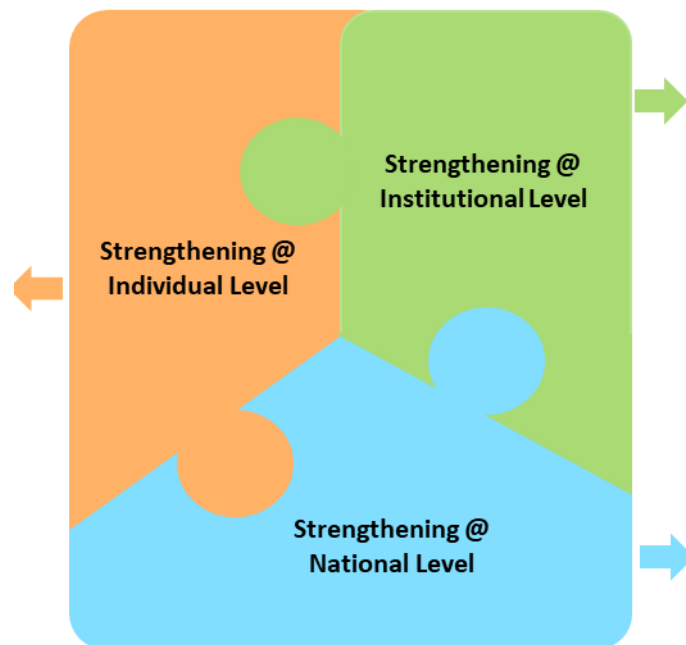




NATIONAL  
SCIENCE  
FOUNDATION

## Strategy to Strengthen the National Research, Development and Innovation Ecosystem



National Science Foundation, Sri Lanka  
Ministry of Education, Science and Technology

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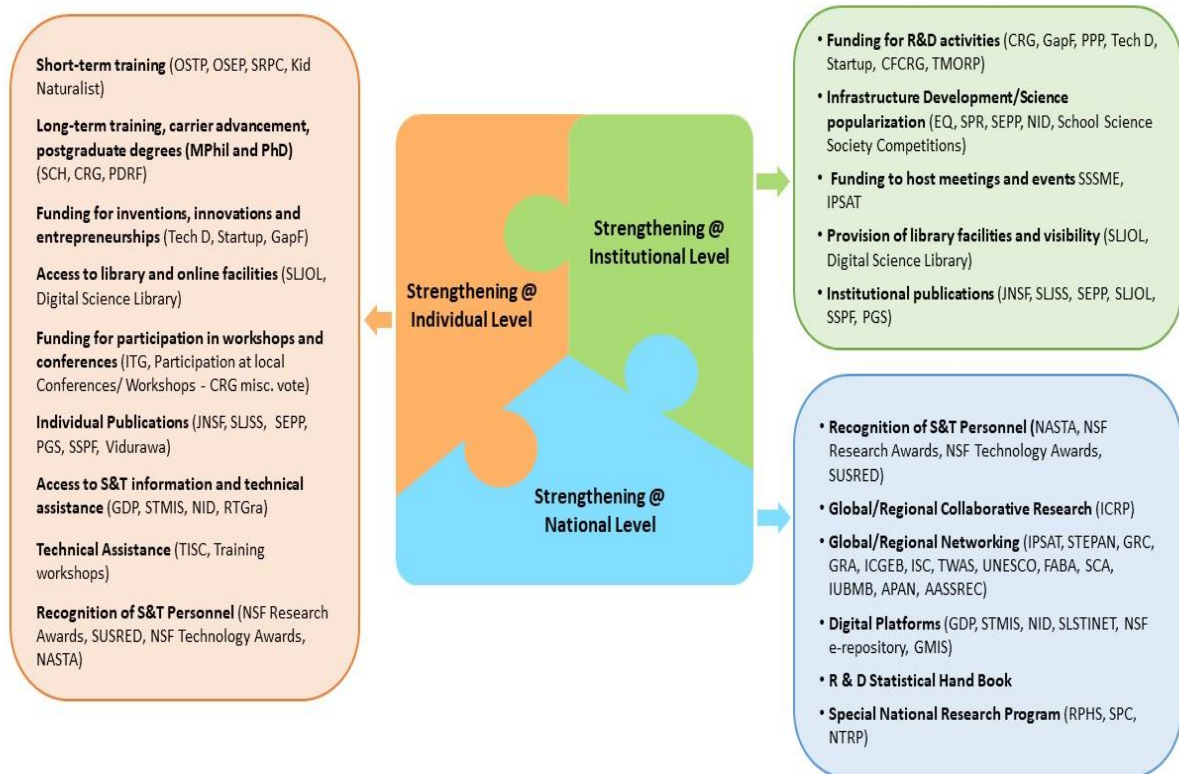
## Executive Summary

NSF is dedicated to promote Science, Technology and Innovation for the economic and social prosperity of Sri Lanka. Programmes at NSF spans across many areas, with a focus on establishing and promoting best practices in research and development to provide appropriate recommendations and supporting science education in specific focus areas that are considered critical. For the success of the overall organization, the NSF is supported through a popular management philosophy “knowledge-creating company”, of which the sole business is continuous innovation.

An RDI ecosystem is a dynamic network of interconnected entities, including research institutions, universities, corporations, startups, venture capital firms, and incubators. An effective RDI ecosystem fosters innovation, economic development, and societal progress by connecting research, development, and innovation efforts across various sectors.

Following figure depicts how the NSF supports an effective RDI Ecosystem for the economic benefit and the development of the country.

### NSF at a Glance : Strengthening National Research Development and Innovation Ecosystem



## (01) Strengthening the National Research, Development and Innovation Ecosystem

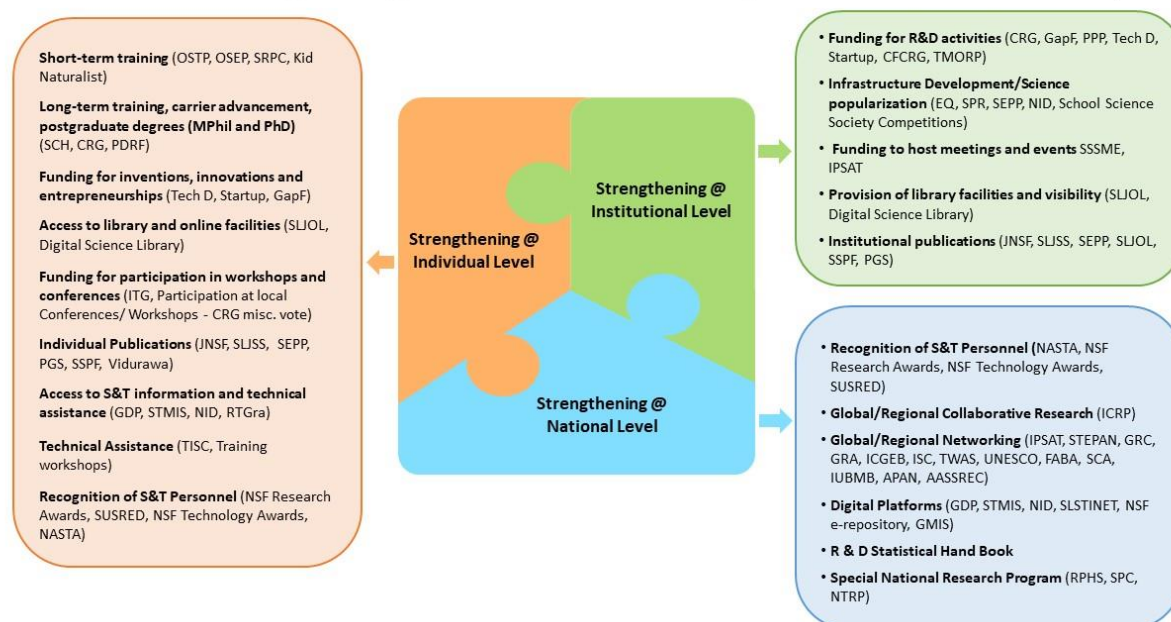
The National Science Foundation (NSF) of Sri Lanka is a statutory body established in 1998 by the Science and Technology Development Act No. 11 of 1994, as the successor to the Natural Resources, Energy & Science Authority of Sri Lanka (NARESA) established in 1981, and the National Science Council (NSC) set up in 1968. The NSF takes the lead role in promoting Science, Technology and Innovation in the country operating under the purview of the Ministry of Education. Accordingly, the NSF has provided its dedicated service to the nation over 56 years since its inception.

The NSF plays a pivotal role in supporting and strengthening the National Research, Development, and Innovation Ecosystem to promote wealth creation and ensure the wellbeing of the citizens of Sri Lanka. NSF, as a key government organization, has designed its programmes and initiatives to contribute to this endeavor at National level, Institutional level and Individual level.

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### NSF at a Glance : Strengthening National Research Development and Innovation Ecosystem



**Fig.01: NSF Strengthening National Research, Development and Innovation Ecosystem**

It is widely accepted that scientific and technological advancement is a significant driver of economic growth in any nation and hence NSF makes strategic investments in the following areas through 35 programmes.

- Basic and Applied Research (09 Programmes)
- Innovation and Entrepreneurship (02 Programmes)
- Capacity Building of R&D workforce & the STEAM workforce (08 Programmes)
- Research Infrastructure Development (02 Programmes)
- Networking and Collaborations (08 Programmes)
- Knowledge Mobilization (08 Programmes)
- Recognition of Research & Innovation Excellence (04 Programmes)

### **1.1 Strengthening @ Individual Level**

NSF has 28 programmes for facilitating and supporting individual researchers, inventors, innovators, entrepreneurs, undergraduates, and school children.

#### **1. *Short-term training***

- Overseas Special Training Programme (OSTP)
- Overseas Science Education Programme (OSEP)
- Science Research Project Competition (SRPC)
- Kid Naturalist

#### **2. *Long-term training, carrier advancement, postgraduate degrees (MPhil and PhD)***

- Research Scholarships (SCH)
- Competitive Research Grants (CRG)
- Postdoctoral Research Fellowships (PDRF)

#### **3. *Funding for inventions, innovations and entrepreneurships***

- Technology Development Grants (Tech D)
- Startup Grants on novel technologies (Startup)
- Gap Filling Grants (GapF)

#### **4. *Access to library and online facilities***

- Sri Lanka Journal Online (SLJOL)
- Digital Science Library

#### **5. *Funding for participation in workshops and conferences***

- International Travel Grants (ITG)
- Participation at local Conferences, Seminars and Workshops- CRG miscellaneous vote

#### **6. *Individual Publications***

- Journal of the National Science Foundation (JNSF)
- Sri Lanka Journal of Social Sciences (SLJSS)
- Science Education and Popularization Programmes (SEPP)
- Publication Grant Scheme for S & T Publications (PGS)

- Support Scheme for Publication Fees (SSPF)
- Vidurawa (English, Sinhala, Tamil)

#### **7. *Access to S&T information and technical assistance***

- Global Digital platform (GDP)
- Science and Technology Management Information System (STMIS)
- National Instrument Database (NID)
- Research and Technology Grant database (RTGra)

#### **8. *Technical Assistance***

- Technology and Innovation Support Centre (TISC)
- Training workshops

#### **9. *Recognition of S&T Personnel***

- NSF Research Awards
- Support Scheme for Supervision of Research Degrees (SUSRED) Awards
- NSF Technology Awards
- National Awards for Science & Technology Achievements (NASTA)

### **1.2 Strengthening @ Institutional Level**

NSF has 20 programmes for facilitating and supporting institutions such as state and non-state universities, higher educational institutes and research institutions, business enterprises including SMEs, and schools.

We cultivate partnerships between academia, government, industry, civil society and other sectors so they can pursue transformative research, solve societal problems, fuel economic progress and build a future-ready workforce.

#### **1. *Funding for R&D activities***

- Competitive Research Grants (CRG)
- Gap Filling Grants (GapF)
- Public-Private/Public-Partnership Research Grants (PPP)
- Technology Development Grants (Tech D)
- Startup Grants on novel technologies (Startup)
- Client Funded Contract Research Grants (CFCRG)
- Transdisciplinary Mission Oriented Research Programme (TMORP)

#### **2. *Infrastructure Development/Science Popularization***

- Research Equipment Grants (EQ)
- Research Equipment Spare part grants (SPR)
- Science Education and Popularization Programmes (SEPP)
- National Instrument Database (NID)
- School Science Society Competitions

### **3. *Funding to host meeting and events***

- Support schemes for scientific meetings and events (SSSME)
- International Partnerships for Science and Technology (IPSAT)

### **4. *Provision of library facilities and visibility***

- Sri Lanka Journal Online (SLJOL)
- Digital Science Library

### **5. *Institutional publications***

- Journal of the National Science Foundation (JNSF)
- Sri Lanka Journal of Social Sciences (SLJSS)
- Science Education and Popularization Programmes (SEPP)
- Sri Lanka Journal Online (SLJOL)
- Support Scheme for Publication Fees (SSPF)
- Publication Grant Scheme for S & T Publications (PGS)

## **1.3 Strengthening @ National Level**

NSF publishes two internationally recognized journals. The Journal of the National Science Foundation (JNSF) is the only Science Citation Indexed journal in the country. NSF also maintains six national-level digital platforms to facilitate and support researchers, policy decision-makers, and entrepreneurs.

NSF is networking with 14 regional and international organizations in STI sector and has bilateral collaborations with Science Foundations of China and Pakistan. Additionally, NSF publishes the S&T Statistical handbook based on the National S&T Survey.

### **1. *Recognition of S&T Personnels***

- National Awards for Science & Technology Achievements (NASTA)
- NSF Research Awards
- NSF Technology Awards
- Support Scheme for Supervision of Research Degrees Awards (SUSRED)

### **2. *Global/Regional collaborative Research***

- International Collaborative Research Programme (ICRP): MoU with National Natural Science Foundation (NSFC) China, Pakistan Science Foundation (PSF), and Government of Brazil

### **3. *Global/Regional networking***

- International Partnership for Science and Technology (IPSAT)
- Science Engineering Technology and Innovation Policy Asia and the Pacific Network (STEPAN)
- Global Research Council (GRC)
- Global Research Alliance on Agricultural Green House Gases (GRA)
- International Centre for Genetic Engineering and Biotechnology (ICGEB)

- International Council for Science (ICS)
- The World Academy of Sciences (TWAS)
- United Nations Educational, Scientific and Cultural Organization (UNESCO)
- Federation of Asian Biotech Association (FABA)
- Science Council of Asia (SCA)
- International Union of Biochemistry and Molecular Biology (IUBMB)
- Asia Pacific Advanced Network (APAN)
- Association of Asian Social Science Research Councils (AASSREC)

#### **4. *Digital Platforms***

- Global Digital platform (GDP)
- Science and Technology Management Information System (STMIS)
- National Instrument Database (NID)
- Sri Lanka Science and Technology Institute Network (SLSTINET)
- NSF e-repository
- Grant Management Information System (GMIS)

#### **5. *S&T Statistical handbook***

#### **6. *Special National research Programs***

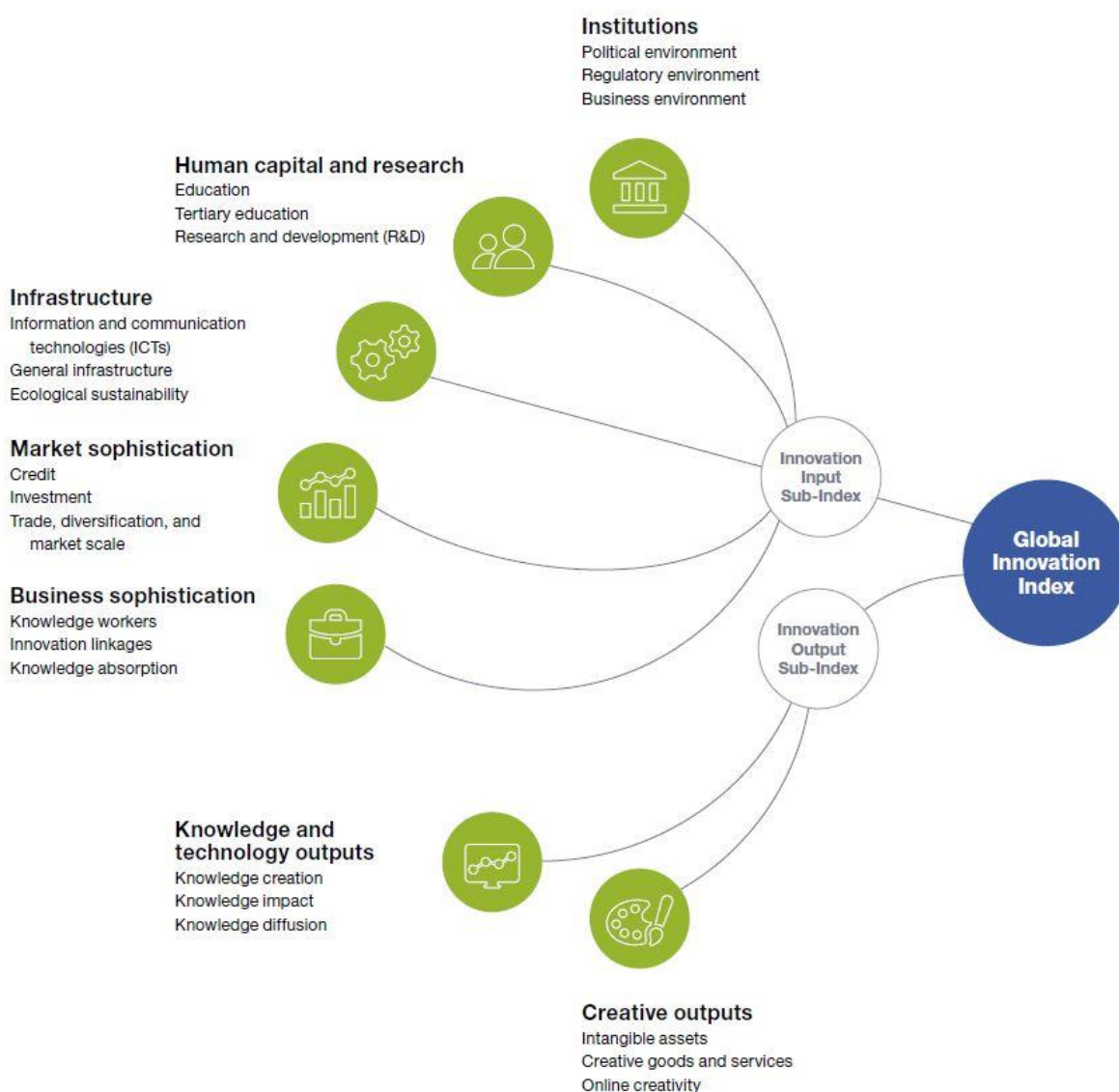
- Research Programme on Health Science (RPHS)
- Special Project on Cinnamon (SPC)
- National Thematic Research Programme (NTRP)

It is evident that the NSF plays a critical role in strengthening RD&I ecosystem of the country. This ecosystem facilitates the seamless flow of ideas, funding, and expertise among various stakeholders, fostering the creation of new products, services, and technologies that enhance people's lives. For the RD&I ecosystem to be more effective and efficient, collaboration and coordination among its partners and components are essential. This can involve partnerships between industry and academia, funding mechanisms to support early-stage research and development, and policies that encourage knowledge-sharing and the commercialization of new technologies.

The first flow is 'interactions among enterprises', primarily driven by joint research activities and other technical collaborations. The second flow is 'interactions among enterprises, universities, and public research institutes', encompassing joint research, co-patenting, co-publications, and more informal linkages. The third flow is 'diffusion of knowledge and technology to enterprises', which includes the industry's adoption rates of new technology through machinery and equipment. The fourth flow is 'personnel mobility', focusing on the movement of technical personnel within and between the private and public sectors (OECD, 1997).



## 1.4 Contribution to Global Innovation Index (GII)



NSF, through its programmes, contributes to the innovation input sub-index and innovation output sub-index under the Global Innovation Index (GII).

### **Innovation Input (05 Pillars, 15 Sub-Pillars and 54 Indexes)**

#### ***Pillar 01- Human Capital and Research***

Sub-Pillar 01 - Research and Development (R&D)

- Researchers, FTE/mn pop.
- Gross expenditure on R&D, % GDP

#### ***Pillar 02 - Market Sophistication***

Sub-pillar 01 – Credit

- Finance for startups and scaleups

### ***Pillar 03 - Business Sophistication***

Sub-Pillar 01 - Innovation linkages

- University-industry R&D collaboration

Sub-Pillar 02 - Knowledge absorption

- Research talent, % in businesses

## **Innovation Output (02 Pillars, 06 Sub-Pillars and 26 Indexes)**

### ***Pillar 01 - Knowledge and Technology Outputs***

Sub-Pillar 01 - Knowledge creation

- Patents by origin/bn PPP\$ GDP
- PCT patents by origin/bn PPP\$ GDP
- Scientific and technical articles/bn PPP\$ GDP

### ***Pillar 02 - Creative Outputs***

Sub-Pillar 01 - Intangible assets

- Trademarks by origin/bn PPP\$ GDP
- Industrial designs by origin/bn PPP\$ GDP

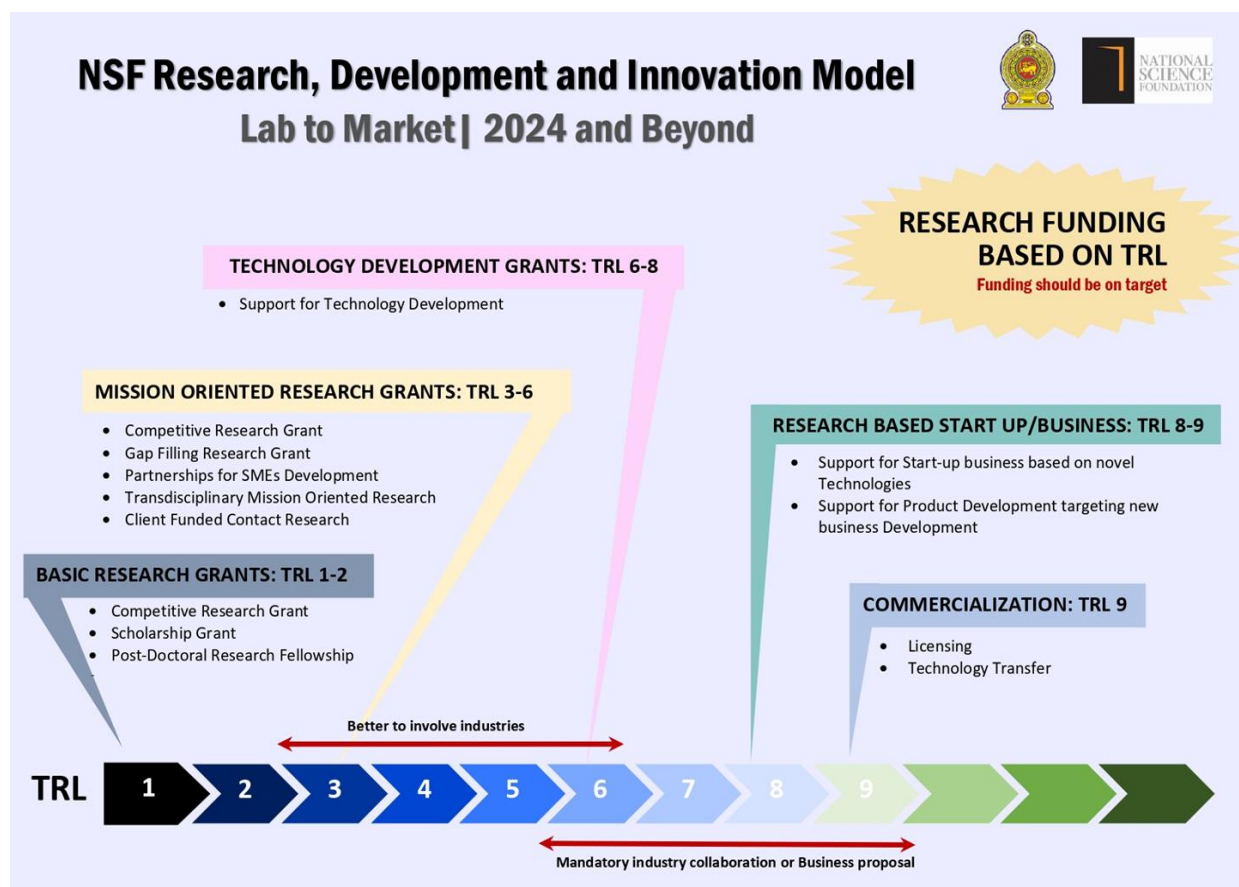
Sub-Pillar 02 - Online creativity

- Mobile app creation/bn PPP\$ GDP

## (02) NSF Lab to Market Model (Pathway for moving ideas from lab to the market and society)

NSF introduced “NSF Lab to Market” model to provide pathways for researchers, innovators, technopreneurs, Micro, Small and Medium Enterprises and aspiring entrepreneurs to transition their ideas from the lab to the market and society. This model is supported by twelve different programs designed to facilitate this process.

This initiative also aims to foster industry-academia collaborations and encourage innovation and entrepreneurship. Notably, 40% of the NSF research funds are allocated for innovation and entrepreneurship, promoting translational research, commercialization of academic and R&D lab research, and entrepreneurship.



**Fig 02: NSF Lab to Market Model: pathway for moving ideas from lab to market and society**

When analyzing the gap in research commercialization, several missing elements become apparent, such as the lack of research continuation and insufficient collaboration among industry, universities, and R&D institutions. This often results in less mission-oriented industrial research. The NSF Lab to Market model addresses these issues by enabling research continuation through various grant schemes until the commercialization of research findings and innovations. Additionally, it fosters the triple helix model, promoting collaboration among academia, industry, and government.

1. Researchers can begin from basic research (TRL 1) and progress to commercialization stage.
2. Industry partners can begin from applied research (TRL3) and progress to commercialization stage.
3. Inventors/Innovators can begin from product ideas that have commercial potential (TRL 4) and progress to commercialization stage.
4. Entrepreneurs can begin from novel technology (TRL8) and progress to commercialization stage.

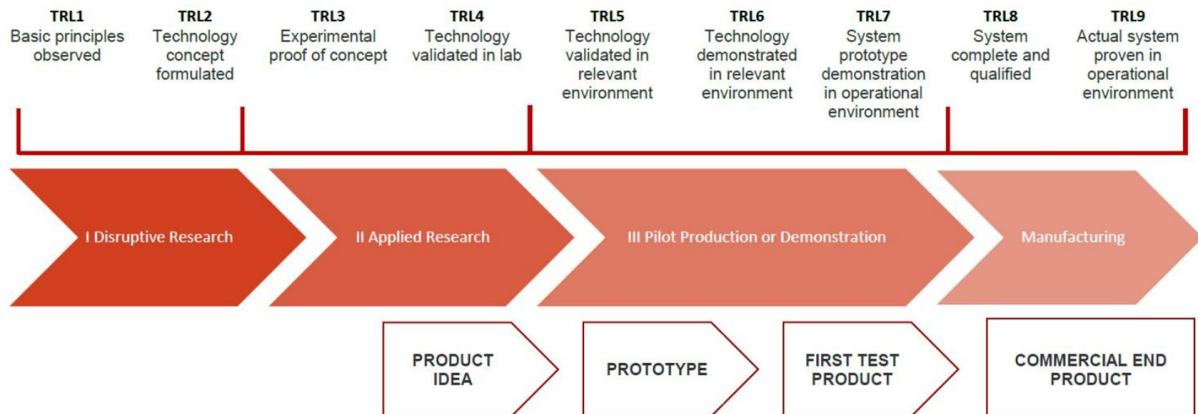


Fig 03: Pathway for Researchers, Innovators, Entrepreneurs and Industry moving ideas from lab to market

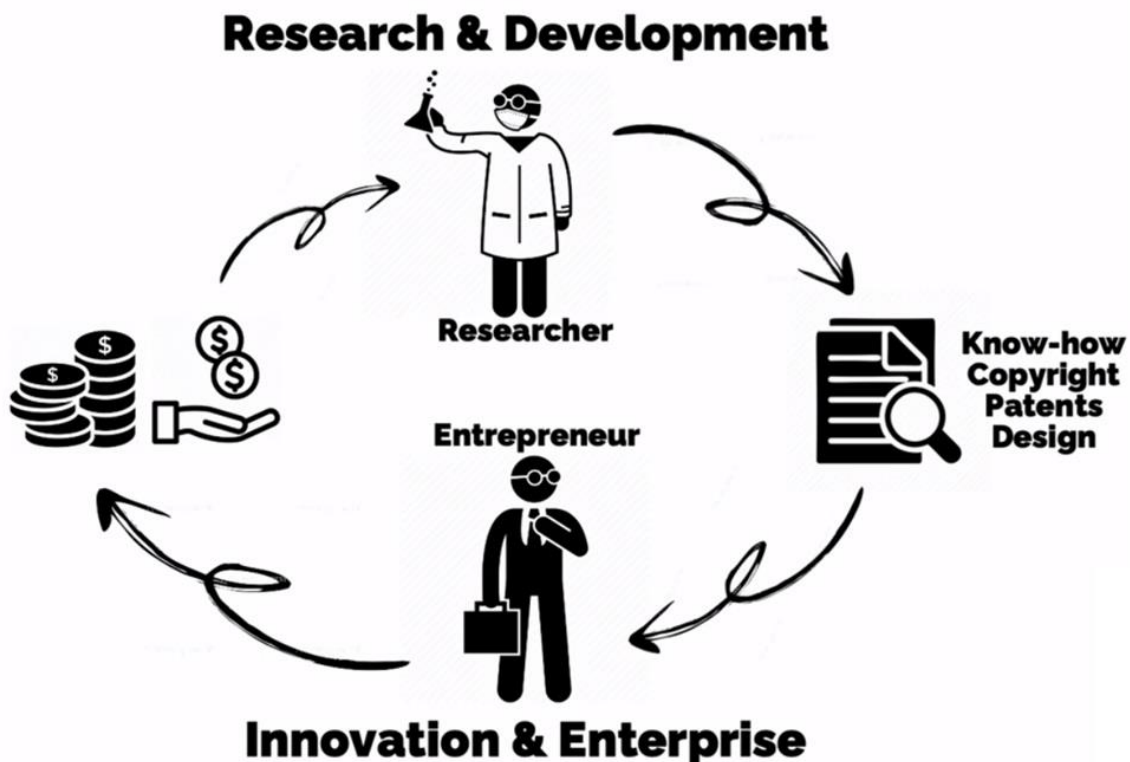


Fig 04: Research, Development, Innovation and Enterprise; Wealth Creation through Lab to Market Model

## **2.1 Lab-to-Market: Basic Research Grants**

Basic research involves experimental or theoretical work aimed primarily at acquiring new knowledge about the fundamental aspects of phenomena and observable facts, without any specific application or use in mind. In Sri Lanka, there are only 106 researchers per million inhabitants, compared to 256 in South Asia and 7,225 in Singapore. This measure of researcher intensity is crucial as it influences the number of patents filed and contributions to scientific journals. To attract youth to pursue research and encourage them to stay and work in Sri Lanka, grant schemes such as Research Scholarships, Competitive Research Grants, and Post-Doctoral Research Fellowship Programmes have been implemented.

- Competitive Research Grant
- Research Scholarship Grant
- Post-Doctoral Research Fellowship

## **2.2 Lab-to-Market: Mission Oriented Research Grants**

Applied research is an original investigation undertaken in order to acquire new knowledge, but it is primarily directed towards specific, practical aims or objectives. NSF supports further research to achieve outputs with commercialization potential from successfully completed NSF-funded research grants.

NSF fosters the Triple-Helix model, which involves partnerships between academia, industry, and government, while also facilitating and stimulating international research collaboration and technical cooperation. As a learning organization, NSF recognizes the importance of promoting transdisciplinary research and contract research.

- Competitive Research Grant
- Gap Filling Research Grant
- Partnerships for SMEs Development
- Transdisciplinary Mission Oriented Research
- Client Funded Contract Research

## **2.3 Lab-to-Market: Technology Development Grants**

Technology development involves systematic work that draws on knowledge gained from research and practical experience. This process generates additional knowledge aimed at creating new products or processes, or enhancing existing ones.

- Support for Technology Development
- Technology and innovation support center (TISC)

## **2.4 Lab-to-Market: Research based Startup/ Business Grants**

NSF invests in early-stage startups that transform scientific discoveries and innovations into products and services with significant commercial and societal impact. Startup grants of NSF, supports startups and small businesses across nearly all areas of science and technology.

- Support for Start-up businesses based on novel Technologies
- Support for Product Development targeting new business Development

## 2.5 Lab-to-Market: Commercialization

Research commercialization is the process of bringing a newly developed product or service to the local, national, or global marketplace. This can be achieved either by starting a new business based on new technology (startup) or by transferring the new technology to an existing industry (licensing). The NSF facilitates and supports both methods. NSF also introduces the Research into Practice programme to promote technology transfer.

- Support for Licensing and Commercialization
- Research into Practice Programme (Technology Transfer)

## 2.6 Key Review Procedure for Research Support Programs

Merit review remains at the heart of NSF's enterprise. Our goal is to fund awards with integrity in a fair, competitive, and transparent process. NSF's mechanisms for assessing merit review includes the utilization of external advisory committees, reports from independent reviewers.

Grant applications received by the NSF are evaluated through a rigorous merit review process, focusing on two key criteria: intellectual merit (the potential to advance the knowledge base) and potential impact (the potential to benefit society and create value for money). The NSF supports a wide range of research and innovation, ensuring that R&D outputs progress beyond bench-top trials to technology development and commercialization.



**Fig 05: Key Review Procedure**