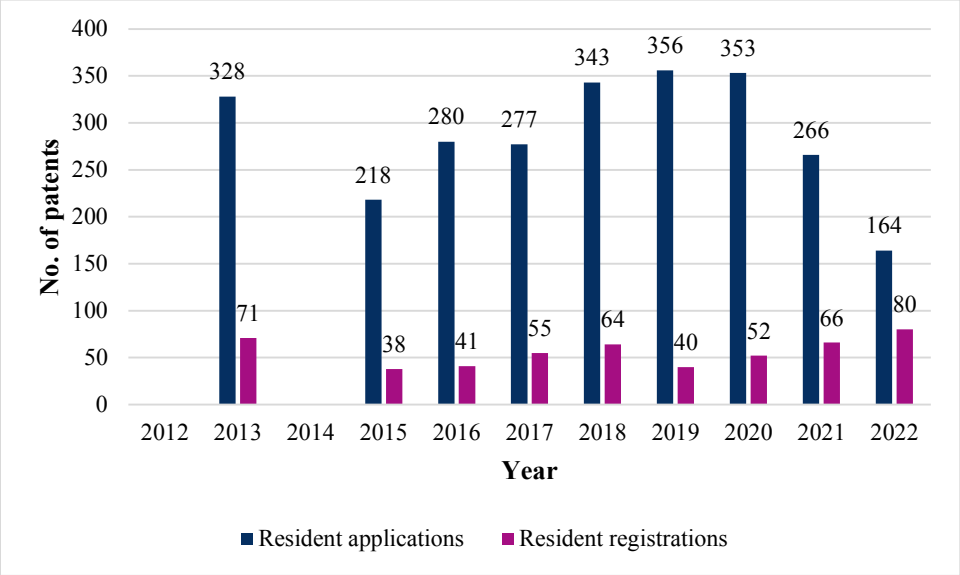

Figure 5.12: Resident patent applications in Sri Lanka, 2012-2022 (Source: NIPO, WIPO)

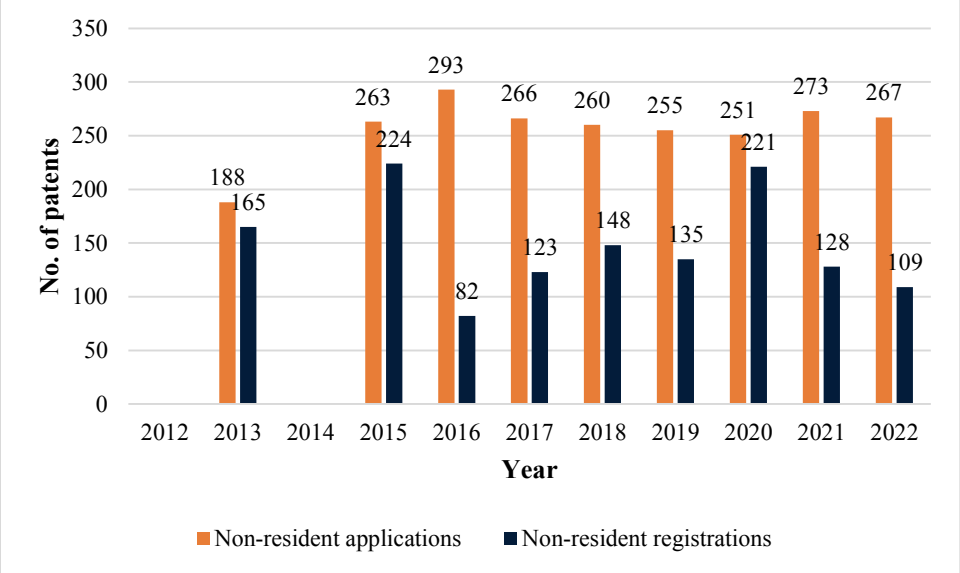

Figure 5.13: Non-resident patent applications in Sri Lanka, 2012-2022 (Source: NIPO)

In 2022, 80 resident patents were granted against 164 applications filed. Our sample survey captured 7 (8.7%) of them.

5.10 Awards received by scientific staff / institution

There were 36 accolades honored by scientists affiliated with surveyed institutions, which includes 24 national and 12 international awards (Table 19).

Table 19: Awards received by scientists/institution

Sector	International	National	Total
Agricultural & Veterinary Sciences	7	8	15
Engineering & Technology	1	5	6
Medical & Health Sciences	0	0	0
Natural Sciences	4	11	15
Social Sciences	0	0	0
Total	**12**	**24**	**36**

5.11 Products and processes commercialized by the institution

In 2022, 17 processes and 4 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 20 and 21 represent the number of products and processes commercialized by the surveyed S&T institutes, respectively, and Figure 5.14 demonstrates their sectorial contribution.

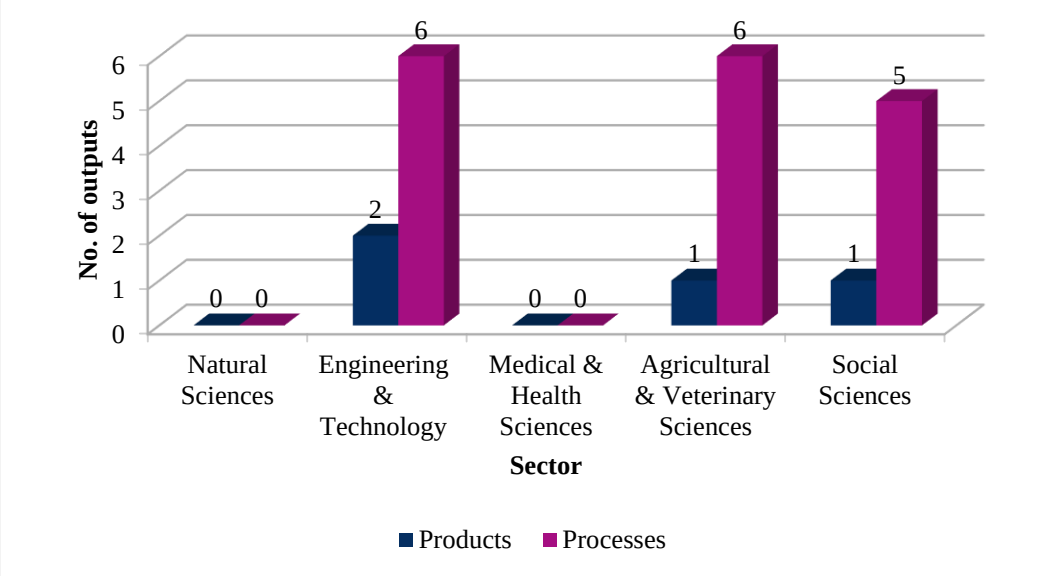

Figure 5.14: Products and processes commercialized by each sector in 2022

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

Sector	Institute	Number of Products Commercialized
Agricultural & Veterinary Sciences	DEA	1
Engineering & Technology	NBRO	1
	SLINTEC	1
Natural Sciences	-	0
Medical & Health Sciences	-	0
Social Sciences	SLSI	1
Total		**4**

Table 21: Processes that have been commercialized by S&T institutions

Sector	Institute	Number of Process Commercialized
Engineering & Technology	ITI	1
	NBRO	1
	NERDC	4
Agricultural & Veterinary Sciences	DEA	1
	HORDI	1
	RRI	4
Natural Sciences	-	0
Medical & Health Sciences	-	0
Social Sciences	SLSI	5
Total		**17**

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[43].

Within the year 2022, 63 technologies were transferred (29 in the agricultural and veterinary sciences sector, 21 in the engineering and technology sector, 7 in the social sciences sector and 6 in the natural sciences sector), and 48 recommendations were adopted (25 in the agricultural and veterinary sciences sector, 12 in the engineering and technology sector, 6 in the social

[43] Technology transfer: https://www.globalnegotiator.com/international-trade/dictionary/technology-transfer/

sciences sector, and 5 in the natural sciences sector). Figure 5.15 indicates the number of technologies transferred and recommendations adopted in each sector.

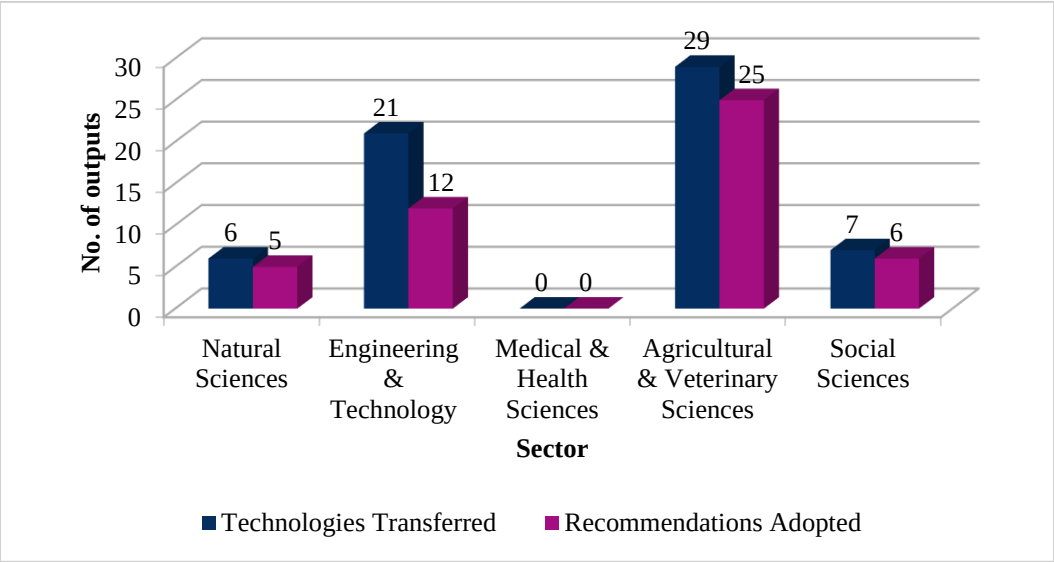

Figure 5.15: Technologies transferred and recommendations adopted in each sector

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 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 5.16 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 (0.029, 0.049, and 0.025, respectively).

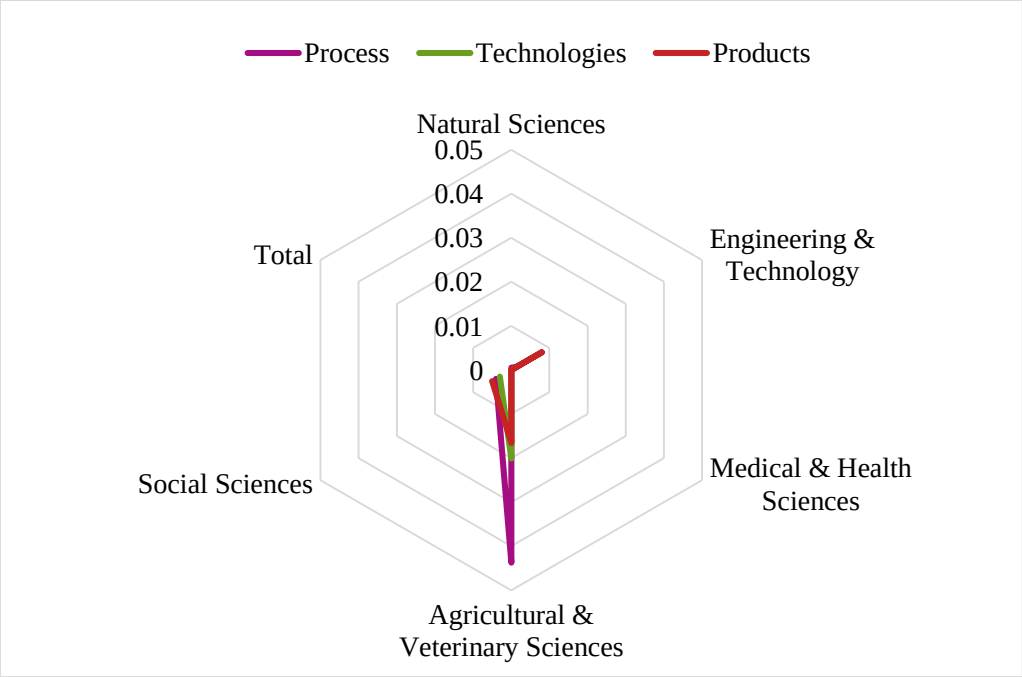

Figure 5.16: Radar chart comparing product, process, and technologies per scientist by sector in 2022

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

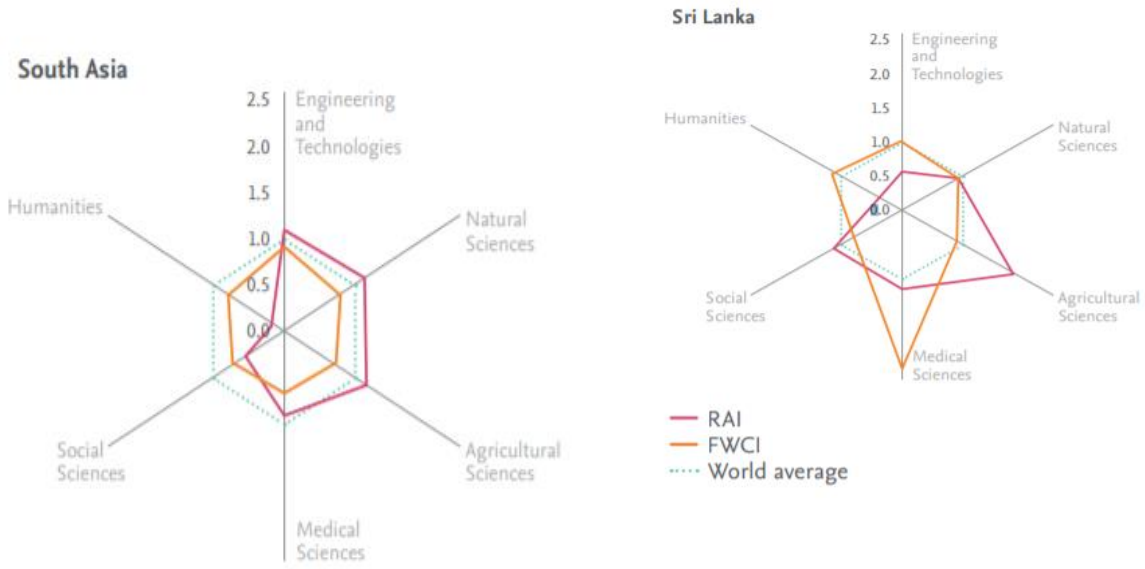

Figure 5.17: RAI and rebased FWCI for the world, South Asia, and Sri Lanka that published over 1,000 publications between 2012 and 2016. Source: Scopus00AE

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.

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 22.

Table 22: Number of clients served with different services by S&T Institutions

Sector	Testing	Calibration	Training	Product and Process Certification	Accreditation Services	Consultancies	Other Services	Revenue Earned (Rs. Mn.)
Natural Sciences	2,899	1,462	28,541	317,011	0	6,766	250	492
Engineering & Technology	10,651	5,998	3,484	26	0	7,407	291	1,207
Medical & Health Sciences	0	0	450	0	0	0	0	0
Agricultural & Veterinary Sciences	786,144	45	17,515	22,920	0	1,572	3,645	103
Social Sciences	9,772	571	2,577	570	9	7	7,708	586
Total	**809,466**	**8,076**	**52,567**	**340,527**	**9**	**15,752**	**11,894**	**2388**

The highest number of clients were served by the testing (n = 809,466), followed by product and process certification (n = 340,527). The Agricultural & Veterinary Sciences sector served the highest number of clients (n = 831,441), but the highest revenue was earned by the Engineering & Technology sector (LKR 1,207 million). The S&T institutes of all the sectors served a total of 1,238,290 clients in the year 2022, and a total revenue of LKR 2388 million was earned through client-based services. Table 22 indicates the levels of revenue generated by different S&T institutes.

Table 23: Revenue generated by S&T Institutes in 2022

Revenue Generated			
Rs. Mn. 0-9	**Rs. Mn. 10-20**	**Rs. Mn. 21-100**	**Rs. Mn. >100**
GJRTI	CEA	ACCIMT	DNBG
MUSSD	HARTI	NERDC	SLSI
FMRC	SLINTEC	CRI	SLAEB
DEA		TRI	ITI
FCRDI		SLAB	NBRO
HORDI			
NIPM			
PRI			
RRI			
NRC			
NSF			
SCS			

6.1 Revenue Generation Trends by Institute, 2012-2022

From 2014 until 2018, the revenue generated per institution generally showed an upward trend. However, since 2019, it has declined, falling from LKR 40 million to LKR 31 million. In 2020, it further decreased to LKR 28 million per institution. Recently, an upward trend resumed in 2021 and 2022. This fluctuation may be attributed to the consequences of COVID-19 lockdowns and the economic hardships faced by the country, which significantly impacted the bottom lines of the institutes.

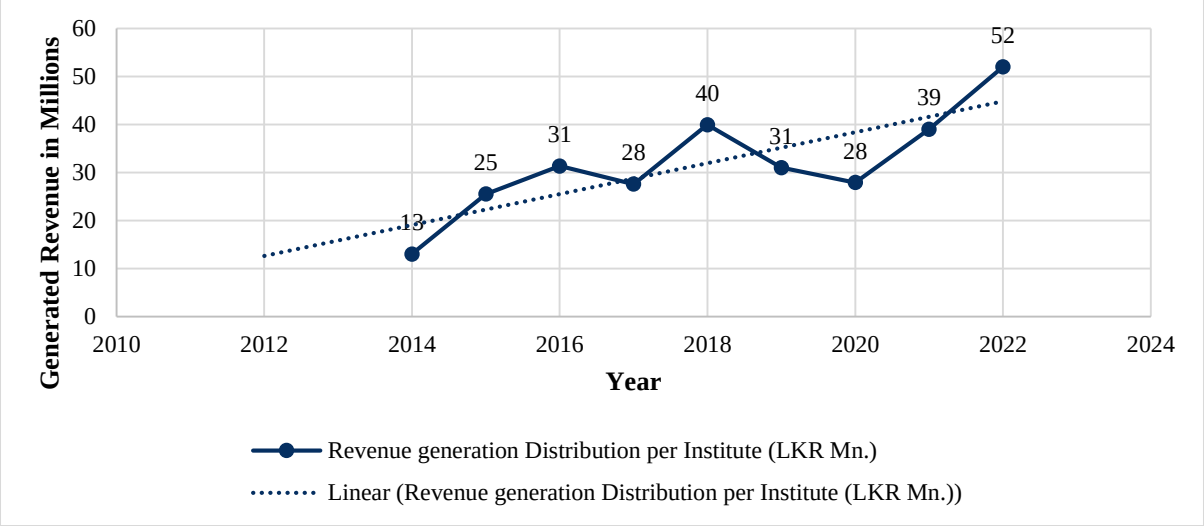

Figure 6.1: Distribution of revenue generated per institute, 2012-2022

RECOMMENDATIONS

The following recommendations were made by the report based on the data analysis: Even if the S&T ecosystem of Sri Lanka may already be familiar with some of these recommendations, they are meant to be gathered here to highlight how crucial it is to put them into practice. That would definitely benefit the S&T ecosystem in the nation as a whole.

The suggestions are broken down into five main categories: human resources, physical resources, research input, research output and services provided by S&T institutions.

Thrust 01: Human Resources: Investment in Human Capital Development

i. Retention of employees:

Long-term development and implementation of a systematic staff retention program is required, especially in the researcher's category, in order to maintain employee retention at the national level. A centralized system can 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. Keep an eye on and respond to employee complaints on a regular basis through surveys and interviews.

ii. Encourage professional advancement and lifetime learning:

Provide a program for researchers to pursue research-based higher degrees and participate in training programs for their continuous professional development (CPD). By fostering a mutually beneficial relationship between research institutions and scholars, the program can foster conditions that support career advancement and lifelong learning.

iii. Encourage opportunities for early career research:

Encourage early-career researchers to develop their skills and stick with the system by offering them enticing incentives and assigning them senior mentors to provide relevant advice. It makes sense to set up a structure that would provide them with training opportunities, scholarships, and special research funding. As a result, the system may have a culture of invention.

iv. Maintain gender parity and encourage women's agency:

Preserving gender equality in all spheres of institutions is essential as indicated in SDG 5. Supporting mentorship programs that provide women researchers with flexible work hours and chances for leadership development is essential. In order to improve the representation of women, particular focus is needed to be placed on the engineering and technology sectors as the female representation in these sectors are lower.

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

v. Create an extensive data archive:

Create a comprehensive data repository to organize and process the pertinent data to assist in making evidence-based decisions. Through this platform, institutions from many sectors might be connected while maintaining secure access.

vi. Empowering the employees with IT competence:

Gives top priority to extensive staff training programs on how to utilize and improve IT tools in an efficient manner. It will be helpful to have training in digital literacy, data management, and information retrieval.

vii. Increasing productivity using IT infrastructure:

Institutional rules and a strategic data management systems are needed to maximize information flow both within and across institutions and systems. The institutes are urged to make investments in creating cutting-edge, effective IT infrastructure to enable these kinds of initiatives that could raise the institutes' general productivity.

viii. Promote resource sharing among institutions

Create a central equipment laboratory that can be accessed by all institutions or create an effective system to share institute laboratory equipment and resources with each other. This can be strengthened by formulating an equipment sharing policy.

Thrust 03: Research inputs: Enhance Research Funding for R&D Development

ix. Increasing the effectiveness of procurement and financial monitoring:

Eliminate obstacles in government procurement tender procedures by optimizing workflows and pinpointing bottlenecks to facilitate the prompt procurement of essential laboratory chemicals and equipment. To reduce delays, think about using other procurement strategies, such as pre-qualified supplier lists and adapting to e-procurement process. Establish a reliable tracking mechanism to enhance the system.

x. Effective coordination and planning:

Improve the institutes' internal planning and coordination procedures to guarantee efficient use of funding. This entails creating project proposals while adhering to SMART objectives and other world and national priorities such as the SDGs and Department of National Planning priorities.

xi. Give science popularization activities top priority:

Encourage sufficient funding for science outreach initiatives in order to optimize their social impact. Maintaining uninterrupted funding for these kinds of initiatives is advised. Enhance cooperation with media outlets, academic institutions, and other pertinent parties to efficiently distribute information to the general public.

xii. Frequent observation and assessment:

Establish a mechanism for routinely assessing how funds are being used in order to spot any inefficiencies, bottlenecks, or areas that need improvement. It will make it possible for institutions to allocate resources optimally, make informed decisions, and guarantee the accountability.

xiii. Management of human resources:

Make sure the institutes have enough trained personnel to manage the execution of several projects. This can be accomplished by implementing regular training programs, focusing recruitment efforts, and forming connections with academic institutions and research centers to access more knowledge.

Thrust 04: Research Outputs: Research to business

xiv. Adequate research funding:

Provide sufficient funds and resources to support research in fields like the medical and health sciences, veterinary and agricultural sciences, etc. that are represented in sectoral

projects. In view of tackling national issues, this will allow researchers to solve sector-specific obstacles, find creative solutions, and progress their particular professions.

xv. Knowledge sharing:

Encourage the sharing of knowledge and interdisciplinary research among institutions and make it easier for various sectors to collaborate with one another. To optimize the impact of research initiatives, encourage researchers to collaborate on them and to share data, resources, and skills.

xvi. Use smart project management techniques:

Use efficient SMART project management techniques to make sure research projects are finished on time. Additionally, a framework will be put in place to allocate the knowledge and resources required for the projects' effective completion. A pool of expertise made up of academics, business and public sector organizations, and others would be ideal.

xvii. Proper intellectual property management:

Through the provision of financial support for the filing of patents, technology transfer, and the commercialization of R&D outputs, a creative culture that leads to commercialization can be attained. Establish technology transfer facilities (TTF) inside of institutions to connect the stages of the procedure to a platform or a national system.

xviii. Publish the research findings:

To improve the dissemination of research findings, encourage the publication of complete research journal articles in addition to conference proceedings. Expand the amount of money available to support academics' attendance at national and international conferences in order to create more possibilities for networking.

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

xix. Qualified staff:

Possessing personnel with the appropriate skills and knowledge will enhance client satisfaction, promote repeat business, and improve service performance. Proper training should be given to relevant staff personnel on proper client interactions to achieve above objectives.

xx. Develop market-focused strategies:

To determine trends in the corresponding industries and develop market-focused strategies, do frequent market research. Partnerships between the public and private sectors of the economy could enhance it and help create new goods and services that satisfy popular demand.

xxi. Popularizing the services provided among the public:

Create a thorough marketing and outreach plan to advertise the services that S&T institutes provide. This can be used with contemporary instruments and programs to target specialized markets in addition to larger audiences.

xxii. Create a goodwill among the public:

Simplify the billing procedure to guarantee openness. Provide clients with a clear explanation of the pricing structure, conditions of payment, and any applicable discounts or incentives. It will support establishing credibility and trust with customers, which helps grow the company.

xxiii. Continuous service supply:

Evaluate and enhance the efficacy and efficiency of procedures for delivering goods and services on a continuous basis. Obtain customer feedback on them so that it can be incorporated into the value chain operations for the products.

Limitations:

The conclusions drawn from the report are subject to several limitations. These limitations encompass constraints arising from the absence of representation and information pertaining to private-sector organizations, as well as the higher education system as known as universities within the country at the time of the study. In particular, the Medical and Health Sciences sector in the report was unable to draw information from the institutes, with only one institute providing data despite the presence of many public institutions in this sector. Consequently, extrapolating the findings to reflect the state of Science and Technology (S&T) at the national level may not be appropriate. Hence, it is essential to recognize that while private-sector entities were not fully represented, the evaluated public-sector S&T institutions significantly contribute to their respective fields and exert a substantial impact on the broader S&T ecosystem within the country. Moreover, to enhance context and relevance, the findings have been supplemented by cross-referencing with national statistics and globally recognized standard indices whenever considered appropriate. During this procedure, the lack of both national and global statistics related to Sri Lanka for the most recent years has also posed a limitation in data comparison.

Conclusions:

Despite the declared limitations, it remains evident that Science and Technology (S&T) institutions have played a pivotal role in enhancing the performance of the national S&T ecosystem. Amidst this backdrop, there arises a compelling necessity for augmenting funding allocated to research and development endeavors. Concurrently, there is a call for the implementation of a systematic evaluation framework aimed at monitoring the enduring impact of state-funded Research and Development (R&D) initiatives. Such an evaluation framework is essential not only to gauge the efficacy of these activities, but also to ensure their alignment with overarching national objectives and commitments, thereby fostering the sustainable advancement of 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

Annexure 02 – Questionnaire format used for data collection

National Review of the Status of Science and Technology in Sri Lanka – Year 2022

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 2022.**

(1) 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 2022)

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
Scientific			
1. Research Staff*			
2. Support Staff			
3. Librarians, Information Officers			
Accounting			
1. Accountants			
2. Support Staff			
Administration			
1. Executives			
2. Support Staff			
Other			
TOTAL			

***** *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 *(specify)*			
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)		
other		

Universities

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

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			
Other (specify)			

(III) PHYSICAL RESOURCES

i) Infrastructure Facilities

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

ii) other facilities

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

other	

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		
other		

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 → / Focus Areas ↓	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

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

1. **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 2022

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 *(please specify)*	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 *(please specify)* …… ……		

(VI) RESEARCH OUTPUTS

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

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

ii) New products/ processes/ technologies developed through research during year 2022 *(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 *(Please specify)* *(e.g. Bulletins, Newsletters, Magazines, Working papers)*	
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 *(eg: Research, Science Popularization)*	Whether National/International

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

(Please list)

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

vii) How was the commercialization initiated?

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

Commercialization Process	**Yes**	**No**
Demonstrated to private sector		
Through exhibitions		
Through *mass media		
Direct discussion with interested parties		
Other *(please specify)* ……		

**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?

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

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

Technologies transferred	Recommendations developed
e.g.: New method of water filtering 1. 2. 3. 4. 5.	*e.g. New fertilizer mixture* 1. 2. 3. 4. 5.

x) What are the barriers faced in technology transfer?

Barriers	**Yes**	**No**
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 *Eg: Water* *Fertilizer*		
Calibration of equipment		
Whether calibration standards calibrated by Department of Measurement Units, Standards & Services		
Training *(list the training programmes conducted to outside sources and indicate the number participated)*		
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	Developing an Acceptance Tester for factory compliance testing for an Automobile Battery Manufacturing and Exporting Company	To support local industry in developing dedicated testing solution to improve manufacturing process (Import substitute and possibility exists to venture out to export market as a product)
2	Developing Cranking / Retention Tester for factory compliance testing for an Automobile Battery Manufacturing and Exporting Company	To support local industry in developing dedicated testing solution to improve manufacturing process (Import substitute and possibility exists to venture out to export market as a product)
3	User Interface for Personal security/alarm device against crime for European countries (Alarm wear)	Product development support for high-tech electronic manufacturing industry
4	Sensor Based Automation of Water Taps	Institute industry partnership, saving of foreign exchange/import substitute product and support to develop local electronic industry
5	Remote parameter monitoring, logging and alarm system for switch endurance tester	Improved efficiency of testing laboratories.
6	Remotely monitoring water level (SCADA system)	Demonstration panel for CPD, staff capacity building
7	Xilinx Tea Colour Separator	Locally designed developed machine for tea factory tea processing
8	Real-time climate monitoring automatic weather stations (Maintenance and expansions)	Installation of weather stations for environmental and soil parameter monitoring m in tea growing areas (8 units)
9	MIS Development	Efficient System for Decision Making
10	Mobile App Development	Development of a mobile App

11	International Collaborative Research on Cataclysmic Variable Stars	Research paper
12	Monitoring and quantifying the forest degradation in Sri Lanka with open access satellite	Forest Degradation index for Sri Lanka
13	Space technology-based approach for identification of potential deep aquifer recharge sites by rainwater in Ampara district	Groundwater artificial recharge zones map for Ampara district
14	Geospatial modeling of electricity distribution network	Modelling Electricity distribution network
15	Mapping and spraying drone	For the plantation sector to improve precision agriculture practices
16	Vertical Takeoff and Landing UAV	Capacity development of engineers, development for defense sector purposes
17	Design and development of 1U Nano satellite sub systems for future programs	Capacity and practical hands on know how development of engineers
Central Environmental Authority		
1	Development of Ecosystem Services Indicators for Kambarawaganga study area	Update of land use/ cover, Series of maps for ecosystem services, Final rank map of Ecosystem Services
2	Developement of Ecosystem Services and valuation for Hanthana EPA	Update of land use/ cover, Series of maps for ecosystem services, Valuated map as a tool for management of Hanthana EPA
3	Development of Ecosystem services and valuation for Maragala EPA	Update of land use/ cover, Series of maps for ecosystem services, Valuated map as a tool for management of Maragala EPA
4	Health Quality Assessment of a Highland stream using selected Physico-Chemical parameters, Biological Factors and Micro plastic level	Identification of significant relationship of the diversity and abundance of freshwater macro invertebrates

		(Odonate larvae) with selected environmental parameters
5	Study of BOD and COD ratio in different industry sector with a view to utilize one measurement	• Identification and categorization of the industries into toxic, biodegradable and acceptable or stable zones using BOD/COD ratio • By zonation of the BOD/COD ratio, the treatment strategy could be identified to achieve the safe level of organic matter in an environment
6	Assessment of impacts of Mini Hydro Power Projects, giving special reference to biodiversity, for sylected mini hydro projects in Kalawana Divisional Secretariat Division	• Generate species check lists for Mudalige kanda and Handuwelkanda forests in Kalawana Divisional Secretariat Division • Preparation of forest conservation plan for Kalawana Divisional Secretariat Division
7	Survey on Environmental awareness level of the community in Kegalle	• Promoting environmental communication among the community • Reduce the level of negative impact of human activities on the environment
8	Study of water quality in vegetable wash water at selected locations of commercial vegetable washing by Checking COD, BOD and TSS	• Preparation of a chemical profile • Make aware the responsible agency to avoid the contamination of drinking water sources with pesticide residue and heavy metals
9	A comparative study on Environmental awareness, and attitudes among the secondary level school students in Rathnapura district	• Identification of gaps on environmental awareness and attitudes on environment of the secondary level students among all divisions
10	Assessment of Surface Water Quality in Kalu Ganga Basin using CCME Water Quality index	• Rank the surface water quality in Kalu Ganga basin for Ambient Water quality Categories based on CCME WQI • Maintain an ambient water quality database for Kalu Ganga as a main important inland surface water body in Rathnapura and Kaluthara districts.

		• Investigate the physical, chemical, and biological suitability in Kalu Ganga comparison to Ambient Water Quality Standard for water source simple treatment and bathing and recreational purpose. • Investigation of micro plastics in Kalu Ganga water samples
11	Impact of Green Technologies on Energy Efficiency and Environmental Sustainability in urban settings in Sri Lanka	• Recommend the most suitable green technologies that could be utilize in urban settings
12	Proposal for Independent site Ccontamination audit and remedial action plan preparation for the Muthurajawela solid waste dumping site	• Total environmental contamination audit report for Muthurajawela
13	Policies, Legal Instruments and Processes for Aquatic Systems Related Developments and Development of a New Protocol for Aquatic Systems Related Environmental Assessment	• A gap report of policies, legal, institutions and processes regarding environmental management of Sri Lanka. • Status report of approved developments, types, ecological, social and economic aspects related to reject and status of rejected. • Map projections of developments and geo spatial data related to each basin, hotspots of development, density of distribution and sub basin-wise land use in development areas. • Effective implementation of the mitigations of environmental management. • Status report of implementation of recommendations, their adequacy and current status of selected physico-chemical and biological parameters
Coconut Research Institute		

1	Evaluation of hybrid vigour of brown dwarf crosses for yield and tolerance to moisture stress in different Agro ecological zones	Increased yield and enhanced tolerance to moisture stress across diverse agro-ecological zones.
2	Evaluation of hybrid vigour of Sri Lankan Tall and Sri Lankan Dwarf crossed with exotic varieties	Enhanced overall yield, disease resistance, and agricultural resilience in coconut cultivation
3	Evaluation of intra-varietal dwarf coconut hybrids for home gardens and beverage purposes	Reveals their suitability for both home gardens and beverage production, showcasing a dual-purpose potential that combines ornamental value with quality coconut yeild for processing
4	Development of potential inter and intra varietal hybrids using local and exotic varieties conserved at field gene banks	Improved crop resilience, yield, and adaptability, contributing to the sustainable advancement of coconut cultivation.
5	Collection and conservation of local and exotic germplasm and utilization in breeding program	Safeguard and harness diverse genetic resources, fostering the development of resilient and high-performing crop varieties.
6	Screening varieties /accessions/cultivars for red-weevil tolerance	Completion of the screening of varieties/accessions/cultivars for red weevil tolerance
7	Screening varieties/accessions/cultivars for quality of activated carbon	Identification and selection those with optimal characteristics for producing high-quality activated carbon.
8	Evaluation of Mirishena Green Dwarf as a beverage coconut variety	Comparative evaluation of Mirishena Tall for traits related to beverage quality
9	Induction of somatic embryogenesis and plant regeneration in ovary derived callus	Study on effect of amino acid and polyamine on callogenesis and somatic embryogenesis.
10	*In vitro* and biochemical approach to investigate somatic embryogenesis and tissue culture responsiveness in coconut	Study on histological and biochemical variation associated with somatic embryogenesis and tissue culture responsiveness in coconut
11	Identification of new explants for vegetative propagation of coconut	Evaluation of potential of tender leaf explant as new explants for vegetative propagation of coconut
12	Investigation of genotypic specificity in coconut plumule culture protocol	Evaluation of potential of meristem culture protocol for multiplication of high value coconut cultivars

13	Multi-locational field evaluation of tissue cultured coconut plants	Performance evaluation of tissue cultured plants under different agro-climatic regions
14	Characterization of drought tolerant coconut genotypes using gene expression studies	Enabling the selection and propagation of resilient genetic resources for sustainable coconut cultivation in water-scarce environments
15	preliminary study on the effects of anti-transpirants on coconut seedlings under water stressed conditions	Identification of the effective anti-transpirant/s and effective concentrations
16	Development of sustainable moisture conservation method by using carbonized plant material (bio-char) for mature coconut plantations	Development of a sustainable moisture conservation method for mature coconut plantations
17	Development of a sustainable moisture conservation method by using carbonized plant material (bio-char) for coconut seedlings	Enhanced water retention in the soil, fostering improved seedling growth and water-use efficiency in coconut cultivation
18	Assessment of the effectiveness of Biochar as a soil conditioner on managing sustainable fertility of Coconut lands, with special emphasis on effective microorganisms	Evaluation of the impact of Biochar application on soil health, nutrient retention, and microbial activity, contributing to enhanced sustainability and productivity in coconut cultivation
19	Identification of climate resilient coconut varieties using antoxidative enzyme activity under drought stress	Collection of data on plant house experiment & field experiment for the identification of antioxidative enzyme activity as a tool to determine the tolerance of coconut to drought
20	Identification and evaluation of new mulching material on soil moisture conservation and the growth of coconut seedlings	The identification and evaluation of new mulching materials for soil moisture conservation aim to assess their effectiveness in enhancing water retention and promoting optimal growth conditions for coconut seedlings,

		contributing to improved cultivation practices and seedling establishment.
21	Development of a sustainable approach to utilize king coconut husk as a source of K fertilizer and a sustainable soil amendment	Evaluation of the feasibility of utilizing king coconut husk waste as a K source and biochar for coconut
22	Coconut for the future: Assessing the effect of global warming and drought on the coconut industry of Sri Lanka	Assessing the impact of global warming and drought on the coconut industry in Sri Lanka involves examining the vulnerabilities, adaptive strategies, and potential resilience measures essential for sustaining coconut cultivation amid changing climatic conditions
23	Identification of future vulnerability of coconut plantations in the coconut triangle to climate change	Data analysis to find out the combined impact of local climate and soil properties on soil moisture patterns
24	Evaluation of drought tolerant Sri Lankan tall accession Ambakelle special and its progenies in different agro climatic zones	The evaluation of drought-tolerant Sri Lankan Tall accession 'Ambakelle Special' and its progenies across diverse agro-climatic zones aims to assess their adaptability and performance under varying environmental conditions, providing valuable insights for sustainable coconut cultivation in regions susceptible to water scarcity
25	Evaluation of drought tolerant mechanisms in selected coconut varieties for improving drought tolerant mechanisms	Understanding and enhancing the inherent resilience traits within these varieties, aiming to improve their capacity to withstand and thrive under drought conditions
26	Investigating the effects of applying Silicon on drought tolerance of coconut seedlings	Improvement of the drought tolerance of coconut seedlings

27	Quantification of below ground carbon stock and development of an allometric model to estimate the variation of below ground carbon stock of coconut palms in different age groups and in major land suitability classes ()	Providing crucial insights for carbon sequestration and sustainable land management
28	Evaluating the effect of micronutrients on the growth and performance of coconut seedlings	Offering valuable insights for optimizing nutrient management strategies to promote healthier and more productive coconut cultivation
29	Evaluation of Municipal Solid Waste Compost to use as an Organic Manure source in Coconut Plantations	Providing a sustainable and environmentally friendly approach to enhance soil fertility and promote healthy growth in coconut cultivation
30	Assessment of the effectiveness of boron fertilizer on nut setting and leaf Boron status	Effectiveness of Boron fertilizer on nut setting and leaf Boron status
31	Assess the suitability in recommending liquid fertilizer and other N sources for coconut	Enhanced agricultural sustainability and productivity, by promoting efficient resource utilization
32	Determining the decomposition and nutrient release pattern of locally available organic manures under different climatic conditions in the major coconut growing soils of Sri Lanka	Contribute valuable insights for optimizing agricultural practices, leading to enhanced soil fertility and sustainable coconut cultivation practices
33	Effect of agricultural compost age and storage condition on compost quality and development of a rapid test for identifying stability status	Develop a methodology to test the stability status of compost
34	Prepare and assess nutrient rich compost producing using available sources and with slow-release property	Fabrication of biochar-based K enriched fertilizer bricks
35	Evaluation of regenerative organic farming systems	Establishment and evaluation of the performance of the organic farming systems in coconut triangle
36	Introducing new fertilizer sources to growers by conducting field trials	Providing evidence-based insights that empower farmers to optimize crop yields, resource efficiency, and environmental sustainability

37	Growth performance evaluation of high value resin crops under coconut	Insights into the compatibility and potential synergies between these two crops, providing valuable information for diversification strategies and sustainable agroforestry practices.
38	Evaluating the adaptability of new intercrop species and varieties (Durian, Vanilla, Aloe vera, and Tea)	
39	Evaluation of *Mucuna bracteata* as a cover crop for coconut plantations	Cover crop recommendation for coconut cultivation
40	Investigating the Alternative Uses of *Panicum maximum* (Guinea Grass)	Production of two (02) sets of compost and two (02) sets of Vermicompost and recommending Guinea grass as a raw material for the production of compost and vermicompost
41	Evaluation of the effect of fertigation on the yield of coconut.	Collection of water-soluble inorganic fertilizer samples, testing the dissolution rates of fertilizers and cost analysis. Field selection for field experiment and designing the irrigation system.
42	Quantification of antibiotics and assessment of antibiotic resistant bacteria in manure & compost applied coconut growing soil new project	
43	Assessment of prevalence of black beetle and red weevil in climatic zones	Provide crucial insights into pest dynamics
44	Development of coconut cultivars resistance to coconut mite	Ensure long-term agricultural productivity and economic stability for coconut farmers.
45	Evaluation of Sri Lanka Tall and Sri Lanka Dwarf crossed with exotic varieties for resistance/ susceptibility to the damage by coconut mite	Contributing to the resilience of the coconut industry against pest challenges

46	Screening of coconut varieties/ hybrids tolerant to Weligama Coconut Leaf Wilt Disease	Developing resilient cultivars, ensuring sustainable coconut farming, and mitigating the impact of the disease on coconut yields and overall agricultural productivity
47	Deciphering rhizosphere microbiome for Leaf Scorch Decline (LSD) and Weligama Coconut Leaf Wilt Disease (WCLWD) affected palms and the efficacy of resistance inducers for disease management	
48	Identification of xylem-phloem restricted fastidious prokaryotes in LSD and WCLWD affected palms and designing primers for detection	
49	Study behavioural responses of *Plesispa* to leaf volatiles	• Completion of EAG studies; improvement of black beetle pheromone synthesis protocol. Improving red palm weevil repellant. • Commencing field evaluation, Continuation of laboratory screening of essential oils.
50	Development of a mass rearing technique for *N. paspalivorus*	Collection of mites from the field and establishment of a laboratory culture
51	Screening varieties for *Plesispa* beetle and other pests	
52	Studies on whitefly and its possible biocontrol agents	• Collection and identification of white flies associated with coconut. Commence laboratory rearing of whitefly colonies. Surveying of possible biocontrol agents of whitefly and laboratory maintenance of biocontrol agents. • Testing of new insecticides • Conducting population dynamics studies

53	Development of ICT based techniques for identification of pests and diseases	Development of an ICT based method to detect red weevil and whitefly damage
54	Testing of Evisect granules and Abemectin granules to control the black beetle	Assessment of the efficacy and potential of these insecticidal formulations, offering valuable insights into their suitability for integrated pest management strategies in coconut cultivation
55	Improvement of Extra VCO production process through fermentation	Study of microorganisms responsible for separation of oil in coconut milk
56	Development of coconut butter	Improvements to the coconut butter developed
57	Determination of the effect of fresh ground coconut kernel to reduce domestic wastage and study on health benefits of creamed coconut	Improvement to the fresh creamed coconut by using colloidal mill and conduct sensory evaluation tests
58	Development of a Nano device for the detection of adulteration in coconut oil	Development of nano technology enabled electronic device for detection of palm oil in coconut oil
59	Development of a spread cheese using Coconut Skimmed Milk	Development of a protocol to produce coconut skim milk based spread cheese
60	Production of biodegradable packaging from coconut protein isolates and biocelluloses	Application of packaging material as a food wrap and improving quality characteristics
61	Improvements for the coconut paring oil production process	Study the influence of different treatment on the stability of coconut testa oil
62	Determination of isotopic fingerprinting to authenticate Sri Lankan kernel products	Preliminary investigation by analyzing samples of desiccated coconut obtained from different mills
63	Quality improvement of gloves and rubber boots by applying coconut husk products	Develop composite material for rubber glove preparation
64	Fabrication of a dryer for drying coir pith	Fabrication of a drying system for coir pith drying, inhouse testing, field testing

65	Fabrication of a new version of Ceylon drum for bristle fibre extraction	Fabrication of a machine to extract bristle fiber, inhouse testing, field testing
66	Development of a value-added coconut skim milk powder beverage	Develop skim milk beverage with acceptable quality
67	Determination of the effect of virgin coconut oil in ameliorating Type 2 diabetes in human. a. Determination of the effect of fresh coconut kernel, coconut oil and other edible products in the patients with diabetes mellitus and impaired glucose tolerance	Enhance awareness and provide scientific evidence on consumption of VCO
68	Determination of the efficacy of adjunctive extra virgin coconut oil/ coconut products used in people with mild cognitive impairment and mild to severe Alzheimer's disease (community based randomized, double blind placebo controlled pragmaticn study	Efficacy of the adjunctive extra virgin coconut oil/ coconut products used in people with mild cognitive impairment and mild to severe Alzheimer's disease determined
69	Anti-diabetic and anti-oxidative potentials of partially-defatted coconut parings of indigenous coconut cultivars	Phytochemical identification of coconut testa extracts responsible for anti-diabetic and anti-oxidative activities
70	Study on coconut testa flour based low GI food items	Formulation of defatted coconut flour based testa flour based food with nutritional analysis
71	Efficacy and safety of virgin coconut oil and king coconut oil compared to liquid paraffin as a moisturizer for mild atopic dermatitis: A randomized, double blind study	Evaluation of efficacy and safety of VCO and KCO compared with liquid paraffin as a for mild atopic dermatitis
72	Identification of the contributing factors for coconut prices and developing the price forecasting model	Development of a price forecasting model
73	Dynamics of household coconut and edible oil consumption of Sri Lankan consumers	Quantify the household edible oil consumption – number

74	Identification of factors that prevent trade facilitation of export of coconut kernel and non-kernel products with special reference to COVID 19 pandemic situation	Propose policy changes to facilitate export trade of coconut products
75	Estimation of export demand elasticities for non-traditional coconut kernel products	Estimate export demand elasticities to be used in policy decisions
76	Constraints for the choice of export market by local manufacturers of VCO	Identify the causal factors for not choosing export market by VCO producers
77	Factors affecting the value addition by coir exporters	Identify the issues face by coir manufacturers that prevent them from further value addition to coir fibre when exporting
78	Value chain analysis of sap-based products of coconut industry in Sri Lanka	Identify the value chain of sap based industries and propose policies to develop the industry
79	ICT to overcome value chain inefficiencies in scattered small scale value chains (King coconut, sap based products, organic and coir)	Introducing a mobile app and a software
80	Value chain analysis of coconut milk, milk powder and cream	Identify the value chain of coconut milk, milk powder and cream and propose policies to develop the industry
81	Studies on Sri Lankan coconut growers' pro-environmental behaviour	• The effect of the behavioral factors; pro- environmental attitude, pro-environmental subjective norms, perceived pro- environmental control, and pro- environmental intention on pro-environmental 113 anageme of the coconut growers. • Determinants that affect to implement environmentally friendly recommendations and technologies in coconut lands.
Department of Census and Statistics		

1	Pilot study on implementation of decisions taken at the 19th international conference of statisticians	
2	Household survey on drinking water quality	
3	Global adults tobacco survey	
4	Awareness program for field staff	
5	International comparison program for Asia and pacific	
Department of Export Agriculture		
1	Pepper canopy improvement through different planting material originated from different cutting types and canopy training.	Identification of suitable cutting types to pepper canopy improvement
2	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
3	Growth and yield performance of Macadamia VP plants at different spacing levels	Introduction of Macademia VP cultivation to Sri Lanka
4	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), *Cinnamomum litseaefolium* (Thwaites) and *Cinnamomum capparucoronde* (Blume), and their progenies at mid-country research station, Dalpitiya, Sri Lanka	Determination of factors affecting pollination behavior of Genus *Cinnamomum*
5	Studying the ecology of cinnamon wood borer (*Ichneumenoptera cinnamomumi*)	To find out the seasonal abundance of cinnamon wood borer
6	Identification and studying the biology, ecology and management of cinnamon thrips	To identify the thrips taxonomically & to identify the biology and the ecology
7	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
8	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.

9	Determination of Optimum pH level for growth of Cinnamon	Find the best dolomite dose for 115 anageme the soil pH that maximize the growth of Cinnamon
10	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
11	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 on growth, yield and quality of the cinnamon
12	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
13	Multiplication and evaluation of selected hybrid cinnamon plants under recommended agronomic practices for quality, growth, and yield performance	To identify superior quality cinnamon accessions
14	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
Department of Irrigation		
1	Water quality in Hambantota	Database/report
Farm Mechanization Research Centre		
1	Floating tiller for boggy land	Prime mover suitable for boggy land cultivation
2	Design and development of 2W Tractor attached Groundnut seeder	2W Tractor attached seeder for groundnut
3	Adaptive Modification of Groundnut Harvester	4W Tractor attached harvester for groundnut
4	Design and development of Boom Sprayer for Organic Liquid	Tractor attached boom sprayer for large scale Agriculture
5	Design and develop 2 row transplanter with 8” row spacing	Transplanter for paddy

6	Design and development of Chilli seed extractor	Chilli seed extractor with input capacity of 30kg/h
7	Design and development of 4 Wheel tractor attached seeder	4 Wheel tractor attached seeder with 15Acers/day field capacity
8	Design and development of 4 Wheel tractor attached weeder	4 Wheel tractor attached weeder for high land
9	Design and development of Semi-Automated coconut husk removing machine	Coconut husk remover with the capacity of 100Nos/hr
10	Design and development of 8” Power weeder	Design and development of 8” Power weeder
Field Crops Research and Development Institute		
1	Evaluation of exotic Chilli hybrids	Identification of adaptable exotic varieties
2	Evaluation of exotic Big and Cluster onion varieties for recommendation	Identified adapatable exotic varieties
3	Hybridization of mung bean parental lines	Develop new lines with 116anagemen characters
4	Preliminary Yield Trial of mung bean	Develop new mung bean varieties
5	National Coordinated Varietal Trial for mung bean varieties	Develop new mung bean varieties
6	Variety Adaptability Trial –mung bean	Develop new mung bean varieties
7	Blackgram breeding; Hybridization	Develop new lines with 116 anagemen character
8	National Coordinated Varietal Trial Black gram	Develop new black gram varieties
9	Blackgram breeding; Variety Adaptability Trial	Develop new black gram varieties
10	Seed multiplication of new Black gram varieties MIBG 3 & MIBG 4	Develop quality seeds

11	Hybridization and selection of cowpea	Develop new lines with desirable characters
12	Preliminary Yield Trials –cowpea	No. of lines
13	Hybridization and selection of soybean	Develop new lines with desirable characters
14	Preliminary Yield Trials of soybean	Develop new soybean variety
15	Maize Breeding; Evaluation of maize exotic hybrids	Identified exotic hybrids performing under local conditions
16	Maize Breeding; Purification of OPV “Ruwan”	Purified recommended variety
17	Maize Breeding; Purification of OPV “Bhadra”	Purified recommended variety
18	Development of double cross maize hybrids using available hybrids and make segregation population in inbred lines development program	Isolated of inbred lines for advancement
19	Maintenance of sweet corn inbred lines	Maintained Genetic purity of locally developed inbred lines
20	Maintenance of popcorn inbred lines	Maintained Genetic purity of locally developed inbred lines
21	Development of sweet corn and waxy-corn inbred lines through generation advancement	Develop homogeneous and homozygous lines
22	Development and evaluation of sweet corn hybrids using locally developed inbred lines	Developed hybrids for further evaluation
23	Morphological characterization of developed sweet corn inbred lines	Characterized sweetcorn inbred lines
24	Development of composite (Synthetic) variety for Sweet corn	High performing sweet corn population
25	Evaluation of exotic sweet corn hybrids	Locally developed popcorn hybrids for further evaluation
26	Evaluation of exotic baby corn hybrids	Locally developed baby corn inbred lines

27	Evaluation of finger millet in AYT (Developed pedigree lines using generation advancement)	Identified lines for further evaluation
28	Evaluation of Finger millet in NCVT	Identified lines for VAT
29	Sorghum and other millet ; Evaluation of proso millet in AYT	Identified lines for NCVT
30	Sorghum and other millet ; Evaluation of foxtail millet in VAT	Identified lines under farmers management
31	Evaluation of developed sweet sorghum lines in NCVT	Identified adaptable lines
32	Development of cherry tomato inbred lines	New variety/ies
33	Evaluation of exotic Water melon varieties	New varieties
34	Maintenance of Grapes & Mango germplasm	Good quality ecofriendly fruits planting materials and 118anagement118118n field for famers
35	Maintenance of Guava plantation	Good quality ecofriendly fruits planting materials and 118anagement118118n field for famers
36	Maintenance of Lime plantation	Good quality ecofriendly fruits planting materials and 118anagement118118n field for famers
37	Maintenance of Wood apple germplasm	Good quality eco-friendly fruits planting materials and 118anagement118118n field for famers
38	Maintenance of Drumstick cultivation	Good quality eco-friendly fruits planting materials and 118anagement118118n field for famers
39	Maintenance of Dragon fruit cultivation	Good quality eco-friendly fruits planting materials and 118anagement118118n field for famers
40	Maintenance of Banana cultivation	Good quality eco-friendly fruits planting materials and 118anagement118118n field for famers

41	Maintenance of Passion fruit cultivation	Good quality eco-friendly fruits planting materials and 119anagement119119n field for famers
42	Maintenance of papaya cultivation	Good quality eco-friendly fruits planting materials and 119anagement119119n field for famers
43	Testing of *Trichoderma* to control diseases in seeded and layered guava plants	Effect of *Tricodema strsins* on the quantitative characters of guava
44	National coordinated rice varietal testing for 3 & 3.5 months age rice varieties	Adapted rice varieties
45	Testing of flowering stability of rice varieties under changing natural temperature & solar radiation gradient	
46	Evaluation of different local Chilli hybrids for major pests	Identification of pest resistant/tolerant lines
47	Testing of bio pesticides to control leaf curl complex in chilli	Identification of effective bio pesticides for chilli pest
48	Efficacy of the net materials to control chilli leaf curl complex	Evaluation the pest population 119anagement119 level
49	Evaluation of mung bean lines for major pests	Identification of pest resistant/tolerance lines
50	Evaluation of cowpea lines for major pests	Identification of pest resistant/tolerance lines
51	Evaluation of soybean lines for major pests	Identification of pest resistant/tolerance lines
52	Effect of different nitrogen fertilizer levels on Fall Armyworm damage in Maize	
53	Testing of pheromone lures to control Fall Armyworm in Maize	Identification of effective pheromone lures to FAW
54	Testing of repellents to reduce peacock damage in Maize	Identification of effective repellents
55	Evaluation of ground nut lines for major pests	Identification of pest resistant/tolerance lines

56	Effect of Trichoderma on control of chilli soil borne diseases, nutrient uptake and plant growth performance	Control of chilli soil borne diseases, nutrient uptake and plant growth performance using Trichoderma spp.
57	Development of a weather-based disease forecasting model for Onion Anthracnose	Weather based disease forecasting model for onion Anthracnose
58	Evaluation of Mung bean (MB) MYT lines for yellow mosaic virus, powdery mildew and anthracnose diseases	Resistant/tolerant MB lines for major diseases
59	Determination of suitable time of planting to minimize the mosaic virus disease in Black gram	Control of MB/BG mosaic virus
60	Evaluation of Black gram (BG) lines for powdery mildew	Resistant/tolerant BG-lines for powdery mildew
61	Evaluation of cowpea lines for major diseases	Resistant/tolerant varieties
62	Evaluation of ground nut lines for major diseases	Resistant/tolerant groundnut lines for blast
63	Evaluation of Soybean lines for major diseases	Resistant/tolerant Soybean lines major diseases
64	Evaluation of finger millet lines for major diseases	Resistant/tolerant finger millet lines for blast
65	Testing of new herbicide to control weeds on onion	Effective Weedicides to control weeds on onion
66	Testing of new herbicide to control weeds on Maize	Effective Weedicides to control weeds on maize
67	Exploring the possibility of using of anti-transpirants to minimize the impact of moisture stress on growth and yield of big onion	Identified anti-transpirant to increased yield under water stress
68	Development of sustainable farming practices for upland rain fed and irrigated cropping systems through a novel conservation agriculture approach	Identified a sustainable conservation farming technique
69	Estimation of plant nutrient uptake of Other Field Crops under organic and inorganic management	

70	A study on improvement on the productivity of black gram	Improve the black gram yield
71	Screening of blackgram varieties for agronomic performances	Identified black gram varieties for organic farming
72	Study on suitable nursery media for chilli seedlings raised in nursery trays	suitable nursery media for raising chilli seedlings in trays
73	Screening of chilli varieties for agronomic performance under the organic farming	Identified chilli varieties for organic farming
74	Effect of different growing media and fertigation combinations on growth and yield of hybrid chilli (Capsicum annum) under protected house conditions	Identification of suitable growing media for hybrid chilli and the identification of best fertigation combination under protected house condition
75	Effect of plant population on growth and yield of cowpea varieties Dhawala, MICP1 and Waruni under 121anagem conditions	Optimum plant densities for different cowpea varieties and soybean for higher grain yield production
76	Study the compatibility of rhizobium inoculum with fungicide, insecticide and seed coating material on root nodulation and yield formation in soybean	Determine the possibility of using liquid inoculum for polymer seed coating in Soybean
77	Effect of organic manure application on performance of soybean rhizobium inoculant and grain yield in dry zone of Sri Lanka	Select the best source of organic manure which gives highest yield performance in soybean
78	Effect of organic manure application on yield performance of OPV- Ruwan and MI Maize Hybrid 5 in dry zone of Sri Lanka	Select the best source of organic manure which gives highest yield performance in maize
79	Effect of initial seed moisture content, materials used for packing and the location of the storage on enhancement of maize seed storage duration while protecting the seed viability	Select the optimum moisture content and packaging material for storing maize seeds without losing the seed viability
80	Evaluation and multiplication of local *Dioscorea* germplasm	Selection of suitable *Dioscorea* species for Dry Zone conditions of Sri lanka
81	Study on the effect of time of planting of *Dioscorea alata* on vine growth and tuber yield	Determination of best time of planting for optimum growth and yield of *Dioscorea alata*

82	Study the effectiveness of low temperature on phase changes of life cycle of onion variety Dambulla selection	Produce new varieties within short period
83	Impact of harvesting stage of Onion crop on post-harvest losses	Reduce post-harvest losses
84	Development of a new cropping system for Onion seed crop to get additional income during the season	To get additional income at the mid-season
85	Impact of usage of seed-crop bulbs as planting material in seed yield and its quality.	Reduce cost of production
86	Testing the effectiveness of different fertilizers to incorporate into the already developed drip irrigation based agronomic management package for onion	Effectiveness of different fertilizer products to incorporate into the already developed drip irrigation based agronomic management package for onion
87	Testing the effectiveness of different fertilizers to incorporate into the already developed drip irrigation based agronomic management package for onion	Effectiveness of different fertilizer products to incorporate into the already developed drip irrigation based agronomic management package for chilli
88	A study on the response of Maize in relation to application of 'HERP' and 'ESSP'	Effectiveness of 'HERP' and 'ESSP' on maize
89	Testing of commercial fertilizer products for maize under the fertilizer testing program	Recommendation of special fertilizer product for farmers
90	Effect of Supper Water Absorbent (SAW) on land, water and fertilizer use efficiencies of chilli under organic conditions	Effectiveness of Super Water Absorbent products in crop production
91	Effect of Supper Water Absorbent (SAW) on land, water and fertilizer use efficiencies of onion under organic conditions	Effect of Supper Water Absorbent (SAW) on land, Water and fertilizer use efficiencies of chilli & Onion
92	Field verification studies on locally developed soil moisture sensing based automated irrigation systems for maize	Soil moisture sensing based automated irrigation systems

93	Field verification of the crop advisory system developed on the web-based weather forecasting for the maize crop	Supported already operational process of generation, dissemination and application of fore-cast based agricultural advisories by the DoA using web-based weather forecasting
94	Generation advancement of QPM incorporated maize BC4F8 line	QPM incorporated maize line/variety
95	Line x Tester analysis to select Maize inbred lines showing high GCA	QPM incorporated maize hybrids
96	Optimization of chilli plant regeneration protocol for chilli variety MI-1, MI hot	optimized protocol for chilli plant regeneration
97	Determination of presence and expression of Anthracnose resistant gene in F2 population of Chilli	Resistant level of anthracnose
98	Chilli- MICH 3	Breeder seeds for seed multiplication process
99	Chilli- MICH HY 01	Breeder/parent seeds for seed multiplication process
100	Maize Parental line – CAL 1471	Increase seed availability of parental line from F1 seed production
101	Maize Parental line – CAL 1426	Increase seed availability of parental line from F1 seed production
102	Maize Parental line – CAL 147	Increase seed availability of parental line from F1 seed production
103	Maize Parental line – CL0 2450	Increase seed availability of parental line from F1 seed production
104	Maize F1 seeds – MI Hybrid 03, 04, 05	Increase seed availability of recommended maize hybrids
105	Finger millet -Rawana	Maintained genetic purity of recommended Finger millet variety
106	Finger millet -Oshada	Maintained genetic purity of recommended Finger millet variety
107	Snake gourd- MI-Short	To maintain genetic purity of recommended variety

108	Bitter gourd – MC-43	To maintain genetic purity of recommended variety
109	Ash Gourd – Mk Ash Gourd 01	Purity maintenance & supply Breeder seeds for seed
Forest Department		
1	Tree improvement – tissue culture	Quality planting material
Fruit Research and Development Institute		
1	Development of hybrids and open pollinated varieties and seed production	
2	Climate resilient green technological improvement for food crop production and smart dissemination of technology to ensure food security in Sri Lanka	
3	Development of mandarin model village for commercial production in Sri Lanka (KOPIA)	
4	Development of high yielding and good quality varietal hybrids of pineapple	
5	Develop quality assurance protocol for compost production from organic waste in Sri Lanka	
6	Population improvement, evaluation and selection of fruit crops	
Gem and Jewellery Research and Training Institute		
1	Exploration and assessment of Gem minerals in Sri Lanka	2 final reports and maps
2	Develop a baseline for valuation of gemstones	1 baseline
3	Develop a policy/Technical Guideline for rehabilitation of gem mines	1 policy/technical guideline
4	Promote variety of gem stone; 1) Heat treatment low quality Spinel (Krinchi) in Sri Lanka 2) Modification of Lakmini Gas Furnace	1 value addtion technology, 1 manuscript
5	Pilot biochemical study on exposure assessment of Mecury in small scale Jewellery manufactures in Sri Lanka	1 method, 1 publication

Hector Kobbekaduwa Agrarian Research & Training Institute		
1	Import Ban on Chemical Fertilizers and Other Agrochemicals: Short-term Impacts on the Paddy Sector	Research report
2	Import Ban on Chemical Fertilizers and Other Agrochemicals: Short-term Impacts on Vegetables	Research report
3	Import Ban on Chemical Fertilizers and Other Agrochemicals: Short-term Impacts on Selected OFCs and Potato Crop	Research report
4	Import Ban on Chemical Fertilizers and Other Agro Chemicals: Effects on Floriculture	Research report
5	Study on the Impact of the Current Economic Crisis on Household Food Security in Sri Lanka – Rural Sector	Research report
6	Study on the Impact of the Current Economic Crisis on Household Food Security in Sri Lanka – Urban Sector	Research report
7	A Study on the Impact of the Current Economic Crisis on Household Food Security in Sri Lanka – Plantation Sector.	Research report
8	Income Diversification as a Sustainable Livelihood Strategy for Rural Development: An Assessment of Optimal Conditions	Research report
9	Assessing the nature of human wildlife conflict (HWC) and its impact on the agrarian communities: Data collection and knowledge dissemination	Research brief/report

Horticultural Crop Research and Development Institute		
1	Bitter gourd, Brinjal and cucumber germplasm collection, breeding line development, evaluation and selection towards high yield and quality Hybrid and OP variety development	Local Bitter gourd, Brinjal and cucumber varieties to increase production
2	Location field trial promising lines	Most adaptable promising lines for official release
3	Breeder seed production of released varieties and hybrid parental lines	Availability of sufficient seed stocks for multiplication
4	Exotic Variety evaluation (Bitter gourd, brinjal and Cucumber)	Recommend most adaptable exotic varieties for commercial importation
5	Molecular and tissue culture base technology identification and development for vegetable breeding	Shorten the breeding cycle
6	Mushroom variety development and technology development	
7	Generation advancement, purification and inbred line development of the selected lines of capsicum for the development of new hybrids	High 126anageme local capsicum hybrid varieties
8	Establishment of a base population to develop new OPVs or inbred lines of capsicum.	High yielding better quality OP varieties
9	Development and evaluation of new crosses (F1 hybrids)	Identify superior hybrids and better cross combinations for further evaluation
10	Screening of existing germplasm for abiotic stresses	identify lines with drought tolerant character to utilize in drought tolerant variety development
11	Evaluation of exotic capsicum varieties	Recommend most adaptable exotic varieties for commercial importation

12	Production of Nuclear seeds, Breeder seeds and Parental lines of hybrids	Availability of sufficient seed stocks for multiplication
13	NCVT for 3 tomato hybrids to select most promising varieties to fulfill breeding objective	Selection of most suitable tomato F1 hybrid for further evaluation or/and production of seed of parental lines
14	NCVT for 2 tomato OPV's to select most promising varieties to fulfill breeding objective	Selection of most suitable OPV for further evaluation or/and production of seed
15	Evaluation of F7 generation of a segregated tomato population	Selection of suitable inbred lines with desirable characteristics for use as parental line/s for new crossing program to produce F1 hybrids
16	Identification of suitable parents and their combining abilities to develop new tomato varieties	Selection of best parental line s and cross combinations to evaluate in second season
17	Evaluation of new tomato cross combinations developed at ARS, Girandurukotte	Selection of new F1 tomato cross combinations with desirable characteristics
18	Evaluation of 20 new tomato germplasms	Selection of desirable characteristics of new tomato germplasms which can be utilized to continue tomato crop improvement programme
19	Hybrid variety development (NCVT for 2 okra varieties)	Selection of most promising Okra F1 hybrid variety/ies for further evaluation or/and production of seed of parental lines
20	OP variety development (NCVT for (2) okra OPV	Selection of most promising Okra OP variety/ies for further evaluation or/and production of seed of selected best varieties
21	F2 and F3 segregated population evaluation for inbred line development	Selection of most promising inbred line/s further evaluation or/and for production of F1 hybrids

22	Variety development program of Bean to develop high yielding Bean varieties with root rot/virus resistant, tolerance to heat and water stress and good pod qualities	High yielding better quality Bean varieties resistant/tolerant to biotic and abiotic stresses
23	OP variety development program of Yard Long Bean (Mea) to develop high yielding Mae varieties with desirable pod qualities	High yielding better quality YLB varieties
24	Purification of Krishna winged bean	Availability of good varieties and pure seeds for farmers
25	Breeder seed production of recommended vegetable varieties	Availability of sufficient seed stock
26	Exotic vegetable evaluation prior to importing seeds by private companies	Recommended varieties with good quality
27	Study the effect of agronomic and plant physiological aspects on growth and tuber yield of selected sweet potato varieties	Data on rooting and tuberization Cultivation technique to increase yield
28	Study on cattle manure application and land preparation method on low input cultivation of beans	An agronomic management package for beans
29	Study on Land Preparation Method, Mulching and Organic Manure Application on Low Cost Organic Cultivation of Tomato	An agronomic management package for tomato
30	NARP-Development of integrated strategy for the management of seed-borne bacterial canker disease of Tomato in Sri Lanka.[285-02- 02-15-2507-11 NARP]	Disease confirmation at molecular level
31	DOA/MOA- Biocontrol method (Rhizosphere fungi) for Tomato Early Blight control and plant growth promoting	Bio control method for Tomato Early Blight associated *Alternaria* spp. and a plant growth promoter
32	Endophytic fungal assemblages of capsicum and their effect on plant growth and anthracnose disease control in Sri Lanka	Bio fungicide against Anthracnose disease

33	New disease identification in under-utilized vegetables and tuber crops	Identified new diseases in under-utilized vegetables and tuber crops
34	Collaboration research on “Development of resistant varieties for Bean Horsegram Yellow Mosaic Virus (HgYMV) and Fusarium wilt 129anagem” (Collaboration with breeding division)	Horsegram Yellow Mosaic Virus (HgYMV) resistant bean varieties Fungal root rot resistant bean varieties
35	Biological control method with endophytes/rhizosphere fungi on bean fungal root rot	• Availability of information on effectiveness of identified biocontrol agents (fungi) as biocontrol agents for bean fungal root rot. • Beneficial characters of selected endophytes such as plant growth regulators etc. will be helpful to improve the final crop yield in terms of quality and quantity reducing the environmental damages.
36	Development of nutrient 129anagement package for mitigating of low water stress on tomato cultivation	Nutrient Management package for mitigate the water stress condition in tomato
37	Development of nutrient management package for hybrid vegetables (Capsicum and Tomato)	New fertilizer recommendations for hybrid vegetables
38	Establishment of soil calibration levels for nutrients (N, P, K, Mg. S) for different vegetable crops	Suitable nutrient level in soil for vegetable production
39	Effect of application of calcium nitrate on growth, yield and quality of tomato	Nutrient management for tomato fruit and seed quality
40	Development of nutrient Management package for organic vegetable production	Appropriate nutrient management technology for organic vegetable production
41	Effect of continuous application of compost on vegetable Yield (Observational experiment)	Soil quality changes and vegetable yields obtained due to long term application of compost

42	Screening of Different Varieties in vegetable crops for low input organic farming	Suitable vegetable varieties for low input organic farming
43	Effect of Application of Liquid organic fertilizer on organic vegetable production	Reduction of organic fertilizer rates Introduction of suitable liquid organic fertilizer product
44	Development of field test kit for determine the Phosphorous and Potassium in soil	Low cost field test kit
45	Efficacy testing of special fertilizer	Quality fertilizers for market
46	Heavy metal accumulation in soil and vegetables from different types of organic fertilizers	Data on heavy metal accumulation in soil and vegetables by organic fertilizers
47	Development of Bio fertilizers	
48	Development of specific phosphorus solubilizing microbial (PSM) inoculums to make use them in fixed phosphorus rich vegetable growing soils	Phosphate solubilizing inoculum for vegetables
49	Development of microbial formulations for bio fertilizers using naturally occurring microorganisms for Nitrogen fixation and Phosphorus solublization to increase the crop productivity of vegetable farming systems202	Developed microbial formulations Nitrogen fixing, phosphate solubilizing and potash mobilising
50	Evaluation of MRL and PHI of pesticides	Consumer safety
51	Random analysis of fruits and vegetables for food contaminants	Consumer safety
52	Laboratory developments and activities related to the ISO/IEC 17025; method developments, staff trainings, facing PT/ILC, facing SLAB assessments	To meet with Internationally accepted testing protocol
53	Pesticide formulation analysis; Assessment on Quality assurance of pesticide formulations including its impurities (samples directed by the ROP/ for court cases)	Quality pesticide for better results

54	Evaluation of Pre-harvests (PHIs) and Maximum Residue Limits (MRLs) of selected pesticides through pesticide residue supervision trials in tomato and leafy vegetables	Evaluation of MRLs and PHIs of pesticides through local climatic conditions
55	Evaluation of Agricultural commodities for pesticide residues and heavy metals – random check	Assurance of food safety through residue analysis
56	Analysis of Food crop and water samples taken from SLGAP for food contaminants	Supplying better service for the out stations
57	Determination of pre-harvest intervals of pesticides and assessment of the fate of the pesticides for selected crops (bitter-guard trials will be carried out at two research stations)	Evaluation of MRLs and PHIs of pesticides through local climatic conditions
58	Determination of lead accumulation and distribution in different rice cultivars (Pot trial) and water quality monitoring at water supplies at agricultural areas	Investigate the characteristics of lead accumulation in rice
59	Evaluation of impacts of pre-harvest application of Gibberellic acid on yield, postharvest life and quality of Kolikuttu banana variety Agra (2021-2022)	Quality controlled product
60	Asia Pesticide Residue Mitigation through the Promotion of Bio-pesticides (2021-2023)	Implementing MRLs and promotion of bio – pesticides
61	Field trials to introduce *Diascorea* spp. as an off-seasonal crop	Introduce *Diascorea* spp. As an off-seasonal crop
62	Testing of a method for easy harvesting and reduce root development at the node of Gotukola runners to upgrade quality.	Find easy harvesting and high quality improvement method
63	NCVT developed cassava line	Develop Cassava line
64	Development of farmer friendly harvesting method for *Diascorea pentapila*	Development of farmer friendly harvesting method

65	PYT for developed sweet potato line	D sweet potato line develop Completed
66	Study usage of Cinnomon bark extract fluids to control white flies in cassava	Control of White flies in Cassava
67	Study effect of 2 botanicals to control nematode damage in Innala	Management of nematodes damage in Innala
68	Development of sustainable plant nutrient management package for hybrid vegetable	Identify plant nutrient package for hybrid vegetable
69	Evaluate the adaptability of *Pluerotus ostreatus* a strain from china for growing under local conditions	High yielding mushroom strains
70	Introducing Juncao technology (wild grass) in Oyster mushroom cultivation	Identify more suitable grasses for mushroom cultivation
71	Application of Cinnamon leaf extract effluent for Control of Anthracnose disease in *Diascorea* spp.	Management of anthracnose disease in *Diascorea* spp.
72	Application of different botanicals for Cercospora leaf spot disease in leafy vegetable cultivation LCWZ	To control the Cercospora disease in leafy vegetables
73	Development of high yielding, high quality, basal rot tolerant polon mae variety	Develop of new line
74	Development high yielding, high quality lenairi type brinjal variety	Develop of new line
75	F1 Hybrid and OPV development and seed production	
76	Management of potato tuber moth infestation by using low toxic materials in stored potatoes	Recommend user friendly and safer materials for the management of potato tuber moth in stored potatoes

77	Development of effective trap for control slugs in Up Country Wet Zone	Development of effective non chemical slug control method
78	Pheromone control of Diamond back moth on cabbage	Development of effective and farmer acceptable non chemical DBM control method
79	Identify white grub species and their relative abundance	Knowledge on locally available white grub species and their abundance
80	Optimization of the qRT-PCR protocol to quantify the bacterial wilt pathogen in seed potato production lands	A protocol to quantify the bacterial wilt pathogen in potato growing lands
81	Development of management strategies for bacterial wilt infection in potato growing lands	Suitable soil amendment to manage bacterial wilt infection in potato-growing lands
82	Development of environmentally friendly management strategies for nursery diseases of cabbage	Environmentally friendly nursery disease management strategy
83	Evaluation of fungicide spraying schedules based on weather conditions for efficient management of potato late blight	Fungicide spraying pattern to manage potato late blight under upcountry wet zone condition
84	Potential use of antagonistic bacteria against black rot disease in cabbage	Potential antagonistic bacteria against cabbage black rot disease
85	Development of management strategies for club root disease in cabbage	Management strategy for cabbage club root disease
86	Screening of biological controlling agents to control soft rot & black leg of Potato	Identification of potential bio controlling agents against causal agent of soft rot & black leg of Potato
87	Evaluate the effect of quantity and timing of different organic amendment application on the productivity of potato-vegetable cropping system in UCWZ	Study the effect of quantity and timing of cattle manure, poultry manure and compost on the productivity of potato-vegetable cropping system

88	Soil calibration studies on Magnesium (Mg) and Sulphur(S) for the improvement of yield and quality of potato and Up Country vegetables	Study the effect of Magnesium (Mg) and Sulphur(S) for the improvement of yield and quality of potato and cabbage
89	Breeding of potatoes	Development of high yielding potato varieties locally
90	Breeding of carrot	Development of high yielding carrot varieties locally
91	Effect of anti-browning treatments on quality and shelf life of TJC mango pulp	Blanched SMS treated TJC mango pulp could be stored for 35 days at -12±3 °C.
92	Influence of dehydration method on quality of bell pepper powder	Vacuum dehydration is the suitable technique to produce good quality bell pepper powder
93	Effect of natural ethylene scavenging package based on rice husk charcoal and sepiolite clay on quality of guava.	Sepiolite clay containing active packaging material to prolong the postharvest life of Guava
94	Development of natural food colorant from (*Cucurbita maxima*) pumpkin and its application on food products	Could be applied successfully for selected foods
95	Active packaging on postharvest quality of stored Banana var. 'Seeni'	Quality improvement of Banana var. seeni was received with active packaging received
96	Investigation of the physicochemical and sensory properties of the Arrowroot (*Maranta arundinaceae)* incorporated low-fat ice cream with a natural colorant	Value added products
97	Extraction of natural food colourant from Canistel fruit (*Pouteria campechiana*) and its possible food applications	Could be applied successfully for selected foods such as jelly, laddu, Marshmelows etc.,
98	Development of purple yam (*Dioscorea alata*) ice cream based on soy milk as a nondairy alternative with desired physicochemical and sensory attributes.	Local yam based value added products for food processors

99	Comparison of the Effectiveness of Postharvest Treatments for the Selected Fruit Varieties: Sour Banana (*Musa* AAB cv. "*Embul"*) and Red Lady Papaya (*Carica papaya*) to Meet the Requirements of the Export Market	Cold storage can be used as a postharvest treatment for sour banana. Harvesting at the proper maturity stage will impact on the eating quality of red lady papaya.
100	Development of technology for pumpkin incorporated nutrient bar	Novel value added product for pumpkin
101	Tomato varieties suitable for sauce production as dehydrated powder form	Finding a suitable tomato varieties for sauce production as dehydrated powder form
102	Phytochemical properties and physiochemical properties of bitter gourds of advanced breeding lines	Providing phytochemical and physio-chemical properties of bitter gourds of advanced breeding lines in order to select varieties
103	Study on selection of most suitable brine solution for bottling of tender jack	Best brine solution for bottling of tender jack
104	Comparative study on Induced Ripening and Natural Ripening of 'Amban' Banana (Musa spp.)	Correct technology for induced ripening of 'Amban banana
105	Development and quality evaluation of extruded food products using local yam varieties	50% cassava (var. swarna) and 50% wheat flour with pumpkin powder were used to develop pasta successfully.
106	Identification of a suitable postharvest package for local and export market for locally available cassava varieties	Cassava stored in moist saw dust, waxed with paraffin wax and wrapped with plastic wrap can store for 16 weeks without affect the quality.
107	Comparative analysis of physical, nutritional and nutraceutical properties of available accessions of sapodilla (*Manilkara zapota*) fruit in Sri Lanka	Physical, nutritional and functional properties of Sapodilla fruits and powders were influenced by accession and these findings will eventually help to identify the potential of utilizing sapodilla in food application

108	Characterization of DOA recommended tomato varieties for morphological physicochemical and bioactive/functional components	Study reveals that HTH3, Bathiya and Thilina are suitable for long-distance transportation and processing. Local OP varieties could be better utilized for sauce production by addition of sugar externally
109	Analyzing maturity indices of DOA recommended tomato varieties	The positive relationship between lycopene content and maturity was significant
110	Effect of Variety, and breaking method on quality characteristics of tomato paste	Find effect of variety and breaking method on physiochemical characteristics of tomato paste.
Institute of Policy Studies in Sri Lanka		
1	Livelihoods Insurance from Elephants (LIFE) in Sri Lanka" (Commercial Insurance for Farmers for Human Wildlife Conflict by Elephants)	Report
2	Updating the National Environmental Policy 2004 of Sri Lanka	Report
3	Formulation of the National Cooling Policy of Sri Lanka (NCP)	Report
4	Dialogue Series -Agricultural Value Chains Linkages to Improved Food Systems in Sri Lanka	Report
5	National Value Chain Development, Traceability and Marketing	Report
6	Policy Research Capacity and Influence (PRCI) year 2 - Impact of Fertilizer Ban	Report
7	Geographical Indication (GI) Registration for Ceylon Tea	Report
8	Preparing the FAO Country Programming Framework 2023-2027	Report

9	Food Loss Mitigation in Mango and Tomato Value Chains in Pakistan and Sri Lanka	Report
10	The Ukraine War and its Food Security Implications in South Asia	Report
11	Climate and Sustainability: The Future of Agriculture	Report
12	Strengthening Fiscal Policies and Regulations to Promote Healthy Diets in Sri Lanka	Report
13	Non-state Actors in Education in Sri Lanka: A Country Study	Report
14	Policy Research on Agricultural Labour Markets - Chapter on Opportunities and Challenges for Sri Lankan Agriculture in 4IR Era	Report
15	IPS-KIVU Tobacco Control Extension Program - Identify Targets for Policy Influence which Can Affect Tobacco Consumption	Report
16	How to Reduce Beedi and Smokeless Tobacco Consumption in Sri Lanka?	Report
17	Improve Data and Knowledge for Strategic Planning, Efficiency Improvement and Prioritisation of Health Finance	Report
18	A Cross-country Analysis Aims to Identify the Types and Magnitudes of Social Norms or Context-specific Barriers that Restrict Gender Inequality in the Labor Market	Report
19	Addressing Context-specific Barriers to Female Labour Force Participation in Decent Work in Sri Lanka	Report
20	Improving Active and Retirement Age Social Security for Formal and Informal Private Sector Workers in Sri Lanka	Report

21	IPS-KIVU Tobacco Control Extension Program - Year Two	Report
22	Tobacco Smuggling in Sri Lanka: A Scoping Study	Proposal
23	China's Belt and Road Initiative (BRI): State of Play and a Survey of Stakeholder Perceptions in Sri Lanka	Report
24	Palm Oil Industry in Sri Lanka: An Economic Analysis	Report
25	The Effects of Import Controls on Sri Lanka's Export and the Economy	Report
26	Impact of GSP+ Withdrawal on Sri Lanka's Exports	Report
27	South Asia Development and Cooperation Report	Report
28	Sri Lanka Policy Reforms to Achieve SDGs by 2030	Report
29	Executive Opinion Survey: Global Competitiveness Report	Survey data
30	A Participatory Study on Improving the Pandemic Policy Responses to Reduce Adverse Health Effects on Women Workers in the Export Sector of Sri Lanka	Report
31	Ex-ante Economic Evaluation of Preferential Trade Agreements	Report
32	Estimating the Impact of Fiscal Policy on Inequality and Poverty in Sri Lanka	Proposal

33	Migration and Development Country Assessment to Identify Current National Goals and Priorities to Mainstream Migration into Development Strategies of Sri Lanka	Report
34	Student Migration - Analysis of Student Migration from Sri Lanka	Report
35	Comprehensive Mapping and Assessment of Reintegration Measures in South Asian Colombo Process Member States (Afghanistan, Bangladesh, India, Nepal, Pakistan and Sri Lanka)	Report
36	Country Assessment of the Linkages between Climate Change, Environmental Degradation, and Migration in Sri Lanka	Report
37	Protecting Migrants' Rights and Promoting Decent Work with the South Asia Centre for Labour Mobility and Migrants (SALAM)	Report
38	A Study on Skills, Aspirations and Reintegration Challenges of Return Migrant Workers	Report
39	Comprehensive Landscape Mapping of Current Social Protection Systems in Sri Lanka	Report
40	Improving Active and Retirement Age Social Security for Formal and Informal Private Sector Workers in Sri Lanka	Report
41	The New Face of Hunger: Call for Proposals for Evidence-based Policy Responses for the COVID-19 Crisis	Report
42	Demand for Private Tutoring during COVID-19: An Initial Scoping Exercise for Sri Lanka	Report
43	Impact of COVID19 on Recent Migrant Workers and their Families in Sri Lanka	Report

44	Artificial Intelligence Framework for Threat Assessment and Containment for COVID-19 and Future Epidemics while Mitigating the Socioeconomic Impact to Women, Children, and Underprivileged Groups	Report
45	Social Protection Expenditure Review and Documentation of the Government's COVID-19 Social Protection Response (National Consultant)	Report
46	COVID-19 Low Income Household Survey Analysis	Survey data
Industrial Technology Institute		
1	Enhancing the nutritional status of people by introducing healthy food products from Jak, Pumpkin, Banana and Fish while reducing post-harvest losses of these commodities	
2	Development of Nutritious and Healthy Food Corners for the Children/Adolescents	
3	A stable composites based on Titanium dioxide and clay as an effective photo catalyst for waste water treatment	
4	Purification of Graphite of Sri Lanka as a high value addition	
5	Expanding Ceylon Cinnamon Exports via Research, Development & Innovation for Quality Improvement	
6	Fruit and Vegetables for sustainable Healthy Diets (FRESH) –Work Package 4: Postharvest and Inclusive Markets	
7	Application of anaerobic digestion for the treatment of Poultry processing wastewater and determination of CH_4 and CO_2 emission factors.	

8	Development of 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.	
9	Spray drying of selected fruits, vegetable juices and yam pulps and innovative spray dried powder based product development.	
10	Chemical residues in bovine milk produced by medium and large scale dairy farms and their public health concern in Sri Lanka.	
11	Development of technologies to utilize waste whey in local dairy bio processing industries for the production of value added/functional beverages.	
12	Establishment of a facility for thermal process validation of canned food and low moisture processed food operations in Sri Lanka.	
13	Development of a plant based fungicide formulation to control anthracnose disease of mango and papaya.	
14	Pharmacognostical, chemical characterization and selected bioactive properties of *Canarium zeylanicum* and development of value added products.	
15	Development of new value-added health products incorporating underutilized bioactive medicinal plants to address life style diseases in Sri Lanka	
16	Development of lubricant products from local graphite.	
17	Design of production process equipment and wastewater treatment plant for Graphene production process.	
18	Quality Assurance and risk assessment in commercially available cosmetics products in Sri Lanka.	

19	Study the distribution and quantification of micro-plastics and the accompanied pollutant assemblages in the aquatic environments in Sri Lanka	
20	Study on microbiological physicochemical characteristics and mycotoxin contamination in commonly consumed edible oils in Sri Lanka.	
21	Assessment of claims on intense accumulation of heavy metals; Hg in Puttalam lagoon followed by potential health implications and industrial contributions.	
22	Rapid determination of virgin coconut oil authenticity and quality with -phase II.	
23	Development and characterization of a certified reference material for nutrients, micronutrients and heavy metals from Sri Lankan traditional rice varieties for method validation and QA/QC activities.	
24	Modification of MTS Clay Water Filter to Suppress harmful bacteria activity and other contaminants including fluoride and heavy metals in drinking water	
25	Further development of red clay based superior quality cookware	
26	A Low-cost electrode modified by controlled synthesis of nanofiber network of homo/copolymer of aniline and pyrrole on graphite-clay composite substrate for supercapacitor applications	
27	Demand driven automotive rechargeable cost efficient battery manufacturing technology for SME startups	
28	Preparation of Composite Membrane for Reverse Osmosis Plant	
29	Designing and fabrication of a Water Ionizer	

30	Application of an integrated solution for laboratory wastewater treatment in Sri Lanka	
31	Evaluation of anti-adipogenesis and glucose uptake enhancement potentials of purified herbal extracts against 3T3 L 1, mouse adipocyte cells – Cell based approach for study of anti-diabetic activity	
32	Development of low cost adulteration detection kits for Ayurvedic & food industries	
33	Value addition to fractionated essential oils and their industrial applications	
34	Development of immunity-boosting products incorporating Sri Lankan medicinal plants to prevent infectious diseases	
35	Establishment of taxonomic status, nutrition labelling systems and development of value added products from Sri Lankan citrus varieties	
36	Development of user friendly non-destructive, high tech portable IR device to authenticate and geotagging Sri Lankan bee honey	
37	Development of an in-house PCR based method for detection of plant-based adulterants in Sri Lankan spice Turmeric (*Curcuma longa* L.) and Tea (*Camellia sinensis* L. Kruntze)	
38	Traceability study of organic residual contaminants in dairy supply chain, risks and opportunity assessment and dilating dairy product testing facilities at ITI	
39	Vegetarian food products containing non-synthetic additives processed using less preferred local vegetables	
40	Utilization of selected underutilized and popular root/tuber crops grown in Sri Lanka to formulate healthy and novel food products and food ingredients aiming local and international market	
41	Development of milk – grain functional beverages and food supplements	
42	Establishment of inactivation kinetics for potentially harmful microorganisms associated	

	with thermal processing of king coconut water and coconut milk	
43	Study on the environmental fate of Glyphosate and its major metabolite Aminomethylphosponic acid (AMPA) in soil, sediment and water sources in wet zone of Sri Lanka	
44	Development of a technical guideline to facilitate appropriate disposal of wastewater in the industries those are facing the limitation of meeting 1 : 8 dilution in the receiving waters	
45	Extraction and formation of Titanium alloys from Rutile with cost effective methods than conventional methods	
46	Determination of microplastic contamination of edible salts in Sri Lankan market & identification and quantification of the heavy metals associated	
47	AI based elephant detection & HEC mitigation platform	
48	Development of Infra-Red Thermometer calibration system	
49	Development of Measuring Tape Calibration System	
50	ISO 17025: 2017 Accreditation for the testing parameters of the Petroleum and Lubricant Testing Laboratory	
51	Enhancement of lubricant properties with nano materials incorporation	
52	Development of novel juice extraction techniques for high quality extracts from underutilized agro-based commodities, extract based fermented/powder products and direct targeting and inactivation of food pathogens using nano-biosensing	
53	Formulating meat analogues and plant-based meat products using plant proteins and mycoproteins	
54	Waste to energy-fabrication and development of cost effective briquettes from leftover food waste using organic garden waste as additives	
55	Development of automated system for stopwatch calibration	

56	Development of a nano-based strip for rapid detection of viral diseases	
57	Quality assessment of dried fish in local market	
58	Research &Development Activities for Development of Kithul Industry	
National Aquatic Resource Research and Development Agency		
1	Development of aquaculture and health management to enhance fish production in Sri Lanka	Enhance the fish production in Sri Lanka through new technological application
2	Enhancement of the export-oriented aquaculture industry in Sri Lanka through the development of Ornamental fish, Aquatic plants and seaweed culture technology	• Providing best protocol for micro propagation of *Aponogeton* Species, better growth of the aquatic plant culture industry. • Commercial prawn diet could be recommended to co-cultivate Guppy and Lunuwila plant in simple floating raft aquaponic system
3	Monitoring and assessment of coastal fishery resources	Scientific recommendations for formulation of management and development plans/ policies for fishery resources
4	Monitoring and assessment of large pelagic fishery resources	Scientific recommendations for formulation of management and development plans/ policies for fishery resources
5	Sri Lanka - Norway bilateral project	• Develop an improved data collection system for coastal fisheries with DFAR and MoF. RV "Samuddrika" is technical and operationally suited to conduct fisheries independent surveys. • NARA scientists have the needed Theoretical and practical competence to plan, conduct and report findings from fisheries independent surveys according to

		scientifically recognized norms 3.Reports on the findings from scientific surveys and time series are publicly available. • Scientific papers have been produced, Fisheries independent surveys have been conducted with Sri Lankan vessels as part of time series. Survey results are used for management purposes
6	X – Press pearl environmental impact assessment	
7	Enhancement of quality of fish handled in the supply chain	Modified fish storage compartment within a multiday fishing vessel Quality assessment of Skipjack tuna fish before the modification of the multiday fishing boat Calculation of post-harvest quality loss for Skipjack tuna before the modification of the multiday fishing boat Information on controlling measures of histamine forming bacteria
8	Introduction and popularization of ready-to-eat fish based snack products and liquid fertilization to the Sri Lankan market	Ready to eat snack product and nitrogen rich liquid fertilizer
9	Feasibility study on modification of existing gill nets to fulfill IOTC resolution and promote Pole and line for Skip Jack Tuna	Determine the gill net operating depth in Sri Lanka and compile IOTC resolution
10	Assessment of Water Pollution Status of selected Fishery harbours in the Southern Province of Sri Lanka (Hambanthota, Tangalle, Mirissa, Kudawella, Dewundara)	Identified the status of water safety and quality of fishery harbours in southern province, suitable recommendations to minimize harbour pollution, provide recommendations to relevant government authorities for sustainable management of fishery harbours

11	Investigation of causes for environmental emergencies (e.g mass fish kills, oil and chemical spills, algal blooms)	Ensure clean and Healthy aquatic environment by providing recommendations to the relevant stakeholders, Institutional strengthening in environmental management, increased understanding on environment friendly sustainable exploitation of aquatic resources
12	Value chain analysis of Sea cucumber and edible Oyster in Sri Lanka	Mapped value chains of sea cucumber and edible oysters
13	Tuna Fishing Ground Advisory and Fisheries Information Service	A new forecasting model for bigeye tuna and fishes. Validating the forecast with log book data.
14	Maintenance of sea level station	Archiving historical sea level data, Facility to real time ocean status around Sri Lanka
15	Offshore sand investigations in the continental shelf of the Southwestern coast	To prospect the construction and mineral sand resources selected sites To study the possibility to utilize offshore sand in selected sites for an alternative for river sand To map the continental shelf in terms of Geology and Geophysics
16	Seasonal variability of ocean (boundary) current and other parameters around Sri Lanka	Re-establishing functionality of ADCP. Determine the seasonal variability of selected biological, physical, and chemical parameters. (nutrients, chlorophyll, pH, phytoplankton and zooplankton), Monsoonal influence on the dispersion of micro plastics and marine debris in sub-ssurface
17	Hydrology and water circulation of Lankapatuna Lagoon	• Identification of freshwater flux, tidal flow as the major controlling factor of lagoon property. • Study of water quality, sedimentation, bottom friction and impact

18	National Nautical Charting Program i. Topographic data acquisition for Electronic Navigation Chart Colombo to Weligama ii. Preparation of Electronic Navigation Chart Puttalam Harbour iii. Upgrading the published nautical chart (Colombo Port, Galle Port having discussion with the Harbour Master iv. Bathymetric data collection for Nautical Chart Trincomalee to to Kudremalai Point	i. Electronic Navigation Chart of Puttalam Harbour ii. Updating Existing Chart Colombo, Galle, where it necessary iii. Nautical Chart of Approaches to Puttalam
19	Establishment of database and online data processing unit for crowd sourced bathymetry parallel with the Seabed 2030 global mapping project of General Bathymetric Chart of the Oceans (GEBCO), Nippon Foundation. Updated the database with the collected crowd sourced bathymetry within the EEZ of Sri Lanka	Updated Bathymetric model around the country for understanding underwater topography for decision making on Marine spatial Planning, Environmental protection and conservation, Disaster management and risk reduction, resource management and economic development
Department of National Botanical Gardens		
1	Botanical survey in Hakgala Strict Nature Reserve	Record data threatened plants
2	Conservation of the genus *Diospyros*	Data on phenological behaviour of *Diospyros* sp.
3	Plant exploration in Gampaha district	Record data of plants in sensitive eco systems
4	Morphological and molecular characterization of *Acrotrema* sp.	Location data and molecular data of *Acrotrema* sp.

5	Exploration study of Hill top flora of Sri Lanka	M.Sc. in pharmaceutical Botany completed by student with Adams Peak study. Started with Gartmore area.
6	Strategic reintroduction profile for extinct in the wild (EW) species *Alphonsea hortensis* (Annonaceae)	Recovery work proceeded
7	Strategic recovery plan for natural wild populations of the endemic and endangered species *Osbeckia lanata alston*	Field work
8	Encountering of rare plant species in the proposed cental expressway trace sections	Recovery of species – *Crudia zeylanica*
9	Study of native species in Urban Parks in Colombo	Report compilation
10	Botanical survey	Fern collection enrichment
11	Water quality improvement of Sri Lanka Pond	Testing and presented in JRDC symposium
12	Effect of organic fertilizers in the growth and yield of the medicinal plant *Solanum virginianum* (Katuwelbatu)	B.Sc. degree completed by student. Abstract presented in OUSL congress.
13	Germplasm conservation of selected medicinal plants in Sri Lanka	Field work
14	A new protocol to sterilize explants of *Nepenthes* spp. For *in vitro* culture	
15	Investigation of optimum concentration of growth regulators to enhance flowering of *Jasminum sambac*	
16	Postharvest behaviour of Purple Lily (*Nymphaea erangae*) flowers as affected by harvesting stage and preservative treatments	
17	Investigation of the suitable growth medium and environmental conditions for growth of *Spathiphyllum cannifolium* seedlings	
18	Plant production and novel marketing approaches practices by floriculture growers	

	during the Covid-19 pandemic in Gampaha district	
National Building Research Organization		
1	Development of ISO Standard Sand from local silica deposits for Cement Testing	Standard sand
2	2022-R1) Detailed Structural Appraisal of Old School Buildings In Sri Lanka Constructed in the 1980s and 1990s	Suggestions on rectification methods for the flexural strengthening of the T flanged beam sections and the slab panels
3	2022-R2) Artificial intelligence in nondestructive testing of reinforced concrete structures	An application to predict in-situ compressive strength of concrete using nondestructive methods
4	2022-R3) The Implications of Adopting Eurocodes for Designing Disaster Resilient Buildings in Sri Lanka	To showcase the adequacy of Eurocodes for designing disaster resilient buildings in Sri Lanka and to direct further development of Sri Lankan National Annexes
5	Dimension and the Level of Risk based Classification for Landslides in Sri Lanka	Developing a classification scale for the landslides for the inventories
6	Study on Risk Sensitive Land use Model Development for Landslide High Risk Areas	Developing a predictive and planning tool that will assist in making informed decisions regarding land use and development
7	Hazard identification structural assessment of damaged houses situated in the Hingurakoda DSD and provide recommendations for resilient house construction	Improving the structural integrity of houses to withstand and mitigate potential hazards more effectively
National Engineering Research & Development Centre		
1	Development of machineries required for manufacturing organic fertilizer	1.A engine mounted or motor operated shredder / cutter (medium scale) 2.A tractor mounted shredder/cutter (large scale)

		3.A tractor mounted compost turner
2	Maldives fish dryer for fishing communities	A dryer constructed at a fishing site to produce high quality Maldives fish suitable for fishing community
3	Design and modification and performance evaluation of railway compartment for vegetable and fruits transportation	Design for application of railway compartment for vegetable and fruit transport
4	Design, develop and pilot operation of refrigeration system with storing facility for existing multiday fishing boat	Refrigeration and improved storing facility for multiday fishing boats for improving quality of fish
5	Early Detection system for Landslides and structural stress	Local development of extensometer for detection of landslides
6	Development of Non-plastered smooth finished full wall system for cost effective construction Industry	Technology of construction of light weight wall using form - concrete and cement mixture
7	Designing of a industrial plant to produce Cellulose fibers roofing sheets with NERDC developed technology	A design of industrial plant to produce Cellulose fibers roofing sheets with NERDC developed technology
8	Pilot project by using lightweight block	A model house to demonstrate the application of light weight construction block made using bottom ash of coal power plant, form chemical and cement
9	Design and fabrication of Automated wall painting device	An automated wall painting devise to be used in construction industry
10	Semi-automated tea making and vending machine with adjustable sugar levels	

		A prototype Semi automated tea making and vending machine with adjustable sugar levels
11	Development of Multi input data acquisition system with Mobile interface	A of multi input data acquisition system with Mobile interface for industrial applications
12	Automated Coconut Tree Climbing Device	An automated Coconut Tree Climbing Device
13	Design, development of a human powered tricycle	A locally assembled human powered tricycle
14	Bio-char reactor for municipal solid waste	A prototype bio-char producing system from compost residue installed at Karadiyana compost site.
15	Development of Oxygen Concentrator	Locally fabricated oxygen concentration system to be used in hospitals
National Institute of Fundamental Studies		
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	Food Chemistry	
16	Natural Products	
17	Nutritional Biochemistry	
18	Quantum Physics & Applied Electronics	
National Institute of Postharvest Management		
1	Study on present status of postharvest practices & loss assessment of selected agricultural food crops.	Identification of current postharvest losses in selected fruits and vegetables
2	Economic analysis at different postharvest stages and farmers willingness to store of selected economically important food grains	Identification of storage need and the requirements
3	Design and development of monkey and rat repellent device	Fabricated equipment
4	Reduction of postharvest losses of *Allium cepa L. aggregatum* group by improved postharvest technologies	Reduction of losses during curing and storage

5	Potential of substituting wheat flour by jackfruit and breadfruit flour in food products and evaluating their functional properties and sensorial attributes	Versatile products
6	Effect of carbohydrate profile and gluten content for the replacement of wheat flour with *Dioscorea alata* (raja ala)	Developed products
7	Survey on rice mills and other food grinding mills	Data base development
8	Design and Development of a process line for groundnut oil extraction	Production mechanism for quality oil production
9	Development of a science based protocol for postharvest handing of Avocado	Handling protocol for avocado
10	Potential applications of natural antimicrobial agents for enhancement of fresh fruit quality of mango	quality improvement of fresh mango
11	Characterization of alternative flour types and their combinations as a partial replacement for wheat flour in flatbreads	Reduction of wheat flour consumption together with new product formulations
12	Study the feasibility and design a ventilated trailer for perishable transportation	Reduction of losses during transportation
13	Testing and evaluation of the effectiveness of using low temperature storage as a solution for proper utilization of excess fruit and vegetable production in Sri Lanka	Identification of storage conditions for selected fruits and vegetables
14	Solar assisted dryer for drying and dehydration of perishable commodities	Fabricated solar drier
15	Identification of currently available stored pest in food commodities and evaluating of potential plant based chemicals under plastic hermetic storage container in Sri Lanka	Reduction of postharvest losses in grains at storage
16	Comparison of air conditioned sales and roadside ventilated sales of selected fruits, vegetables and cut flowers in terms of qualitative and quantitative postharvest losses	Identify the factors affect for the quality deterioration of perishables at road side markets
17	Effect of different postharvest treatments on shelf-life extension of fresh cassava roots (*Manihot esculenta*) for sea transportation	Developed protocol for cassava sea transportation

18	Utilization of processing waste of pineapple for cider production. Research was funded by Say Lanka Earth (PVT) Ltd, Kandulawa, Ibbagamuwa	
19	Development of minimally processed 'mallum' mixes from leafy vegetables. Research was funded by Sdaharitha Plantations, Anuradhapura.	
20	Studying effectiveness of commercial level parboiled rice production process with or without removing of chaff grains in paddy soaking. Research was funded by New Tharaka Rice Processing Center, Ralapanawa, Nochchiyagama.	
21	Development of Aloe Vera based value added products special reference to producing jelly and dry powder. Research was funded by Ceylon Agri Ventures, Dharmapala Mawatha, Anuradhapura	
22	Strengthening Sri Lanka's efforts to quantify greenhouse gases related to post harvest losses. Research was funded by New Zealand Greenhouse gas research center, Palmerstone North, New Zealand.	
23	Effects of anti-browning treatment and wax application with wrapping treatment for shelf life extension of tender king coconut under low temperature	
24	Development and quality evaluation of dehydrated vegetable curry from pumpkin (*Cucurbita maxima*) and tender jack fruit (*Artocarpus heterophyllus*	
25	Development and quality evaluation of *Aloe vera* pickle	
26	Preparation and evaluation of the storage quality of green chili (*Capsicum annuum* L.) sauce in mint (*Menthe piperita*)and Tabasco pepper (*Capsicum frutescens* L.) flavours, preparation and evaluation of the storage quality of green chili (*Capsicum annuum* L.) sauce in mint	

	(*Menthe piperita*) and Tabasco pepper (*Capsicum frutescens* L.) flavours	
27	Effects of different drying treatment on preparation of dehydrated tamarind powder (*Tamarindus indica* L)	
28	Study on the alternation of physical properties, milling, nutritional and cooking qualities of improved rice varieties during the storage	
29	Development of a plant based product in controlling storage pest of maize	
30	Potential application of papaya leaf extract in controlling major postharvest diseases of Guava (*Psidium guajava* L.)	
31	Development of a skin moisturizing gel with *Aloe vera* and natural Occlusive oil	
32	Present Status of post-harvest practices of Guava (*Psidium guajava* L.), Bitter gourd (*Momordica charantia*) in Anuradhapura and Kurunegala District	
33	Health Safety of guava products in selected guava production system in Anuradhapura district	
34	The effects of wax coating combine with modified atmospheric packaging for shelf life extension of apple masan (*Ziziphus maurutiana*) fruit	
35	Effects of milling and particle size on development of bread from cassava (*Manihot esculenta*) flour combined with wheat flour	
National Plant Quarantine Service		
1	Morphological and molecular identification of weeds in export ready coir samples	
2	Investigation on the presence of *Xylella fastidiosa*; quarantine pathogen in potential host plants in Sri Lanka.	The investigation carried out to confirm that Sri Lanka has the country freedom of contamination with *Xylella Fastidiosa*
3	Characterization of causal agent of soft rot in *Aglaonema maria* and exploring the expression of defense-related genes	The causal organism was identified and confirmed as *Dickeya fangzhongdai* and the test bacteria was identified and confirmed as *Bacillus velezensis* which

		is to be used as the biocontrol agent to control the soft -rot disease in *Aglaonema maria.*
4	Investigation of fungi and bacteria associated with imported liquid bio-fertilizer from Australia	To identify the fungus and bacterial strains already recoded by Australia
Natural Resources Management Centre		
1	AFACI - Development of the Soil Atlas of Asia and National Soil Information System	
2	Soil Erosion/ Deposition assessment using a nuclear technique in the Payindikulama tank command area, Anuradhapura district	
3	Assessment of Atmospheric Nitrogen Pollution Sources, Impacts on Environmental Sustainability, Human Health and Remedial Measures in Three Unique Pollution Regions in Sri Lanka	
4	Assessment of decomposition and Nutrient Release Pattern of Different Organic Manures under Mung bean cultivation in the Mid Country Intermediate Zone of Sri Lanka	
5	Exploring and mapping potential areas for Mango, Pineapple & Banana, and other Priority fruits crops based on resource suitability and availability of Land	Suitability area Maps
6	Predicting soil erosion susceptibility associated with climate change scenarios in the Central Highlands of Sri Lanka	Research
7	Assessment of rainfall variation to revitalize rainfall Erosivity map of Sri Lanka	Map
8	Preparation of an Inventory on Climate Smart Agriculture Technologies and Scaling up Climate Smart Agriculture Technologies in Sri Lanka	CSA Technologies Inventory
9	Study of Decomposition and Nutrient Release Patterns of Different Organic Manures	Research

10	Improving Land and Water Productivity of water scarce sloping lands in Mid/Up Country Intermediate Zone through efficient gravity pipe irrigation systems	Report
11	Seasonal and monthly agro-met advisories	Advisories
12	The combined effect of EI-Nino southern oscillation (ENSO) & Indian Ocean Dipole (IOD) events on the rainfall regime of Sri Lanka	Researches
13	Impact of the El-Nino Southern Oscillation and Indian Ocean Dipole Phenomena on the paddy production of Sri Lanka	Researches
14	Identification of sources and transport of agro-contaminants in hilly agricultural watersheds in the declared conservation area in Sri Lanka	Researches
National Science Foundation		
1	Investigation on biological control measures for white root disease of rubber to improve integrated disease management strategies	Socio-economic development of the country, Knowledge creation and knowledge enhancement, Infrastructure development
2	Development of in-country Ethephon formulations to promote low cost harvesting systems for rubber plantations in Sri Lanka	
3	Bacteriophage-mediated biocontrol of soft rot in carrots (*Dacus carota*) caused by *Pectobacterium* spp. in Sri Lanka	
4	Effect of virgin coconut oil and selected edible oils on the intestinal absorption of chlorogenic acid: an in vivo and in vitro study	
5	Design and synthesis of novel pullulan and chitosan-based nano-polyplexes for gene therapy	
6	*In vitro* evaluation of biocompatibility and antimicrobial properties of Hydroxyapatite Nanoparticles and their composites derived from naturally occurring Sri Lankan minerals for biomedical and water purification applications	
7	Development of effective sunscreen formulations from Sri Lankan medicinal plants	

8	Chemistry and bioactivity of endophytic fungi from four popular condiment plants *Curcuma longa*, *Myristica fragrans*, *Syzygium aromaticum* and *Zingiber officinale* used in indigenous system of medicine in Sri Lanka: possible applications in health and agriculture	
9	Synthesis of colloidal quantum dots for infra-red photo detection and solar cells	
10	Computational studies on inhibition of epigenetic modifications of cancer codes	
11	Development of highly efficient and environmentally stable perovskite solar cells and perovskite solar panels by industrially viable methods for power generation	
12	Building a 3D air pollution model for the city of Kandy: a platform to evaluate health outcome	
13	Evaluation of anti-Candida activity of selected medicinal plants in Sri Lanka against oral candidiasis in cancer patients	
14	Tick borne spotted fever group rickettsioses in the Central province: type of pathogens, vertebrate reservoir host community composition and tick species involved in circulation and maintenance of pathogens	
15	Optimization of bead-based SELEX for selection of aptamers and evaluation of a novel real time PCR based approach for monitoring SELEX	
16	Genetic Dissection of polyethylene degradation ability of *Perenniporia* sp. isolated from decaying hard woods in Sri Lanka	
17	Investigation of alternative stabilizer for soil and develop low cost, eco-friendly load bearing walling material	
18	Optical injection locking and characterization for direct modulation in optical communication	

19	Novel materials for secondary sodium-ion batteries and proton exchange membrane fuel cells	
20	Optimization of donor acceptor materials for fabrication of efficient solar cells	
21	Novel nanoparticle (M=Ti/V/CdS/CdTe)-graphene based material for lithium ion batteries and solar cells	
22	Development of carbon-based nanomaterial for counter electrodes in dye sensitized solar cells	
23	Development of novel predictive based Smart Distribution Management System (S-DMS) to maximize the rooftop PV absorption capacity of last mile networks	
24	Optimization of bio refinery processes for conversion of rice straw extracted cellulose to platform chemicals	
25	Design, Development and Modelling of a Thermo-Acoustic generator for low grade heat recovery	
26	Systematics and phylogenetic relationships of Murine rodents of Sri Lanka	
27	Studies on ecology of *Typha angustifolia*, its current and potential uses to develop a community-based management strategy to control its invasion in the Man & Biosphere (MAB) wetland reserve at Bundala	
28	Taxonomic study of the Sri Lankan species, belonging to Family *Elaeocarpaceae*	
29	A study to evaluate the effect of clinical pharmacy interventions on management outcomes in Chronic Kidney Disease of uncertain etiology patients undergoing hemodialysis in Sri Lanka	
30	Identifying colorectal cancer specific autoantibodies and their role in diagnosis, prognosis and prediction of colorectal cancer	

31	Dengue transmission intervention using lure-based adult suction traps and gravid Aedes traps (GAT): A cluster randomized trial approach in Jaffna municipal area.	
32	Establishment of a center of excellence and a research hub on Diabetes and NCD epidemiology and a national research program on diabetes and non-communicable diseases epidemiology	
33	Development of tools for Screening and Treating Diabetes and related foot Complications Through Biomedical Engineering Innovations	
34	Innovative tools and strategies for surveillance and control of dengue: 2017 - 2020	
35	Development of an early warning system, a risk map and a prediction model for dengue and establishment of roles of asymptomatic carriers and brackish water derived mosquitoes in dengue transmission in Jaffna District	
36	Study of Risk factors affecting Transmission of Dengue in the District of Gampaha	
37	Developing an effective epidemiological surveillance system for dengue in Southern Province of Sri Lanka.	
38	Proactive Dengue Management System (ProDMS)	
39	Identification of the true burden and associated complications of dengue and related viral infections in Sri Lanka and finding long lasting solutions, through in depth understanding of the pathogenesis for development of therapeutic targets.	
40	Strengthening the Cancer Information Systems in the Ministry of Health [Hospital Information System (HIS); electronic Morbidity and Mortality System (eIMMR); National Cancer Registry (NCR)]	

41	Sri Lankan Inherited Cancer Biobank (SLICBB) & Sri Lankan Inherited Cancer Genetic Variation Database (SLICGVDb)	
42	Biomarker Discovery in Haematology – Myelodysplastic Syndromes	
43	Novel Biomarkers of Breast Cancer in Pre and Post-Menopausal Women Predictive of Therapeutic and Prognostic value	
44	Identification of new cancer biomarkers and validating existing biomarkers for the Sri Lankan setting and identification and development of anti-cancer compound libraries	
45	Nationwide surveillance, quantify burden of NCDs, development of case definition and biomarkers for CKDu	
46	An exploratory study on environmental, genetic and dietary determinants of chronic kidney disease of uncertain aetiology based on postmortem tissue analysis	
47	Immunomodulation associated with CKDu progression, of Sri Lanka	
48	Risk Analysis if the Landslides at Morawaka Kanda Area in Matara District	
49	Comparative Analysis of Climate-Resilient Biodiversity of Home garden ecosystems in different Agro-ecological Regions of Sri Lanka	
50	Assessment of Spatial Impacts of Climate Change on Geographic, Economic and Social Vulnerability on the Plantation Sector in Sri Lanka	
51	Understanding the long term influence of Indian Ocean Warm Pool and Indian Ocean Dipole on the monsoon variability of Sri Lanka	

52	Quantification of the response of tropical rain forests of Sri Lanka to varying atmospheric temperature for prediction of the impact of future climate change on their carbon balance and biodiversity	
53	Assessment of vulnerabilities and challenges on Quality of Life (QoL) of national ageing population due to climate change risks	
54	Development of in-vitro protocol for mass production of micro rhizomes of Turmeric (Curcuma longa L.)	
55	A research study to identify suitable location for onion production promotion through true seeds in the potential areas of North Province of Sri Lanka	
56	Development of Innovative Shelter Hospital Buildings for Infectious Diseases	
57	Development of an Electronic Detection system for rapid diagnosis of COVID-19 caused by SARS-CoV-2	
58	Enrichment mechanisms of CKDu-risk factors in ground waters, their uptake pathways and potential remedies	
59	Assessment of aquifer quality in relation to chronic kidney disease with unknown aetiology in dry zone of Sri Lanka through an integrated approach using isotopes and water chemistry	
60	Membrane fouling mechanism and control of high-pressure membrane processes (NF/RO) and electrodialysis (ED) purifying groundwater with DOM and high hardness in CKDu affected areas of Sri Lanka	
61	Genetic characterization of drug resistant Mycobacterium tuberculosis isolates from Sri Lankan and Pakistani TB patients and identification of associated biomarkers	

62	Preparation of cost-effective synthetic skin grafts for the treatment of burns and chronic ulcer wounds: bioactivity directed investigation of angiogenic and cell-migration potentials of plant extracts	
63	Novel urinary biomarkers for early detection of Chronic Kidney Disease of Unknown Aetiology (CKDu) in Sri Lanka	
Office of the Registrar of Pesticides		
1	Developemnt/validation of test methodologies and identification of toxicity status of twenty selected comonly used insecticides on local honey bee (Apiscerana) to ensure pollinator safety	Pesticide toxicity database for *Apis cerana* (local honey bee)
2	1. Determination of residue behavior of some insecticides on cabbage 2. Detrmination of residue behavior of some insecticides on Brinjal	Pre-harvest intervals established for pesticides
Palmyrah Research Institute		
1	Characterization of activated charcoal prepared from palmyrah seed and formulation of hand wash	Publication
2	Extraction, modification and characterization of palmyrah tuber starch and its applicability as thickener.	Publication
3	Effect of different stabilizers on the consistency of palmyrah Ready to Serve drink	Publication
4	Production of yeast extract spread	Publication
5	Formulation of Ayurvedic bathing soap with reduced alkali content enriched with antioxidant and antimicrobial properties	Publication
Plant Genetic Resources Center		
1	Study the storage behavior of selected crop species (chilli, brinjal and okra) under hermetic conditions for long term conservation in seed Genebank	
2	Molecular and morphological characterization of selected traditional rice varieties towards	

	identification of accessions responsible for resistance to Brown plant-hopper	
3	Genetic diversity assessment and evaluation of selected crop wild relatives in Sri Lanka for crop improvement	
Plant Protection Service		
1	Establishment of Surveilance and forecasting system for major insect pest of food crops, weeds and pathogens in Sri Lanka	Initiate the national level pest (insects and allied species, pathogens, weeds) surveilance system and minimize the crop losses due to pest damages
Rice Research and Development Institute		
1	Development of new rice variety for 4 month Stress tolerant rice varieties for AFACI member countries	To select salinity, submergence and drought tolerant lines
2	Closing Rice Yield Gap in Asia (CORIGAP)	Land consolidation, facilitate for mechanization and increase productivity
3	Prevention of migratory pests in Asian region - AFACIPMP	
4	Near canopy environment & occurrence of heat induced spikelet sterility	Study the near canipy environment and use of IR64 EMF rice line to develop new rice varieties to avoid heat induced spikelet sterility.
5	Improvement of root characteristics of rice varieties along with the new plant type adaptable to LCWZ	To develop high yielding new rice varieties with good root structure
6	Brown leaf spot and grain discoloration of rice	Identification of resistant & susceptible sources and management of the disease.
7	Productivity improvement of rice through maximizing K and water	Productivity improvement
8	Phosphorus bio fertilizer on seed paddy production of Bw367 and Bw312	To reduce the Phosphorus fertilizer usage in rice cultivation
9	Morpho-physiological characteristics to enhance the yield	Development of new rice varieties with high yield
10	Long term effect of single application of Biochar	
11	Novel breeding tool to develop Gall midge resistance rice	To develop GM resistant rice lines.

12	Germplasm study on drought tolerant of rice	To select drought tolerant rice lines/varieties
13	Development of reliable screening technique for Fe toxicity tolerance	To develop reliable screening technique for Fe toxicity tolerance
Rubber Research Institute		
1	Breeding Selection and Evaluation of new Genotypes using Conventional and Molecular Breeding Strategies	1.Adding 50 new widening the gene pool with superior 2. Add minimum 40 genotypes to the evaluation process 3. Conservation the breeding pool for future use 4. Strengthen the breeding pool
2	Improvement of nursery and propagation techniques, field establishment and immature upkeep	Reduction of cost of production, Productivity improvement
3	Intercropping diverse crop species with rubber for land productivity improvement and additional income generation	Land productivity improvement and additional income
4	Testing of different tapping systems for better bark management and productivity improvement	Productivity improvement
5	Crop protection and microbiological aspects to improve the sustainability of rubber plantations.	Successful disease management
6	Studies on the New Leaf Disease	Correct disease diagnosis and Successful disease management
7	Evaluate the effectiveness of environmental friendly agro-management practices for enhancing fertility in rubber soils	Enhance plant growth
8	Introduction of new fertilizer mixtures for nontraditional rubber growing areas	Enhance soil fertility and plant growth
9	Effect of nutrient management on the *Pestalotiopsis* disease in rubber	Enhanced plant growth
10	Establishment of site specific management zones under traditional rubber plantations for variable rate fertilizer (VRF) application via geo-spatial and geo-statistical approaches	Enhance soil fertility and plant growth
11	Evaluation of the Effect of micro nutrient and Silicon for growth performance of rubber nursery plants	Enhanced rubber nursery plant growth

12	Issuing certification for land suitability, site specific fertilizer applications and analyzing fertilizer samples	Optimize fertility usage efficiency
13	Research, development and commercial introduction of low intensity harvesting strategies	Sustainable harvesting stratergies
14	Research and development on biochemical and physiological aspects to improve the sustainability of rubber farming	Productivity improvement
15	Expansion of rubber cultivation to nontraditional areas	Issuance of recommendations for drier climates
16	Improving the reliability of interpretations of research projects through appropriate statistical	Reliable recommendations through appropriate statistical methodologies (Experimentations, Analysis & Interpretation)
17	Analysis on Socio-economic implications & sustainability issues of rubber cultivation and different	Provision of policy directives for rubber products manufactures
18	Establishment of accredited laboratory and enhancement of testing facilities for rubber industry in Sri Lanka	Introduce new test methods request from the industry Training programmes on laboratory testing
Seed Certification Service		
1	Studying the occurrence of high percentage of hard seed in Green gram, variety MI 6. (*Vigna radiata L.*)	Recommendation on solving the hard seed problem
2	Determination of most suitable pod range for the seed yield and quality of Okra	Seed quality enhancement through upgrading the seed production technology of Okra
3	Studying the possibility of using the pods of side branches of the okra plant to produce seeds	Recommendation to seed producers on possibility of using the pods of side branches
Sri Lanka Atomic Energy Board		
1	RAS1027 Improving the Utilization of Nuclear Technique s for Cultural Heritage Characterization, Consolidation, and Preservation	Preservation and biocidal treatment of cultural artifacts
2	RAS 1024 Reutilizing and Recycling Polymeric Waste through Radiation Modification for the Production of Industrial Goods	Recycling of plastic waste and development of industrial goods out of waste plastics

3	J 02014 Advancing Maintenance, Repair and Calibration of Radiation detection equipment	Development of Personal Radiation Detectors with networked operation and alarm integration
4	RAS 5091 Assessing and Mitigating Agro-Contaminants to Improve Water Quality and Soil Productivity in Catchment s Using Integrated Isotopic Approaches (RCA)	To improve agricultural catchment, water, and soil management practices in the Asia– Pacific region by enhancing the capacity of countries to assess and mitigate agricultural contaminants
5	RAS 7028 Enhancing Regional Capabilities for Marine Radioactivity Monitoring and Assessment of the Potential Impact of Radioactive Releases from Nuclear Facilities in Asia-Pacific Marine Ecosystems	Determine the radioactivity level (both natural and anthropogenic) in Sea water and Sediments
6	RAS 7037 Enhancing Wetland Management and Sustainable Conservation on Planning	Stable isotope applications for Trophic level discrimination for aquatic fish species
7	Pilot project on Geochemical Approach on Verification of the Origin of 'Ceylon Tea'	Development of Ceylon tea origin verification model
8	IAEA CRP 21090 - Developing a screening method to detect palm oil adulteration in coconut oil using FTIR technique	Developed methodology for the screening of adulterate d coconut oil with palm oil using FTIR-ATR
9	IAEA CRP 21090- Developing an analytical method to detect melamine in animal Vitamin Mix using FTIR	Developed methodology for the detection of melamine in animal Vitamin mix using FTIR-ATR
10	Applying Isotopic Fingerprinting to Authenticate Sri Lankan Coconut Kernel Products to Protect and Promote in International Market	Development of origin verification model for desiccated coconut
11	IAEA RAS 5087, Promoting irradiation by EB and X-Ray technology *to enhance food safety, security and trade*	Knowledgeable decision on establishment of an EB/X ray irradiator
12	RAS7040 Assessment of Climate Change Impacts on Groundwater Sources in Malala Oya Basin in a Sem-iArid Region in Sri Lanka, Using Isotopic and Chemical Approaches	• Recharge mechanism, water quality variations, source of salinization and water level fluctuations identified under different climatic

		condition s in the Malala Oya basin of Sri Lanka. • Comprehensive report, database and maps on the groundwater dynamics, quality and contaminants on shallow and deep groundwater system in Malala Oya basin. • Policy documents prepared on safe extraction of groundwater under different climatic condition s and enhance in the use of isotopic technique s for water resources management for the increased accessibility for the safe and clean drinking water in the country.
13	IAEA/RCA Project - RAS/7/035:Enhancing Regional Capability for the Effective Management of Groundwater Resources Using Isotopic Techniques	Natural and anthropogenic pollutants /contaminants identified in the shallow coastal aquifer system from Colombo, Negombo, comprehensive report on groundwater dynamics quality and contaminants of CN aquifer system Out comepolicy document prepared
Sri Lanka Institute of Nanotechnology (Pvt)Ltd		
1	Development of Textile Dye material	New textile dye
2	Development of fertilizer	New fertilizer mixture
3	Herbal cosmetics development	New cosmetic product
4	Development of post-harvest shelf life extender	New composite material
Sugarcane Research Institute (SRI)		
1	Enrichment of *Saccharum* germplasm through local expeditions/importation and quarantine	Enrichment of germplasm
2	Conservation of *Saccharum* germplasm	
3	Hybridization for 2022 series for commercial attributes and true seed processing	Selection of sugarcane varieties for commercial cultivation
4	Seed sowing and establishment of seedling nursery	

5	Varietal evaluation – Stage 1 to III, PYT, RYT	
6	Evaluation of sugarcane varieties in different sugarcane-growing areas in Sri Lanka	
7	Clonal selection of 200 sugarcane families of SL 2018 series through family evaluation	
8	Evaluation of genetic variability of *Saccharum officinarum* through *in-vitro* mutagenesis in callus culture technique	Evaluation of genetic variability of *Saccharum officinarum* through in-vitro mutagenesis in callus culture technique
9	Gene expression studies related to the sugar content and maturity of variety SL 96 128	Develop a protocol to identify maturity patterns easily
10	Characterization of *S. officinarum* using molecular and cytological methods	Identification of genetic variability
11	Development and selection of sugarcane varieties for green economy	Identification of recommended sugarcane varieties
12	Evaluation of new sugarcane varieties of 2004 series for maturity patterns	Identification of maturity pattern of 2004 series varieties
13	Investigation of the effect of agronomic practices on soil improvement in organic sugarcane cultivation	Introduction of soil improvement technics for organic sugarcane
14	Investigation of non-chemical weed management techniques in organic sugarcane	Identification of suitable weed management technique for organic sugarcane
15	Analysis of agro-meteorological conditions of major sugarcane-growing areas in Sri Lanka in 2022	Collection and providing agro meteorological data to relevant parties and department of meteorology
16	Production of seed cane and expansion of sugarcane cultivation for small-scale processing industries in Kilinochchi	Providing seedcane for sugarcane growers
17	Development of organo-mixed fertilizer pellets for sugarcane by using low-cost sugarcane industry by-products	Increasing fertilizer use efficiency and reduce wastage
18	Evaluation of response of the sugarcane variety SL 96 128 for N, K and Zn on its cane yield and quality parameters (continuation)	Increase productivity and profitability of sugarcane
19	Management zone based site-specific fertilizer management for sugarcane cultivation in Sri Lanka.	Improving the fertilizer recommendation up to site-specific level
20	Appropriate organic-based plant nutrition study for commercial sugarcane cultivation	Identify the most economical amount of organic compost to increase the productivity, and profitability

21	Development and testing improved organic amendments for sugarcane cultivation	Recycling of sugarcane industry by-products in an efficient manner in sugarcane crop nutrition
22	Evaluation of the suitability of compound fertilizer for sugarcane cultivation in Sri Lanka (this will be done if funded by CIC Agri businesses Pvt Ltd)	provide useful information on using compound fertiliser in sugarcane
23	Analysis of soil, plant and sugar samples for other divisional research needs and industry needs	Provide analytical facilities for research divisions and sugar industry
24	Development of IPM package to manage sugarcane pests in Sri Lanka	Incorporating novel strategies to the IPM packages of moth borers and WLD vector
25	Development of IDM package to manage sugarcane diseases in Sri Lanka	Introducing a sustainable, economical eco-friendly disease management of strategies to manage the major sugarcane diseases in the industries.
26	Development of sugarcane-based value-added products	Making available knowledge and technologies for sugarcane-based value-added products
27	Rectification of milling standard for improvement of processing efficiencies in local sugar factories	Improved processing efficiency in local sugar factories Improved processing efficiency in local sugar factories
28	Isolation of plant grown promoting microorganisms from diverse environment for bio-fertilizer formulation	Making available knowledge and technologies for production of bio-fertilizer
29	Operational evaluation and energy efficiency improvement of Hot Water Treatment (HWT) plant operates at different sugar industries and SRI	Making available modified hot water treatment plant
30	Application of system approach concept to the Appropriate Mechanization, Energy optimization and Smart Agriculture (AMEOSA) for improving the productivity of sugarcane farming.	Smart Agriculture (AMEOSA) for improving the productivity of sugarcane farming
31	Construction and maintenance of protected fences for sugarcane	Protection of sugarcane research fields
32	Repair and maintenance of vehicles, tractors and farm implements	
33	Economic assessment of new sugarcane technologies	Minimize cost of production of sugarcane and sugar production Continuous

34	Economic assessment of sugarcane cultivation and sugar production in Sri Lanka for the year 2021	Introduce policies and measures for the sugarcane industry development
35	Support design , conduct and data analysis of research	Improve the quality of the research conducted by SRI
36	Development of appropriate protocol for detection of smut reaction of the sugarcane varieties	Accurate detection of smut reaction of the varieties
37	Maintaining and updating SRI web site	Improve the sugar industry and its technology and research related awareness of the country
38	providing it related services to the other divisions of SRI	Improve the quality of the research conducted by SRI

Annexure 04 - New Products Developed

Arthur C. Clarke Institute for Modern Technologies	
1	Sensor Based Automation of Water Taps
2	Remote parameter monitoring, logging and alarm system for switch endurance tester
3	Remotely monitoring Water level (SCADA system)
4	Nano Satellite developments-KITSUNE
Coconut Research Institute	
1	Coconut flour added bread
2	Coconut cheese
Department of Census and Statistics	
1	Android applications
Department of Export Agriculture	
1	Cinnamon flavored crackers
2	Cinnamon infused ready to serve beverages (Jack fruit/Nelli)
3	Cinnamon bark oil and cinnamon powder incorporated millet cookies
Horticultural Crop Research and Development Institute	
1	Development of low-cost field test kit for analysis of phosphorous in soil and provide soil health card for rice growing farmers to promote the soil test-based fertilizer recommendation
2	A new technology on cultivate sweet potato in bags or pots was released through Technology releasing committee of DOA. This technology is ideal for home gardens to ensure food security of households.
3	Determination of bioavailability of potentially toxic trace elements (As, Cd, Cu, Pb, and Zn) in soils in Major Vegetable growing areas in Sri Lanka; It reveals that trace elements concentration in vegetable crops was also below the maximum permissible level imposed by FAO/WHO and estimated dietary intakes of the trace elements in vegetables were far below the Provisional Tolerable Daily intakes recommended by FAO/WHO.
4	Nutrient enriched orange flesh sweet potato noodles
5	Production of ice-cream, a novel product enriched with β- carotene using Orange fleshed sweet potato powder

6	Investigation of the physicochemical and sensory properties of the Arrowroot (*Maranta arundinaceae)* incorporated low-fat ice cream with a natural colorant
7	Development of purple yam (*Dioscorea alata***)** ice cream based on soy milk as a nondairy alternative with desired physicochemical and sensory attributes
8	Development and quality evaluation of extruded food products using local yam varieties
9	Production of banana chips using five banana varieties
10	Development of natural food colorant from **(***Cucurbita maxima***)** pumpkin and its application on food products
11	Parasitoid for control Aphids
12	The predator for control Aphids
13	*Helicoverpa armigera* Biocontrol
14	Bacterial Bio-pesticides
15	Fungal Bio-pesticides
National Building Research Organisation	
1	Landslide data base, Web portal
2	Natural or ecological methods to reduce landslide risks
3	MOBILISE 3.0: Mobile app
National Engineering Research & Development Centre	
1	Tractor mounted compost turner for manufacturing organic fertilizer
2	Engine/motor mounted shredder/cutter medium scale for manufacturing organic fertilizer
3	Tractor mounted large scale shredder/cutter for manufacturing organic fertilizer
4	Maldives fish dryer of 1000 kg per batch capacity suitable for fishing community., to produce good quality product
National Resarch Council	
1	Modified Nutrient Expert decision support tool
2	Model water treatment plant
3	Super sand unit
4	Intelliegnt wheelchair robot
National Science Foundation	

1	Develop a combination of sensor detection system to overcome the technical and non-technical problems encountered during Truck Trailor operations in a road
2	Fabrication and scaling up of an industrial reactor for the purification of waste oil-water of the service stations
3	Production of a coconut de-husking machine
4	Produce bio-fertilizer using microbial inoculant
5	Developed low-cost particle filter analyzer for face masks
Palmyrah Research Institute	
1	Formulation of bathing bar
2	Formulation of hand wash
Rice Research and Development Institute	
1	Produced breeder seeds of about 30 rice varieties and foundation seeds of several rice varieties
Rubber Research Institute	
1	Released five interim clones
2	Tyre tread compound was developed
3	Crepe rubber based fishing baits were developed
4	Crepe rubber based dental device was produced
5	Crepe rubber based erasers
6	Novel rubberized-coir based slipper sole
Sugarcane Research Institute	
1	Production of suitable combinations of organo-mineral fertilizer pellets and maintaining a research trial up to ratoon 1 to evaluate their performance on sugarcane cultivation
2	Ethanol extract from *Lantana camara* leaves, *Leucaena leucocephala* leaves and pods is effective in the seed set dipping technique to protect seed sets from termites at the early germination stage
3	Neem seed ethanol extraction is effect over Sugarcane Woolly Aphid and *Pyrilla perpusilla* Walker management at 10% (W/V) concentration
4	Ethanol and methanol extractions of *L. camara*, 25 g/l concentration is effective for white leaf disease (WLD) vector management
5	Producing 2402 kg of jaggery from the cane harvested at field trials
6	Completing the fabrication of a prototype of four-wheel tractor-mounted pellet fertilizer applicator (SRI-FX 401) and testing it in Uda Walawe and Gal Oya sugarcane fields

7	Completing 95% of construction activities of trash cutting machine (Prototype) SRI-TX 401
8	Fabricating drip pipe laying machine (SRI- IRX 401)
9	Continuation of compost production in compost unit in research farm and produced 100mt of compost using waste matter.
Tea Research Institute of Sri Lanka	
1	TRI 5002, TRI 5005 and TRI 5006 have been recommended and released for Uva region

Annexure 05 - New Processes

Coconut Research Institute	
1	Protein isolation process
Department of Census and Statistics	
1	Development of android applications for e-census and surveys
Fruit Research and Development Institute	
1	Two promising lines of Papaya with high yield good quality and moderate resistance of Papaya Ring Spot Virus were selected for further evaluation
National Building Research Organization	
1	Landslide Information Management System
2	Nature based landslide mitigation
3	Digital Toolset for Building Resilient Communities
National Research Council	
1	Production of fermented non-alcoholic beverages from thermotolerant acetic acid bacteria
2	Process for inhibition of batabical nitriification
3	Production of mosquito repellents using underutilized volatile oil producing plants
National Science Foundation	
1	Synthesis materials such as gloves, cables, etc. using Sri Lankan dolomite and testing the unique properties
2	Introduce most effective and efficient colour and clarity enhancement methods such as oiling, waxing, epi axial coating for semi-precious gem minerals
3	Fabrication of low-cost Polyethylene water treatment plant
4	Develop a decision support service enhancement through a web portal for Agri Food supply chain
Rubber Research Institute	
1	Reduced graphene oxide (RGO) was synthesized and natural rubber composites containing RGO were produced
2	A new test method was developed to identify the contamination ammonia in the field latex

Sri Lanka Atomic Energy Board	
1	Develoment and method validation of FRIR-ATR analysis
Sugarcane Research Institute	
1	Quarantining of 30 sugarcane varieties imported from China, Twenty-two varieties imported from Vietnam were released for the sugarcane germplasm
2	Identification of suitable gamma-ray treatments for sugarcane mutation breeding and mutated plants are evaluated for desirable characteristics such as high cane and sugar yields and disease resistance
3	Identification of the most suitable method to produce low-cost biochar from sugarcane waste material and crop residues and further, identifying the improvement in soil physicochemical characteristics with added biochar during the first three months after planting
4	Isolating nitrogen fixing and phosphorus solubilizing bacteria from the soil and root samples collected from Sevanagala sugarcane cultivated fields
5	Inspecting and guiding the modification of the existing hot water treatment (HWT) plant at Lanka Sugar Company Limited, Sevanagala
6	Multiplication of promising varieties from 2004, 2006, and 2007 series and SL 00 652 for large-scale evaluation and large mill test at Lanka Sugar Company (Private) Limited, Sevanagala and Pelwatte, Gal Oya plantations (Private) Limited, Higurana, and Ethimale Plantations (Private) Limited, Siyambalanduwa.
7	Developing non-chemical strategies for sugarcane pest management.
8	Development of a recipe for jugery incorporated chocolate production
9	Development of a recipe for bagasse incorporated muffin production
Tea Research Institute of Sri Lanka	
1	Integrated Nutrient Management with new Fertilizer Recommendation of T-1240”

Annexure 06 - New Technology Developed

Department of Census and Statistics	
1	CS-Pro based android applications
Department of Export Agriculture	
1	Encapsulated black pepper oleoresin powder
Fruit Research and Development Institute	
1	Grafted guava plants with Costerican guava root stock can be established to control the rootknot nematode
2	Closer spacing (20cm) cultivation within row gave highest yield without affecting fruit quality parameters compared to 30cm spacing
3	Promising nutrient management practices were identified for organic pineapple production
4	In Jack fruit, the maturity stage of the scion significantly affects the grafting success and semi- matured scions perform well on 30 day old rootstocks than immature and mature scions
5	Promising fruit varieties have been identified for further evaluation for official releasing (Twelve Durian hybrids, Two Local Mandarin accessions, Three exotic Mandarin varieties, Two hybrid passion fruit, Two Soursop, Eleven hybrid Pinapple, One Jack fruit (Waraka type)
6	Anthracnose disease in Annona can be controlled by application of 5% CaCl2under in – vitro condition
Horticultural Crop Research and Development Institute	
1	05 new verities released (Bean – HORDI Pokuru, Cassava – HORDI Red ,Mushroom – HORDI Curly, ElabatuManike and Elabatu – Tikira)
2	02 fertilizer recommendation for hybrid Luffa and Capsicum
3	Low cost rapid method for residue analysis in insecticide
4	Technology for pumpkin incorporated fruit leather
5	Influence of dehydration method on quality of bell pepper powder
6	Effect of natural ethylene scavenging package based on rice husk charcoal and sepiolite clay on quality of guava.

7	Development of technology for pumpkin incorporated nutrient bar
8	Identification of a suitable postharvest package for local and export market for locally available cassava varieties
9	Mango powder production through vacuum dehydration and used it for other product developments
10	Active packaging on postharvest quality of stored Banana var. 'Seeni'
National Building Research Organization	
1	Geographic Information Systems (GIS) technology, databases, remote sensing data, and other geospatial technologies
2	Bioengineering techniques for landslide mitigation
3	Geographic Information Systems (GIS), Remote Sensing, Machine Learning and Artificial Intelligence (AI)
National Engineering Research & Development Centre	
1	A design of an industrial plant to produce Cellulose fibers roofing sheets with NERDC developed technology
National Institute of Postharvest Management	
1	Big onion curing and storage
2	Ground nut oil extraction
National Research Council	
1	Technology to produce biochar with bioenergy
2	Technology for model water treatment plant
3	Supersand unit (graphite based nano membrane filtration) technology
National Science Foundation	
1	Development of a fermentation chamber (Controllable temperature and pressure)
2	Develop an IoT based automation system for cultivating up-country vegetables in low-country areas in medium scale poly-tunnels
Office of the Registar of Pesticides	
1	Pre-harvest intervals in cabbage for 3 pestisides
2	Pre-harvet intervals in brinjal for 2 peticides

Plant Protection Service	
1	Management of Lepidopteran pests using yellow bulbs
2	Management of papaya mealy bugs using parasitoids
Rice Research Development Institute	
1	Released four new rice varieties Ld 376, At 378, Bg 377, Bg 381(IP)
Rubber Research Institute	
1	Paper was produced successfully using the fibres of the "Mana" weed and modified field latex
2	Low cost, novel shoe soles with different designs
3	Low intensity harvesting systems for rubber cultivation
4	Waste mica and natural rubber composites were used to produce green filler
5	Heen naran and sour orange extracts as user friendly alternatives coagulant formic acid in manufacture of RSS
Sugarcane Research Institute	
1	Evaluation of 27 varieties of the 2002 series and 27 varieties of the 2003 series showing superior characteristics before releasing for commercial cultivation at Lanka Sugar Company – Sevanagala, Lanka Sugar Company- Pelwatte, Galoya Plantations (Private) Limited, and Ethimale Plantation (Private) Ltd
2	Evaluation of 22 varieties from the 2006 series, 24 from SL 2007 series, 22 from SL 2008 series, 22 from the 2009 series, 58 from the 2010/2011 series, and 65 from the 2012 series showing superior characteristics before large-scale evaluation at Lanka Sugar Company – Sevanagala, Lanka Sugar Company- Pelwatte, Galoya Plantations (Private) Limited, and Ethimale Plantation (Private) Ltd
3	Evaluation of selected 20 foreign varieties at Lanka Sugar Company (Private) Limited, Sevanagala and Pelwatte, and multiplication of those varieties at Gal Oya plantations (Private) Limited, Higurana and Ethimale Plantations (Private) Limited, for future evaluation
4	Identification of the length of the *Maha* rainy season showed a decreasing trend of 7.6 days per decade at Sevanagala
5	Fine-tuning the site-specific fertilizer recommendation model for sugarcane-growing soils under four soil categories based on soil Phosphorous and Potassium concentrations.
6	Development of digitized soil parameter maps for Sevanagala and Pelwatte sugarcane growing areas
7	Identifying that the $ZnSO_4$ application has improved the cane and sugar yields
8	Confirmation of that Chlorantraniliprole 0.4% (w/w) G is an effective chemical for controlling sugarcane moth borers and effective concentration is 16 kg/ha as 4 soil applications near to root zone in 55-day intervals from planting to 5½ month age of the sugarcane crop
9	Identification of two *Erianthus* accessions namely PG56 and MINDANOO having the potential to use as dead-end trap plants for internode borer (INB) female moths

10	Incorporation of dried Ipil- Ipil (*Leucenea leucocephala*)/Gandapana (*Lantana camara*) leaf to the furrows during the time of planting at the rate of 40 g/m effectively manage termite damage during germination and early growth stage
11	Giving recommendation to use pheromone traps to monitor INB population by keeping 5-6 Delta traps with pheromone lures per hectare at spindle level and replacing sticky sheets in fortnightly intervals
12	Giving recommendation to use pheromone traps to mass trapping INB population by keeping 20 Delta traps with pheromone lures per hectare at spindle level from the 4^{th} month to 11^{th} months of the crop and replacing sticky sheets in fortnightly intervals
13	Development of an android-based smart mobile application to deliver updated sugarcane research information and expert knowledge for the sugarcane industry stakeholders in Sri Lanka
14	Conducting large mill test experiments for SL 2000 series new varieties (SL 00 95, SL 00 354, SL 00 603) at Lanka Sugar Company (Pvt) Ltd Pelwatte

Annexure 07 – Liaison Officers Details

No	Institution	Liaison Officer	Designation
1	Arthur C. Clarke Institute for Modern Technologies (ACCIMT)	Mr. Shiran Welikala	Head of the Technology Transfer Division
2	Bandaranaike Memorial Ayurvedic Research Institute (BMARI)	Dr. G.K.P. Madhawa	Medical Officer ETU (Orthopedics)
3	Central Environmental Authority (CEA)	Dr. R.A.C.H. Wijayasinghe	Director Planning & Monitoring
4	Centre for Defence Research and Development (CDRD)	Commander (V) DSC Dissanayake	Chief Coordinator, Radio & Electronics Wing
5	Coconut Research Institute (CRI)	Mrs. K.V.N.N. Jayalath	Head (Cover-up duties)/Agricultural Economics & Agribusiness Management Division
6	Department of Census & Statistics (DCS)	Mr. G.A.K.N.J. Abeyratne	Statistician
7	Department of Export Agriculture (DEA)	Mrs. Damayanthi Samarasinghe	Director (Special Research)
8	Department of Irrigation (DI)	Eng. (Ms.) I.S. Wickramasinghe	Director of Irrigation (Research support, Process Improvement & Training)
9	Department of Measurement Units Standards & Services (DMUSS)	Ms. J S M Silva	Deputy Director
10	Department of National Botanic Gardens (DNBG)	Dr. A. M.A.S Attanayake	Director (Technology Transfer & Research)
11	Farm Mechanization Research Centre (FMRC)	Eng. Srimohanan Sivalingam	Mechanical Engineer
12	Field Crops Research & Development Institute (FCRDI)	Dr. T. Karunainathan	Deputy Director (Research)
13	Forest Department (FD)	Mr. W. D. P Gomaz	Assistant Conservator of Forests (Research)
14	Fruit Research and Development Institute (FRDI)	Ms. A.J. Warusawitharana	Deputy Director (Research)

15	Gem & Jewellery Research and Training Institute (GJRTI)	Ms. M.K.C. Jayamali	Research Officer/Geologist
16	Hector Kobbekaduwa Agrarian Research and Training Institute (HARTI)	Ms. L.A.K.C. Dahanayaka	Assistant Registrar(Programme)
17	Horticultural Crop Research & Development Institute (HORDI)	Ms Chathurika Ranaweera	Information and Communication Officer
18	Industrial Technology Institute (ITI)	Ms. Indira Gallage	Library Assistant
19	Institute of Policy Studies of Sri Lanka (IPS)	Ms. Dilani Hirimuthugodage	Research Economist Officer
20	National Aquaculture Development Authority (NAQDA)	Mr. Manoj Somarathna	Assistant Director (Planning, Monitoring & Evaluataion)
21	National Aquatic Resources Research and Development Agency (NARA)	Mr. Indika Weligamage	Scientist, National Institute of Oceanography and Marine Sciences of NARA
22	National Building Research Organization (NBRO)	Mr. V.K. Anuruddha	Scientist
23	National Engineering Research & Development Centre (NERDC)	Eng. E A N K Edirisinghe	Act. Deputy Director (R&D)
24	National Institute of Fundamental studies (NIFS)	Ms. K. I.K. Samarakoon	Stenographer Grade I
25	National Institute of Postharvest Management (NIPM)	Mrs. Dr. R.M.N.A Wijewardana	Principal Research Officer
26	National Intellectual Property Office (NIPO)	Mr. G.A.M.N.T.B. Atapattu	Assistant Director, Information & Examination I
27	National Plant Quarantine Services (NPQS)	Ms. M.H.A.D.Subhashini	Assistant Director of Agriculture (Research)
28	National Research Council (NRC)	Ms. Nadeeka Dissanayake	Scientific / Research Officer
29	National Science Foundation (NSF)	Ms. Dilushi Munasinghe	Scientific Officer

30	Natural Resources Management Centre (NRMC)	Ms. Gayanthi Rahubaddhe	Development Officer (II)
31	Palmyrah Research Institute (PRI)	Mrs. Subajini Mahilrajan	Research Officer
32	Plant Genetic Resource Centre (PGRC)	Mrs. A.N. Abeykoon	Program Assistant
33	Plant Protection Services (PPS)	Mrs. W.M.D.K. Wijerathnayake	Deputy Director (Plant Protection)
34	Registrar of Pesticide Office (RPO)	Ms. Jeevani Marasinghe	Principal Agriculture Scientist (Toxicology)
35	Rice Research & Development Institute (RRDI)	Dr. (Mrs.) NPS De Silva	Principal Agriculture Scientist (Plant breeding- Rice)
36	Rubber Research Institute of Sri Lanka (RRI)	Mr. Shanaka Dilhan Ratnayake	Biometrician
37	Seed Certification Services (SCS)	Ms. K.K.S.D. Pradeepika	Deputy Director
38	Sri Lanka Accreditation Board for Conformity Assessment (SLAB)	Ms. Chanditha Ediriweera	Deputy Director (Accreditation)
39	Sri Lanka Atomic Energy Board (SLAEB)	Mr. R.M. N. Priyanga Rathnayake	Deputy Director-Promotions
40	Sri Lanka Council for Agricultural Research Policy (SLCARP)	Dr. S M P Chandra Padmini	Deputy Director (Research Management)
41	Sri Lanka Institute of Nanotechnology (SLINTEC)	Dr. Chanaka Sadaruwan	Research Scientist
42	Sri Lanka Inventors Commission (SLIC)	Mr. W. I. C. Senaka Kumara	Administrative Officer
43	Sri Lanka Standards Institute (SLSI)	Mrs. Gayani Manchanayaka	Deputy Director
44	Sugarcane Research Institute (SRI)	Ms. B.D. Sandya Kumari Ariyawansha	Senior Research Officer - Economics, Biometry and Information Technology Division
45	Sustainable Development Council of Sri Lanka (SDCSL)	S.L. Hewawaduge	Assistant Director
46	Tea Research Institute (TRI)	Dr. (Mrs.) H. W. Shyamalie	Head, Agricultural Economics Division

Annexure 08 – S&T Institutes (Not responded to the S&T survey)

1.	Department of Meteorology (DM)
2.	Disaster Management Centre (DMC)
3.	Geological Survey & Mines Bureau (GSMB)
4.	Medical Research Institute (MRI)
5.	National Agriculture Information & Communication Centre (NAICC)
6.	National Food Promotion Board (NFPB)
7.	Sri Lanka Sustainable Energy Authority (SLSEA)

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

1. *Initial draft Submitted to the Commission: 29th April 2024*
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