



REPUBLIC OF MAURITIUS

MINISTRY OF TECHNOLOGY,
COMMUNICATION AND INNOVATION

National Innovation Framework

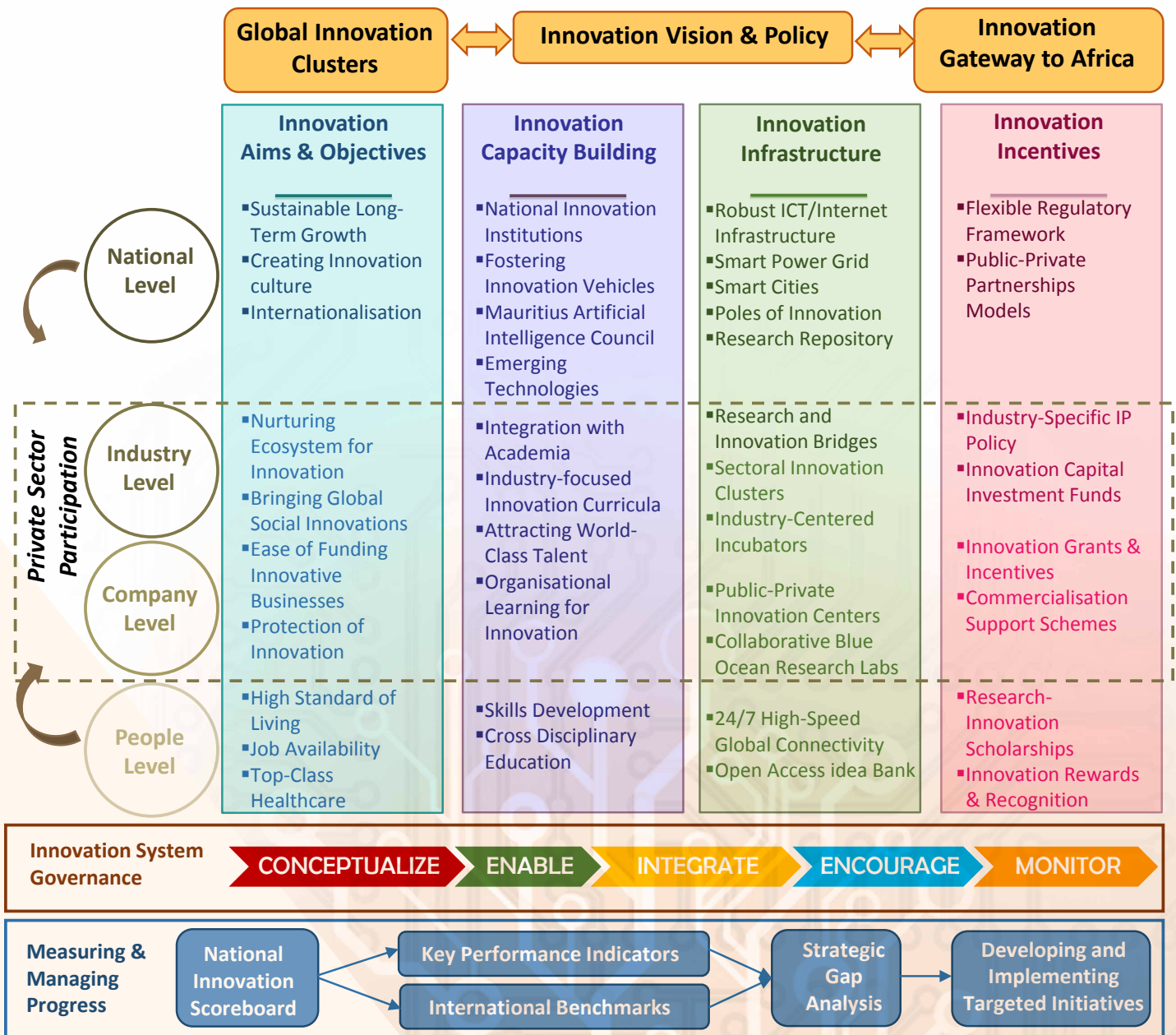
2018 - 2030



MAURITIUS RESEARCH COUNCIL

October 2018

National Innovation Framework



National Innovation Framework - A Snapshot

The National Innovation Framework (NIF) (2018-2030) is a unique programme for creating innovation ecosystems to transform the landscape of the Mauritian economy. The success of this Framework is contingent on the following features:

- 1. Sustainable Roadmap for Growth:** The NIF (2018-2030) seeks to create a roadmap which spells out the long-term policy for the nation and the State. The very nature of the Framework is to create a sustainable plan for a balanced development. The Framework recognizes the prudence in following such a policy. The Framework seeks to invigorate the economy, by balancing the interests of Mauritius as seen from four perspectives - at the National level, Industry level, Company level and People level.
- 2. Private Funding for Programmes:** The Framework moves away from the traditional understanding of progress where the State becomes the chief driver of growth. The downside of a policy which is financially spearheaded by the State usually ends up committing too much of the tax-payers money into risky-laden projects. Such a policy poses a threat to the stability of the economy and can be politically disruptive in case of a bad investment.

The Framework instead focuses on creating avenues to nurture the interests of industry to fill this vacuum of funding innovative businesses. By inviting such investors who have the appetite to invest into innovative businesses and enterprises, the State would free up essential public money and spend it on more urgent socio-economic needs of the people. Such a policy will add to the vitality of the economy which will keep it and the interests of the people insulated from the risk of funding such start-ups. This in turn would contribute to ensuring stability of the economy.

- 3. Integrated and Coordinated Growth:** The Framework sets out a plan for Innovation based on integrated growth. The programmes for innovation call for coordinated efforts between the Industry and Academia and between different disciplines. Research and Development (R&D) efforts would also be deeply rooted in an alliance between market players and academics. Such a balanced and concerted programme will ensure that Innovation becomes an organic part of the Mauritian economy.
- 4. Accountability of Innovators:** The NIF (2018-2030) does not simply lay down certain programmes and schemes to be followed. It creates a web of policies and aims, programmes to implement them, incentives to encourage people to participate and to develop scoreboards to evaluate the programmes after implementation. This entire network of initiatives ensures accountability of the market players and the policy makers.

The NIF (2018-2030) is paving the way to the implementation of national measures such as tax and other individual as well as corporative incentives which can enhance the efforts of public as well as private bodies in investing in R&D and other innovation mechanisms.

Acknowledgements

The NIF (2018-2030) is the output of a number of consultations with several institutions which were initiated in the year 2015. The measures recommended in the NIF (2018-2030) are also built on recommendations made by Special Technical Committees set up under the Mauritius Research Council (MRC) in the context of High Performance Computing (HPC) and the National Bio-technology Cluster. The principles guiding the process of consultations included collaboration, synergy, sharing of ideas and participation, all englobed under the National Innovation Initiative. The support of Nishith Desai Associates from India to formulate the measures is also highly acknowledged.

The contributions of the following organisations/institutions are hereby acknowledged:

Agence Française de Développement
 Association of Mauritius Manufacturers
 Business Mauritius (BM)
 Central Electricity Board (CEB)
 Centre for Biomedical and Biomaterials Research (CBBR)
 Centre International de Développement Pharmaceutique (CIDP)
 Ceridian
 Economic Development Board (EDB)
 Food and Agricultural Research and Extension Institute (FAREI)
 Food and Allied Industries
 Forensic Science Laboratory
 Mauritius Cane Industry Authority (MCIA)
 Mauritius Chamber of Commerce and Industry (MCCI)
 Mauritius Institute of Health (MIH)
 Mauritius Oceanography Institute (MOI)
 Mauritius Sugarcane Industry Research Institute (MSIRI)
 Meteorological Services
 Ministry of Agro-Industry and Food Security
 Ministry of Health and Quality of Life
 Ministry of Education and Human Resources, Tertiary Education and Scientific Research
 Ministry of Technology, Communication and Innovation (MTCI)
 Ministry of Social Security, National Solidarity, and Environment and Sustainable Development (Environment and Sustainable Development Division)
 Ministry of Health and Quality of Life
 National Computer Board (NCB)
 Open University of Mauritius (OU)
 Tertiary Education Commission (TEC)
 Université des Mascareignes
 University of Mauritius (UoM)
 University of Technology Mauritius (UTM)

Honourable Minister's Message



I have the pleasure to present the National Innovation Framework (2018-2030), which outlines the Government vision to transform the country into an innovative nation.

The Republic of Mauritius is an upper middle income country and is poised to transition to the level of a high income country, where innovation becomes the key driver of socio-economic development. At the same time, the country has the potential to lead the African Continent into a new wave of growth and can become a gateway for global business to enter Africa. Hence, the creation of the Ministry of Technology, Communication and Innovation is dedicated to the promotion of innovation.

Given this opportune time for Mauritius to put in place a National Innovation Framework, my Ministry has come up with a strategy for innovation through an understanding of national priority areas and where our scientific, technological and social entrepreneurs can collaborate and maximize their collective impact.

The National Innovation Framework (2018-2030) was conceptualized as a means to catapulting the Mauritian economy to the next phase of growth and becoming a harbinger of prosperity to the African continent. History stands testament to various examples of nations that have not adapted to changing times and thus, we have decided to set up this Framework setting out our plans from 2018 to 2030 to align our efforts to achieve the goal of creating an Innovative Mauritius. This Framework will be the blueprint for the future of the country as it becomes the vanguard in Global Innovation initiatives.

This framework has been developed after consulting international best practices based on other countries' experiences.

While creating an Innovation Vision & Policy, the Framework would follow a multi-pronged approach to achieve this goal. Each pillar of the Vision & Policy has been customized to cater individually to the Nation, the Industry, Corporates and the most important aspect, i.e. People.

Before a Vision can be created, it must strategize on what specific aims and objectives it seeks to achieve in order to reach the ultimate goal of creating an Innovative Mauritius. The National Innovation Framework (2018-2030) inculcates in itself aims such as sustainability and creation of an innovation culture on a National Level, creating an ecosystem for innovation on an Industry Level, easing the funding of innovative businesses on a Corporate Level and finally creating a high living standard and job availability on the People Level.

While the Government on its part undertakes efforts to create a culture of innovation, it is imperative that capacity development happens simultaneously for the nation to harness the full potential of such policies. The Policy, therefore, envisions fostering an environment where the nation, industry, company and individual develop the capacity to undergo such innovation. Innovation Capacity Building includes creation of innovation institutes and vehicles on a national level, integration with academia on an industry level, attracting world class talent and organizational learning on a company level and developing skills and cross-disciplinary learning on a people level.

The National Innovation Framework (2018-2030) addresses several key aspects relating to funding for innovation, as well as incentives to facilitate the partnership between private sector and Government in the innovation process. The ultimate vision is to inculcate a culture of innovation at all levels of businesses and society.

In this context, a plethora of National Innovation Initiatives have been introduced, each focusing on reinforcing the linkages between the academic/research community and the private sector while opening up to international networking and technology transfer. Social innovation is also included to maintain the equilibrium between applied and basic research.

Policies can only be executed through appropriate platforms and mechanisms. To that end, the Framework encompasses a number of key organizations from academia, research, industry and Ministries, which delve directly or indirectly in the business of innovation. The Technology Transfer Office of the Mauritius Research Council will be a major vehicle

of innovation in this effort. The NIF emphasizes on the potential of the Republic of Mauritius for growing into the technology innovation hub for the African Continent. To accomplish this, the Mauritius Artificial Intelligence Council is presented as another vehicle of innovation.

The success of the Innovation Framework will largely depend on the synergy and collaborative spirit which will drive multidisciplinary initiatives across these organizations. The National Innovation Initiatives will target specific instruments at enhancing collaboration through sharing of ideas, information and rewards.

The Innovation Vision and Policy envisages creation of a policy regime that will incentivize and encourage stakeholders to set up innovation infrastructures. On a National Level, the Framework allows for flexible regulatory and public-private partnership models. On an Industry Level, the Framework grants industry specific Intellectual Property and tax incentives along with innovation capital investment funds. While on a Company Level, the Framework allows for innovation grants and commercialization support schemes. Finally, on the People Level, the Framework will grant special rewarding systems such as the National Innovation Challenge for efforts in innovation.

In order to ensure that the seed of innovation sown by the National Innovation Framework (2018-2030) grows, it is paramount to evaluate and assess the results achieved by this Framework. Hence, for this purpose, the National Innovation Scoreboard would analyse the achievements of the Framework by making use of Key Performance Indicators and International Benchmarks. This would create the space to carry out Strategic Gap Analysis which would highlight the areas where the efforts at Innovation waned. Once identified, customized efforts to target specific initiatives would have to be made.

It is hoped that this Framework will be able to consolidate efforts of all stakeholders to invigorate the economy, society and people of Mauritius to come up with innovative solutions to propel it to the status of an innovative-led economy.

Honourable Yogida SAWMYNADEN
Minister of Technology, Communication
and Innovation

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Abbreviations

AI	: Artificial Intelligence
ARC	: Average of Relative Citations
ARIF	: Average of Relative Impact Factor
BERD	: Business Expenditure on Research and Development
CI	: Collaboration Index
CRIGS	: Collaborative Research and Innovation Grant Scheme
FTE	: Full Time Equivalent
GDP	: Gross Domestic Expenditure
GERD	: Gross Domestic Expenditure on Research and Development
GI	: Growth Index
HERD	: Higher Education Expenditure on Research and Development
HPC	: High Performance Computing
ICT	: Information, Communication and Technology
ICR	: International Collaboration Rate
IIT	: Indian Institute of Technology
IP	: Intellectual Property
IPO	: Industrial Property Office
IPPS	: Intellectual Property Promotion Scheme
IPR	: Intellectual Property Rights
KPI	: Key Performance Indicators
MTCI	: Ministry of Technology, Communication and Innovation
MRC	: Mauritius Research Council
MRIC	: Mauritius Research and Innovation Council
NCR	: National Collaboration Index
NEPAD	: New Partnership for Africa's Development
NGO	: Non-Governmental Organization
NIF	: National Innovation Framework
NRI	: Networked Readiness Index
NSIS	: National SME Incubator Scheme
OECD	: Organisation for Economic Co-operation and Development
PCS	: Proof-of-Concept Scheme
PCT	: Patent Corporation Treaty
PhD	: Doctor of Philosophy
PNP	: Private Non-Profit
PPP	: Public-Private Partnership
PoIGS	: Pole of Innovation Grant Scheme
RCR	: Regional Collaboration Rate
R&D	: Research and Development
RCR	: Regional Collaboration Rate
RECs	: Regional Economic Communities
RIBS	: Research and Innovation Bridges
S&T	: Science and Technology
SI	: Specialisation Index
SIRGS	: Social Innovation Research Grant Scheme
SME	: Small and Medium Enterprise
STEM	: Science, Technology, Engineering and Mathematics
STI	: Science, Technology and Innovation
TEI	: Tertiary Education Institution
TTO	: Technology Transfer Office
VC	: Venture Capital

EXECUTIVE SUMMARY

“Innovation” means both radical and incremental changes to products, processes or services, including the implementation of a new or significantly improved product (good or service), or process, a new marketing method, or a new organisational method in business practices, workplace organisation or external relations (Organisation for Economic Co-operation and Development (OECD) and Statistical Office of the European Communities, 2005). The National Innovation System is a set of functioning institutions, organizations and policies that interact constructively in the pursuit of a common set of social and economic goals and objectives and uses innovation as the key promoter of change.

Mauritius is striving to become a high income innovation-driven nation. It is important and crucial at this juncture for the country to take up this challenge and create a flourishing environment for innovation. The idea behind the NIF (2018-2030) is to create an ecosystem for innovation, that is, the National Innovation System.

The NIF (2018-2030) gives a new perspective to Innovation in Mauritius with some new dimensions such as the critical role of the private sector and business companies in generating innovation, the importance of enterprises in creating scientific and technological human resources for innovation and the importance of articulated demand for innovation in driving the process. The NIF (2018-2030) recognizes that innovation is people-centered and acknowledges the importance of social innovation.

Information and statistics, including research and innovation indicators as well as consultations with various stakeholders were used to formulate the document. The formulation of innovation measures was also inspired from international best practices derived from the policy documents of about 40 countries.

On a National Level, the Framework seeks to achieve the aims and objectives of:

- Sustainable Long-Term Growth
- Creating an Innovation Culture
- Addressing the Grand Challenges faced by Mauritius

The NIF (2018-2030), the first of its kind, is a serious attempt at inculcating and sustaining an innovation culture with an important human dimension of engaging people. The proposed measures span across a range of disciplines starting with nurturing creativity at a young age at school and culminating in the workplace. This requires identification of leaders in different sectors to facilitate that culture of innovation.

Finally, the Framework would focus itself to the aims and objectives it wishes to set for the people of Mauritius:

- High-Standard of Living
- Enhancement of the competitiveness of Mauritius
- Creation of Jobs
- Healthy and sustainable environment

Innovation requires effective implementation and structures to be put in place to allow the innovators to operate. The main elements that constitute this framework consist of capacity building, infrastructure, incentives and governance.

At the National level, the Framework identifies collaborative mechanisms between institutions at national, regional and international level as means to build up the capacity of Mauritius to innovate.

The Framework addresses capacity building at Individual Level by Cross-Disciplinary Learning and Skills Development. In countries like Mauritius where natural resources are scarce, the main asset is human capital, hence the importance of a critical mass of researchers. Moreover, the innovation capacity building process addresses ways and means to promote collaboration with regional/international counterparts and to attract Diaspora and foreign researchers in the country.

At the National Level, the Framework aims to set up the basic elements of Public-Private platforms to improve research and the setting up of new start-ups through digitization of Mauritius programmes. Much data and information will be generated, access to such data and information is crucial to potential 'innovators' to translate R & D activities into innovation. A major step in that direction is the Open data policy and portal of the Ministry of Technology, Communication and Innovation (<https://data.govmu.org/dkan/>).

As the world economies embrace new technologies, Mauritius cannot stay aloof. Nowadays digital technologies and novel services are transforming the way new products are manufactured. It is vital for Mauritius to develop a road map to ensure that the country capitalizes on the technology of the future. These include Machine Learning, Artificial Intelligence (AI), Fintech, Blockchain, Robotics, Nanotechnology, among others. Our ability to harness digital data and develop innovative transformation of data into job and wealth creation will be vital for our economic survival.

For encouraging and promoting innovation and ensuring investment of time and money, the Framework aims at providing various incentives. At a National Level, the Framework aims to encourage and set up: Public-Private Partnership (PPP) Models as well as Research and Innovation Funding Schemes with a high degree of internationalization. The legal framework surrounding Intellectual Property Rights (IPR) needs to be reinforced while the participation of Mauritius in international treaties and conventions should be emphasized. Innovative legal frameworks such as legislation to promote freedom of information need to be investigated. Alongside legal frameworks, regulatory frameworks to encourage investment in R & D are considered. It is also high time to initiate new policies such as tax incentives to motivate local and foreign companies to invest in R & D in Mauritius.

At institutional, industry and individual levels it is worth mentioning that there are Research and Innovation funding schemes that are being managed by the MRC under the aegis of the Ministry of Technology, Communication and Innovation (MTCI). Inspired by international models, these schemes allow any stakeholder, whether from the public or private sector or any individual having an innovative idea to test or validate the idea. The Research schemes of the MRC have been revamped to Research and Innovation schemes in line with its new mandate under the forthcoming Mauritius Research and Innovation Council (MRIC). Innovative

features of these new schemes include the collaboration of different stakeholders and matching grants from the applicants; these schemes should boost Research, Development and Innovation in all spheres.

The framework is a living and flexible document which should allow the policies and strategies to be reviewed based on global changes that are bound to happen and impact on our system. Hence an innovative feature of the framework will be the development of the National Innovation Scoreboard, a set of innovation indicators that has been inspired by other countries, which will enable the policy makers to get factual information on the status of innovation in the country as well as the effectiveness of the measures in the policy document. Hence, gaps will be identified and the framework improved and adapted to arising changes over time.

A major pillar of the NIF (2018-2030) is the Governance mechanism to be set up as an overarching structure which allows coordination among relevant stakeholders including Academia, Industry, Public Bodies/Ministries and the general public.

The MRC will be consolidated into the MRIC which will be the executing agency. It will prepare national research and innovation priorities in consultation with major stakeholders. MRIC will develop, monitor and manage innovation program portfolios. It will provide guidance to program leaders in planning and designing the program scope, roadmap and implementation schedule. All programs will undergo a periodic review by MRIC.

It is expected that the measures in the NIF (2018-2030) lay a solid foundation which will allow the innovation culture to be sustained over time while the policies and strategies will be flexible to external changes. Actions stipulated in the plan should lead to an improvement in quality of scientific research institutions and companies' spending on R&D, academia-industry collaboration in R&D, Government procurement of advanced technological products as well as availability of scientists and engineers. It is also expected that social innovation will lead to solutions pertaining to the social challenges faced by the Mauritian population at large. These should poise Mauritius to become an innovation-driven economy.

1.0 THE IMPERATIVE OF INNOVATION

Innovation is critical in today's world. Consistently, many countries are promoting innovation through the development of innovation programs and nurturing the set-up of National Innovation Systems.

Investors choose Mauritius as a favourable holding company jurisdiction for other commercial purposes including but not limiting to excellent services and reputation. The International business sector visualizes the country as an ideal platform for structuring of investment into Africa.

Mauritius aims at integrating with global innovation clusters and becoming an innovation gateway into Africa. The island is at the centre of the marketplace of over 2 billion people arching from the southern tip of Africa to the shores of Sri Lanka encompassing the Gulf region and Indian subcontinent.

Innovation is a well-known key driver for economic development. It is also a differentiator in global competitive landscape countries and regions which are continuously reviewing and developing their innovation policies and strategies. This contributes towards improving their competitiveness.

Given the cross-cutting characteristics of innovation and the multitude of actors in the sector, this document is the first of its kind in providing the Framework for a National Innovation System. In this case, innovation is defined as the introduction into a market of new or improved products and services. Innovation entails the encouragement of research, entrepreneurship and mobility of several such factors to increase market mobility.

The NIF (2018-2030) is a serious attempt to maximize the impact of science, research, technology and innovation on socio-economic development by:

- Bringing coherence and cohesion in the governance structure;
- Building platforms to focus both on alleviation of short term challenges and to deal with development on the medium and longer term; and
- Bridging the gap between public and private sectors as well as considering factors beyond science, research and technology and including entrepreneurship and international partnerships.

This document also makes recommendations to address key challenges are listed below:

- Improving synergy in public sector institutional arrangements and funding structures;
- Setting up appropriate funding mechanisms;
- Enhancing Research, Development and Innovation in the private sector;
- Promoting adequate development of human resources and human competences;
- Removing legal and regulatory barriers to innovation;
- Consolidating linkages between research institutions and private sector;
- Transforming Innovation into Enterprises.

The NIF (2018-2030) gives a new perspective to Innovation in Mauritius with some new dimensions such as the critical role of the private sector and business companies in generating innovation, the importance of enterprises in creating scientific and technological resources for innovation and the importance of demand for innovation in driving the process.

Even if R & D remains at the core of the System, it is acknowledged that the linkages with non-R&D based activities in the manufacturing, financial and services sectors are crucial for the National Innovation System to function sustainably.

2.0 STATUS OF INNOVATION AND CHALLENGES

Over the past seven years, Mauritius has moved from 54th to 45th in the Global Competitiveness Index (GCI) ranking of the World Economic Forum. The GCI ranks Mauritius 63rd out of 137 countries in the Innovation sub-indicator.

Table 1: Global Competitiveness Index ranking for Mauritius

	2011/ 2012	2012/ 2013	2013/ 2014	2014/2015	2015/ 2016	2016/2017	2017/2018
No of countries assessed	142	144	148	144	140	138	137
Overall Ranking	54	54	45	39	46	45	45

Source: World Economic Forum, 2011-2018

Table 2: Innovation sub-indicator ranking from Global Competitiveness Index Reports for Mauritius

	2011/ 2012	2012/ 2013	2013/ 2014	2014/2015	2015/ 2016	2016/2017	2017/2018
Ranking	89	98	81	76	78	67	63

Source: World Economic Forum, 2011-2018

The Global Innovation Index 2018 of the World Intellectual Property Organization ranks Mauritius 75th out of 126 countries.

Table 3: Global Innovation Index ranking for Mauritius

	2011	2012	2013	2014	2015	2016	2017	2018
No of countries assessed	125	141	142	143	141	128	127	126
Global Innovation Index Ranking	53	49	53	40	49	53	64	75

Source: World Intellectual Property Organization, 2011-2018

Mauritius is striving to be a high income country. From both reports, it is clear that efforts will have to be invested in the quality of scientific research institutions and companies spending on R&D, academia-industry collaboration in R&D, Government procurement of advanced technological products, availability of scientists and engineers and Patent Corporation Treaty (PCT) applications, for Mauritius to evolve as a high income country which is innovation driven.

2.1 Research, Development and Innovation

Information and statistics, including research indicators (Annex A) as well as consultations with various stakeholders were used to evaluate the challenges of Research, Development and innovation.

It is noteworthy that the Tertiary Education Commission (TEC), operating under the aegis of the Ministry of Education and Human Resources, Tertiary Education and Scientific Research is providing a number of research funding schemes to increase the number of Doctor of Philosophy (PhD) students and to enable local academics to collaborate with international stakeholders.

2.2 Technology and Innovation

Technology can contribute to the improvement of peoples' lives by providing innovative solutions. Internet technologies are crucial to create connections and solving global challenges.

The role of Information and Communications Technology (ICT) in inclusive growth can be depicted by the Networked Readiness Index (NRI) of the World Economic Forum. During 2016 (most recent available report), it is noted that Mauritius ranks 49th out of 139 nations, the only country in sub-Saharan Africa to appear in the upper half of the NRI rankings.

It is also noteworthy that in terms of Business and Innovation Environment sub-index, Mauritius ranks 41st; this calls for an improvement in availability and Government procurement of latest technologies and venture capital availability. This emphasizes the importance of innovation to enhance entrepreneurship, investment and growth in business.

Table 4: Networked Readiness Index rankings

Country/ Economy	Overall NRI Rank (out of 139 countries)	Business and Innovation Environment Rank (out of 139 countries)
Singapore	1	1
Netherlands	6	10
Korea, Rep.	13	21
Estonia	22	26
Mauritius, Rep	49	41

Source: World Economic Forum, 2016

Continuous innovation is a challenge in itself and there is need to have a constant flow of implementable ideas.

It is envisaged to address the challenges in the identified strategic areas of intervention in this Framework.

2.3 Challenges

A. *Research and Development Funding (Resource Availability)*

- Investment in Research and Technology has to be increased
 - *Government Expenditure on Research and Development is estimated at 0.2% as a percentage of Gross Domestic Expenditure (GDP) (World Bank Group, 2018). This represents a relatively low percentage when compared to expenditure of other developed countries which can reach up to 4% and the target of at least 1% of GDP, as stated by the African Union Commission/New Partnership for Africa's Development (NEPAD), in active R&D programmes as an essential investment for the future. Measures are required to increase this percentage to allow Research and Innovation to have an impact on the economy.*
 - *Venture Capital (VC) Funds are scarce and the networks for VC funds are not well known to the concerned parties.*

B. *Capacity Building/Infrastructure/Logistics*

- Access to scientific publications has to be improved
- Data analysis and processing tools (software/hardware) have to be made accessible
- High Tech Equipment including specialized apparatus and laboratory facilities as well as logistics have to be made available to facilitate innovation
- Specialized Poles of Innovation need to be set up at national level
- The output of doctoral graduates from local Tertiary Education Institutions needs to be improved

C. *Communication/Collaboration/Partnerships*

- Mechanism to facilitate and support multi-disciplinary approaches to be put in place
- Public/Private (Industry and Small and Medium Enterprises (SME))/Academia partnerships to be strengthened
- International partnerships to be encouraged
- Need for stronger links between Research and Policy Making

D. *Support Mechanism/Institutional Support*

- Legal and Regulatory Framework should be enhanced to facilitate innovation including IPR issues
- Ways and means to promote an innovation culture and teamwork
- Innovation in Small and Medium Enterprises (SMEs) should be given particular attention, especially in terms of institutional support and structured guidance e.g. through business incubators.

Detailed statistics pertaining to Research and Innovation Indicators are annexed in Annexure A.

3.0 AIMS AND OBJECTIVES

The NIF (2018-2030) has been formulated keeping in mind clear aims and objectives which it seeks to achieve. These objectives have been tailored to cater the needs of Mauritius on different levels.

On a National Level, the Framework seeks to achieve the aims and objectives of:

- Sustainable Long-Term Growth
- Creating Innovation Culture

Sustainable Long-Term Growth: Such a policy is the essential requisite to ensure that an innovation system achieves essential macro-economic objectives such as stable prices and economic stability. No successful nation in the world can retain its status unless it has sound economic policies which support growth in a balanced and sound manner. The NIF (2018-2030) is an attempt to seek new domestic engines for sustainability and organic growth. The various strategies involved in the Framework are intended at sowing the seeds for a new culture of innovation which would become a part of the Mauritian way of life.

Creating Innovation Culture: While Leadership and Commitment are essential for an innovation system to function sustainably and efficiently, another important prerequisite for a healthy and thriving innovation system is the inculcation of an innovation culture. It is an environment which supports creativity and promotes the conversion of knowledge into economic and social benefits while generating new or improved products, services or processes.

The NIF (2018-2030) is a serious attempt at inculcating and sustaining an innovation culture with an important human dimension engaging people. The proposed strategies cut across all spheres and disciplines, starting with nurturing creativity in very young minds at pre-primary and primary levels, extending to secondary schools, and universities and ultimately culminating in the workplace and the civil society. To achieve these aims, leaders in different sectors and spheres need to be identified to build that culture of innovation. This implies institutional and organizational changes, with single points of accountability for innovation, a system of recognition and rewards, an environment favouring risk-taking without fear of failure. Adopted measures will enhance the creativity of the youth to enhance their capacity to contribute to socio-economic development. A new research and corporate culture adopting standard practices of innovation will allow institutions and companies to harness the innovative potential of all employees including researchers.

At Industry level, the Framework would focus its attention on achieving the following aim:

- Fostering Positive Ecosystem for Innovation
- Bringing Global Social Innovations

Fostering Positive Ecosystem for Innovation: On the level where industries interact, it is essential to create an environment where innovation and creativity can grow. The NIF (2018-2030) seeks to create breeding grounds where the marketplace meets academia and where creativity and innovation grow. Such an ecosystem would create a culture which encourages and inculcates innovation.

Bringing Global Social Innovations: The various socio-economic problems which plague a nation act against the forces of change and innovation. They slow down progress and the process of development. The Framework seeks to create innovations which tackle social issues in a new manner through the vehicles of social enterprises. Global Social Innovations can be achieved with the help of public-private partnerships, corporate social responsibility and strategic philanthropy. Such projects will help tackle social issues more efficiently which will in turn serve the economy.

Following these aims, the Framework would then focus its attention on individual companies and set the following aims and objectives for them:

- Ease of Funding Innovative Businesses
- Protection of Innovation

Ease of Funding Innovative Businesses: The aim of creating an innovative ecosystem cannot be complete without the presence of businesses which believe in being the vanguards of change and growth. At Company Level, it becomes essential to encourage and fund such innovative businesses which are in line with the NIF (2018-2030). The policies and programs of the Framework will make it easy for venture capital to enter the sector of innovative businesses and foster growth. The foundation for such an ecosystem will be strengthened through the implementation of schemes such as the National SME Incubator Scheme (NSIS).

Protection of Innovation: The Framework also recognizes the need to protect the intellectual property of these innovative companies. This would create a secure space for innovators to continue their growth and progress. Schemes such as the Proof-of-Concept Scheme (PCS) (Section 5.2) are part of the Framework which would enable the protection of invention. The Scheme would target companies and help them address high risk new technology by developing prototypes or conducting proof-of-concept experiments. The Scheme will also cover advisory services for the protection of intellectual property as well as assessing the potential for integration into a marketable product/process.

Finally, the Framework would focus itself to the aims and objectives it wishes to set for the people of Mauritius:

- High-Standard of Living
- Creation of Jobs

High-Standard of Living: The people are the driving force behind this Framework. The creation of an innovative economy would bring innovation to everyday life. This would in turn facilitate a higher standard of living where use of technology would make everyday tasks simpler and more efficient.

Creation of Jobs: Creation of an innovative economy would open the door to new enterprises, industries and creation of an entirely new sector which would permeate all existing sectors in the country. This in turn would mean creation of new jobs in large numbers as these new industries would need talented and dedicated workforce, committed to the idea of innovation.

4.0 MAJOR ELEMENTS OF THE NATIONAL INNOVATION FRAMEWORK

Innovation requires effective implementation and structures to be put in place to allow the doers of innovation to operate. There is a need to create an environment where there will be consistent, tactical excellence with specific milestones and specific people.

4.1 Innovation Capacity Building

In order to achieve the ambitious and noble aims and objectives laid down in the NIF (2018-2030), there is a need to groom the stakeholders. This calls for a systematic building of capacity in the country on a national, industry, company and individual level.

4.1.1 National Level

Firstly, the Framework must prime the nation as a whole and build its capacity to innovate by using the following:

- Vehicles of Innovation
- Collaborative mechanisms between institutions at national, regional and international level.

Vehicles of Innovation

- The Technology Transfer Office (TTO) currently functions as an operating unit of the MRC to encourage commercial utilization of the results of R&D and innovation. The aim of the TTO is to provide legal and technical support to local inventors and innovators as well as help identify, manage and make commercial use of their Intellectual Property (IP) assets. The TTO shall be strengthened to provide the necessary support system to potential innovators.
- The budgetary speech (2018/19) made reference to the setting up of an AI Council for the promotion of AI in the country. This is a laudable initiative which will spearhead a plethora of new digital initiatives leading to an enhanced economy. However, in-line with other countries the roles and functions of the Council have to be carefully devised in order to maximise the potential benefits of AI.
- The proposal is to first set up a Task force comprising of local and international stakeholders to define a blue-print for the AI Council.

There are many reasons for this suggestion, namely;

- The AI Council will endure minimum cost and take advantage of existing infrastructure and project expertise;
- A multi-disciplinary and multi-institutional approach can be used for the management of AI;
- Lessons learnt from initial project management and international experience will result in a shorter learning curve;
- Strategic and measurable deliverables can be targeted and closely monitored; and
- More resources will be dedicated on economic and social impact rather than on organizational issues.

4.1.2 Industry Level

Secondly, the Framework must engage in capacity building at an Industry Level as well, by integration with Academia.

The Framework aims at creating a policy for innovation which recognizes the central role which the industry must play. It must take centre stage in steering the policy of the State towards its goal of creating an innovative economy. At an industrial level, it is essential that business plans interact and learn from the academic world to achieve industrial growth. To achieve this goal, several schemes have been launched (Section 5.2).

Thirdly, the Framework will address capacity building at the level of Companies by taking the following steps:

- Attracting World Class Talent
- Organizational Learning for Innovation

Attracting World Class Talent: At the Company Level, the Framework aims to create and attract world class talent which can help create and compete in this innovative environment. The Framework will create incentives in the form of schemes, awards and recognitions which will create a pool of talent which can steer Mauritius on the path to success.

Organizational Learning for Innovation: Enterprises must learn from the innovation policy and inculcate the same principles in their organizational structure. There is a need to move away from the traditional model of an organizational structure and understand new ways of organizing which are more efficient and less time consuming.

4.1.3 Individual Level

Fourthly, the Framework will address capacity building at Individual Level by taking the following steps:

- Cross-Disciplinary Learning
- Skills Development

Cross-Disciplinary Learning: The Framework recognizes the importance of encouraging an understanding of academia by taking a multi-disciplinary approach. Such an approach adopted at the level of scholastic and collegiate learning would create an ecosystem of human resource with an understanding of the significance of innovative learning.

Skills Development: A critical mass of trained researchers is essential for its development. But the number of students enrolled in Science, Technology, Engineering and Mathematics (STEM) subjects tends to be low at secondary and tertiary levels. There is a need to upgrade human competencies and particularly addressing technological gaps. Furthermore, the local PhD production rate in STEM should be increased.

It is important that innovation be directly linked to the public education system. The curricula as well as methods of teaching should be strengthened to promote creativity at a young age, hence assuring an innovation culture

for the future. At the same time, measures should be developed to optimize the absorptive capacity of the job market for scientists, engineers and researchers.

The Framework provides the following measures:

- Sensitize pre-primary, primary, secondary and tertiary students on innovation through outreach programs
- Provide expertise in specific fields
- Attract Foreign Expertise
- Promote absorptive capacity of Science & Technology (S&T) professionals on the job market
- Explore forms of continuing professional education: Through distance learning, increasing access to library sources
- Increase awareness among key stakeholders (policy makers, SMEs, research, training and education institutions) on urgency to innovate
- Build advanced innovation management skills among firms with growth potential. These courses would build up on courses being offered by the National Productivity and Competitiveness Council.

4.1.4 Regional and International Collaborative Mechanisms

There is considerable interest within Mauritius to promote regional integration as a way of stimulating economic growth and enhancing local market demand. The establishment of Regional Economic Communities (RECs) in Africa has fostered regional trade agreements and the creation of regional markets. Through existing RECs, regional markets have been created and these have spurred increased demand for goods and services in areas such as agriculture, health, ICT, and infrastructure thereby increasing the need for innovation. Mauritius was able to form S&T partnerships in the regional and international arena. Linkages and collaboration with renowned universities such as the Indian Institute of Technology (IIT) in India, the Harvard University in United States or the Imperial College in United Kingdom will help to give a boost to local researchers and help the country attract foreign R & D. These linkages will help the country to reach world class research and be a Knowledge Hub in the regional/international arena.

Hence, it is important that the innovation capacity building process addresses ways and means to:

- Promote collaboration with regional/international counterparts;
- Attract Diaspora & foreign researchers in the country

In terms of strengthening the IP framework for the country to enable its positioning for more effective engagements at regional and international levels, Mauritius will join relevant World Intellectual Property Organisation (WIPO) administered treaties.

4.2 Innovation Infrastructure

The alliance of innovation and infrastructure is very critical. Infrastructure is an essential wheel for innovation and hence, needs to be highly advanced to promote the interest of innovation and growth.

At the National Level, the Framework aims to implement the basic elements of infrastructure required for Smart Cities. The Smart City model originated in Europe where digital technology or ICT were used to enhance the quality, efficiency and performance of urban life. Smart Cities use ICT for their basic daily services including government services, healthcare, transport management and Smart parking etc. Smart City concept has been implemented in cities such as Amsterdam, Barcelona, Stockholm and many more.

Some examples of technologies to be implemented for the smooth functioning of Smart Cities are:

- **Robust Internet:** Internet in today's age has become highly essential for carrying on the basic daily requirements of any business as well as in promotion of research, tourism or any aspect of growth. The Framework seeks to obtain an easy and fast internet access and connectivity in the interest of economic progress.
- **Smart Power Grids:** It is the primary objective of the Framework to provide access to electricity through implementation of Smart power grids. Smart power grids possess the capacity to balance electrical consumption with supply, as well as the potential to integrate new technologies to enable energy storage devices.

At Industrial Level, the Framework aims to develop/create the following to improve infrastructure:

- **Poles of Innovation:** It is paramount to create multiple self-sufficient ecosystems of innovation in Mauritius to truly achieve the aim of creating an innovative Mauritius. Poles of Innovation are in the nature of symbiotic machines where industry and academia meet and collaborate. Such clusters become the hotbed for interaction of all stakeholders and market players.
- **Research and Innovation Bridges:** It is important to build bilateral and multilateral collaborative research and innovation partnerships between researchers and industry of two or more countries to improve the competitiveness of Mauritius. The 'Research and Innovation Bridges' expands the Research/Industry Partnership to establish sustainable joint venture opportunities for the Mauritian companies through international cooperation.

The Framework seeks to create such clusters across the nation by creating innovation ecosystems and creating a free space which facilitates this coordinated effort at knowledge creation.

- **Industry-Centered Incubators:** Priority will be given to the creation of conducive environments for the creation and development of new and innovative business ideas. Incentives like high speed internet, prime location at low rent, free telephone will be of essence for ensuring a proper work environment for incubatees. Incubators specialized in diverse sectors will need to be implemented,

thus, ensuring creation of new knowledge, jobs and wealth in a wide range of sectors. Incubators may also provide business training to young entrepreneurs. The NSIS, an initiative in this direction has already been implemented.

At Company and People Level, basic elements of infrastructure can be inculcated such as:

- Public-Private Innovation Centres/ Collaborative Blue Ocean Research Labs: Joint Venture Innovation Centres by public, private and government entities will be encouraged to improve research and new start-ups.
- Collaborative Blue Ocean Research Labs: The Framework looks at encouraging research not only from the point of pure commercialisation but also with the purpose of invention of new kinds of technologies.
- An open data portal and research repository: It is well known that research generates much data and information. Access to such data and information is crucial to potential 'innovators' to allow translation of R&D activities into innovation. This is in line with the open data policy and the open data portal which has been set up by the Ministry of Technology, Communication and Innovation (<https://data.govmu.org/dkan/>). A research repository should be developed in the same context.

4.3 Innovation Incentives

For encouraging and promoting innovation and ensuring investment of time and money, the Framework aims at providing various incentives.

At a National Level, the Framework aims to encourage and set up:

- PPP Models and facilitating IP policy incentives
- Research and Innovation Funding Schemes

4.3.1 Enabling Environment supporting innovation

There is already an effective legal Framework regulating the activities of local public research organisations with responsibilities and objectives clearly stated in legislative acts. Research institutions are also expected to assume responsibility for and to deal with the impact of S&T on human lives and on the environment through a number of legislative acts.

An example of such Act would be The Clinical Trials Act 2011 which has been proclaimed since May 2011 to ensure the implementation of good clinical practices in clinical trials and ensure safety of subjects involved in clinical trials. The allocation of clinical trial licenses is allocated by the Clinical Research Regulatory Council set up under this same act. The Council is assisted by the Ethics and the Pharmacovigilance Committees in its functions. The Act falls under the responsibility of the Ministry of Health and Quality of Life.

It should be noted that despite the existence of a legislative Framework addressing local research sectors, it is becoming increasingly difficult to regulate the rapid scientific and technological development in society especially with the recent debates and controversies on issues such as genetically modified foods, global warming and clinical trials involving human participants. These few examples highlight the difficulty in developing an effective legal Framework regulating the numerous innovation activities of modern society. In this line, it is recommended that the Government work on a comprehensive legislation to ensure the country's competitiveness in the global level through improvements in Science, Technology and Innovation (STI) including protection of IPs.

4.3.2 Intellectual Property and Public-Private Partnerships

The Framework aims at encouraging innovation, research and business development through public-private partnership models. Public-Private Partnership means an arrangement between a government/statutory entity / government owned entity on one side and a private sector entity on the other, for the performance of a specific task may it be research, innovation or carrying on any business relating to research and innovation.

Incentives

- Incentives should be provided to firms to innovate. Furthermore, such incentives should facilitate product value addition and enhance ability to compete in niche markets. Incentive measures include sustaining existing and introducing new matching grant schemes covering firm expenditures on innovation activities.

At a more micro level such as the Company and People Level, the Framework encourages implementation of:

- Industry-specific IP policy incentives
- Intellectual Property Rights

Intellectual property protects the application of ideas and information of commercial value. This is important as new technologies are being developed and international trade is becoming increasingly sophisticated.

Intellectual property in Mauritius is currently governed by the following Acts of Parliaments and regulations made hereunder, namely:

- The Patents, Industrial Designs and Trademarks Act 2002
- The Copyright Act 2017
- The Protection Against Unfair Practices (Industrial Property Rights) Act 2002
- The Competition Act 2007
- The Customs Act 1988 (as revised by the Finance Act 2017)

The administration of copyright and related rights falls under the responsibility of the Ministry of Arts and Culture. The Copyright Act 2017 makes provision for the Mauritius Society of Authors to collectively manage the rights of authors or owners of copyright, represent and defend the interests of its members in Mauritius and abroad, amongst others.

These new acts are in line with international norms and follow the international commitments taken by States, within the World Trade Organization. Furthermore, IP legislation is being amended to take into account changes in technology and to enhance the protection with respect of Plant Varieties, Geographical Indications / Appellation of Origin, and Layout Designs (Topographies) of Integrated Circuits. The administration of IPR currently falls under the responsibility of the Industrial Property Office, Ministry of Foreign Affairs, Regional Integration and International Trade.

Despite the national legislative Framework addressing IPR, a number of issues requiring attention were identified to facilitate IPR implementation by local entrepreneurs (European Union Report, 2006; Mauritius National Export Strategy – Innovation Cross-Sector 2017 – 2021, International Trade Centre / Ministry of Industry, Commerce and Consumer Protection). These obstacles include:

- Awareness of IP issues in general
- Effective legal protection in IP
- Awareness of the benefits of owning and commercializing IP assets
- Costs of legal advisory services for IPR
- R&D costs to be reviewed
- Comprehensive institutional Framework to be set up/promote the commercialization of IP assets.

The Intellectual Property Promotion Scheme (IPPS) of the MRC is one such scheme which encourages relevant stakeholders to protect innovation.

To help achieve the objectives aimed at enhancing the IP framework, actions need to be undertaken in accordance with the following timelines:

- Annual outreach campaign organized by Industrial Property Office (IPO) / MRC. By 2020, Mauritius should be party to the following WIPO-administered treaties (Madrid Agreement, Lisbon Agreement, Patent Cooperation Treaty, Hague Agreement);
- Government is coming up with a new IP legal framework to address shortcomings as above.

4.3.3 Research and Innovation Funding Schemes

Financing of projects should be facilitated under specific schemes targeted towards research, innovation and commercialization and capacity building. In order to motivate industry to embark on innovation activities, funding schemes should incorporate an element of risk-sharing from the Government. In this context, the MRC is already managing seven Innovation and Commercialisation Schemes as follows:

1. Collaborative Research and Innovation Grant Scheme (CRIGS)
2. Intellectual Property Promotion Scheme (IPPS)
3. Social Innovation Research Grant Scheme (SIRGS)
4. National SME Incubator Scheme (NSIS)
5. Proof of Concept Scheme (PCS)
6. Pole of Innovation Grant Scheme (PoIGS)
7. Research and Innovation Bridges (RIBS)

4.4 Major Research and Innovation Measures

4.4.1 *Emerging Technologies*

As the world economies embark on the digitization of the major sectors of manufacturing and service providers, increasingly leveraging on big data and data analytics will become a necessity for improving our competitive edge; more so if Mauritius aspires to be a stepping stone into Africa. In this context, emerging sectors, such as Machine Learning, AI, Internet of Things, Robotics, Fintech, Blockchain, among others cannot be ignored. A national strategy must include a roadway for the development and exploitation of these new avenues of job and wealth creation.

However, before these data driven initiatives can benefit the country there are three major issues to be confronted with. New fields such as AI, Fintech and others, thrive in data; the more the better. Hence, the first requirement is the initiation of a phased digitization process of the Mauritian economy and this should include both the public and private sectors as well as sectors such as Health, Manufacturing, Transport, Logistics, Tourism, among others.

The second requirement is the creation of a shared digital platform to improve access to the data. This platform should ensure confidentiality and protect privacy.

The third requirement is capacity building in the exploitation of data and its transformation into revenue generation while optimizing resources. A new entrepreneurship mindset will have to be encouraged specifically among the young generation.

4.4.2 *Promoting Social Innovation*

The notion of innovation has in recent years been expanded to also encompass 'Social Innovation'. Given the widely acknowledged potential of this approach in addressing, in a pragmatic manner, enduring social challenges, the Council aims to promote and harness the full potential of social innovation and drive socially innovative programmes and practices.

Social Innovation basically refers to the adoption of new social practices in order to meet social needs in a different and more effective way. A defining feature of social innovation is that the Return on Investment is not measured in terms of money but rather in terms of social good particularly for vulnerable segments of the population.

Social innovation has experienced a steep career. Numerous national governments and large organizations like the OECD, the European Commission and United Nations Educational, Scientific and Cultural Organisation have adopted the term and even have specialized departments and units in order to drive, promote, foster and coordinate platforms for coordinating good practices in social innovations with potential users. Social Innovation is set to grow in importance not only concerning issues such as social integration, equal opportunities and dealing with environmental issues but also with regard to preserving and expanding the innovative capacity of companies and societies.

However, in the local context, there is yet to be the adoption and harnessing of this new concept. Fostering and adopting a culture of social innovation therefore holds many promises in terms of how many longstanding topical social issues which Mauritius has to contend with, can be addressed for the greater good of Mauritian society as a whole thereby meeting the goals of a more inclusive, fairer, healthier and sustainable society. Some priority grand challenges which can readily lend themselves to social innovation programmes include addressing Non-Communicable Diseases, substance abuse, poverty, adolescent reproductive health, ageing population, national heritage conservation, education among others.

Against this background therefore, a proposed programme on social innovation envisages to fill a gap in terms of a new set of approaches to address social problems and come up with pragmatic solutions for vulnerable social groups whose needs are not being adequately addressed by existing social policies and collective welfare design and delivery.

The objectives of this proposed programme are as follows:

- To promote interest, vulgarise and foster the adoption of social innovation practices which have the potential to impact positively on grassroot communities (e.g through national workshops).
- To establish linkages / bridges with countries/institutions which have developed strong practical expertise in driving social innovation initiatives and reaping their benefits.
- To operate a Social Innovation Research Grant Scheme on a matching basis with the partnership of Private Sector to design and implement socially innovative practices with potential to bring positive transformations for vulnerable communities.
- To act as a scouting cell for international best practices in social innovation projects across the world and which can be adapted to the local context.
- To promote Private-Public-Third Sector partnership with the view to coordinate social innovation projects.

4.4.3 *Establishing a culture of Innovation*

Dedicating awards especially to recognize innovation and to give innovators a national profile is a significant step in further instilling the culture of innovation in the next generation. Hence, durably changing the mind-sets of people from habitual thinking to novel thinking.

Similar to the Shell Innovation challenge of Australia, VALEO Innovation challenge, United Arab Emirates Innovation challenge or the Philips Open Innovation Challenges which are important features in their respective national innovation landscape, the MRC has introduced a National Innovation Challenge aimed at uncovering and fostering local and professional innovations created by Mauritians working in a variety of fields from Academia, Start-up and Micro Companies, SMEs, communities to local schools and home inventions .

Whilst such challenges exist in various guises worldwide, this competition lays emphasis on a particular set of themes or national problems. Participants are then expected to come up with innovative solutions or strategies.

The aim of this challenge is to inculcate and nurture an innovation culture amongst the Mauritian population whilst finding practical innovative solutions to common life problems. The National Innovation Challenge is of high relevance considering the vision of the government to make Mauritius an innovation-based economy and SMEs one of the pillars of the economy.

This challenge proposes to showcase and reward ideas through a series of TV shows on the national television and social media platform to reach the Mauritian public at large.

4.4.4 Fostering Innovation

Defining Grand Challenges for Mauritius

The prime thrust of the government is to build a strong framework for economic progress and sustainability. The ultimate goal is to drive the economic growth rate to a higher level in the years to come. The vision is therefore for Mauritius to move away from the middle-income trap to become a high-income country.

Mauritius is facing a number of problems which may act as barriers in the process of economic development. It is widely recognised that overcoming those problems/barriers is a real challenge for any developing country. Therefore, it is of utmost importance to have a structure in place for the timely identification and resolution of those challenges.

A definition encompassing all key aspects to be considered while defining a specific problem as a grand challenge is as follows:

“ The Grand Challenge is a strategic platform that helps to identify critical barriers holding back progress in addressing critical problems, develops targeted programs to fund teams to develop solutions to overcome these barriers and implements strategies to help to bring these solutions to scale in order to address the pressing challenges” (Adapted from Grand Challenges Canada).

The concept of grand challenges has been used in a number of countries across the globe to address very pertinent national issues that could lead to detrimental effects if left unattended. The purpose of coming up with grand challenges is to identify and support clear priorities for coordinated research and innovation efforts with a view to finding innovative ideas to enhance the quality of life of citizens through collaboration and joint leadership. In this context, the MRC has embarked into a consultative process to define Grand Challenges for Mauritius.

A Steering Committee comprising members from the public and private sectors and NGOs was constituted to decide on identification criteria and to analyse ideas submitted. The framework and the criteria for identification of grand challenges has been finalised.

A Grand Challenges Website (<https://grandchallengesmauritius.com>), comprising of a discussion forum, has been created for Mauritius whereby the private and public sectors, non-governmental organisations, members of the general public and diaspora members are encouraged to submit grand challenges/ideas that could aid towards enhancing and harmonising the economic and social development of the country.

5.0 THE WAY FORWARD

Mauritius needs a strategy not only to generate appropriate knowledge, but also to transfer the knowledge and create a platform allowing the community to use this knowledge. The model being proposed considered international best practices and is drawn from the experience of a number of countries.

Important steps in the implementation of this strategy would involve different levels of governance.



Table 5.0: Different levels of governance

CONCEPTUALIZE	<ul style="list-style-type: none"> ▪ Create a unified vision and determine the scope and focus of the program ▪ Identify the technical, personnel, financial and administrative requirements ▪ Ascertain the potential stumbling blocks and obstacles to the implementation of the program as well as any negative effects on the social or environmental front.
ENABLE	<ul style="list-style-type: none"> ▪ Acquire or build resources—people, systems and structure—required for the program ▪ Creating the necessary capabilities is essential for the program to succeed
INTEGRATE	<ul style="list-style-type: none"> ▪ Communicate with all the relevant stakeholders and enable the vision and scope of the program as they relate to their work ▪ Achieve the integration by garnering support and commitment of all
ENCOURAGE	<ul style="list-style-type: none"> ▪ Undertake the actual implementation of the program in the phased manner defined under the scope ▪ Determine and fulfil the operational requirements on regular basis and resolve the hurdles as they emerge
MONITOR	<ul style="list-style-type: none"> ▪ Monitor the execution of the program against the roadmap created under the scope ▪ Ascertain the progress towards the achievement of the objectives of the program ▪ Review performance against expectations ▪ Make recommendations concerning the changes required for going forward in the current phase and next phases.

5.1 The Governance Structure

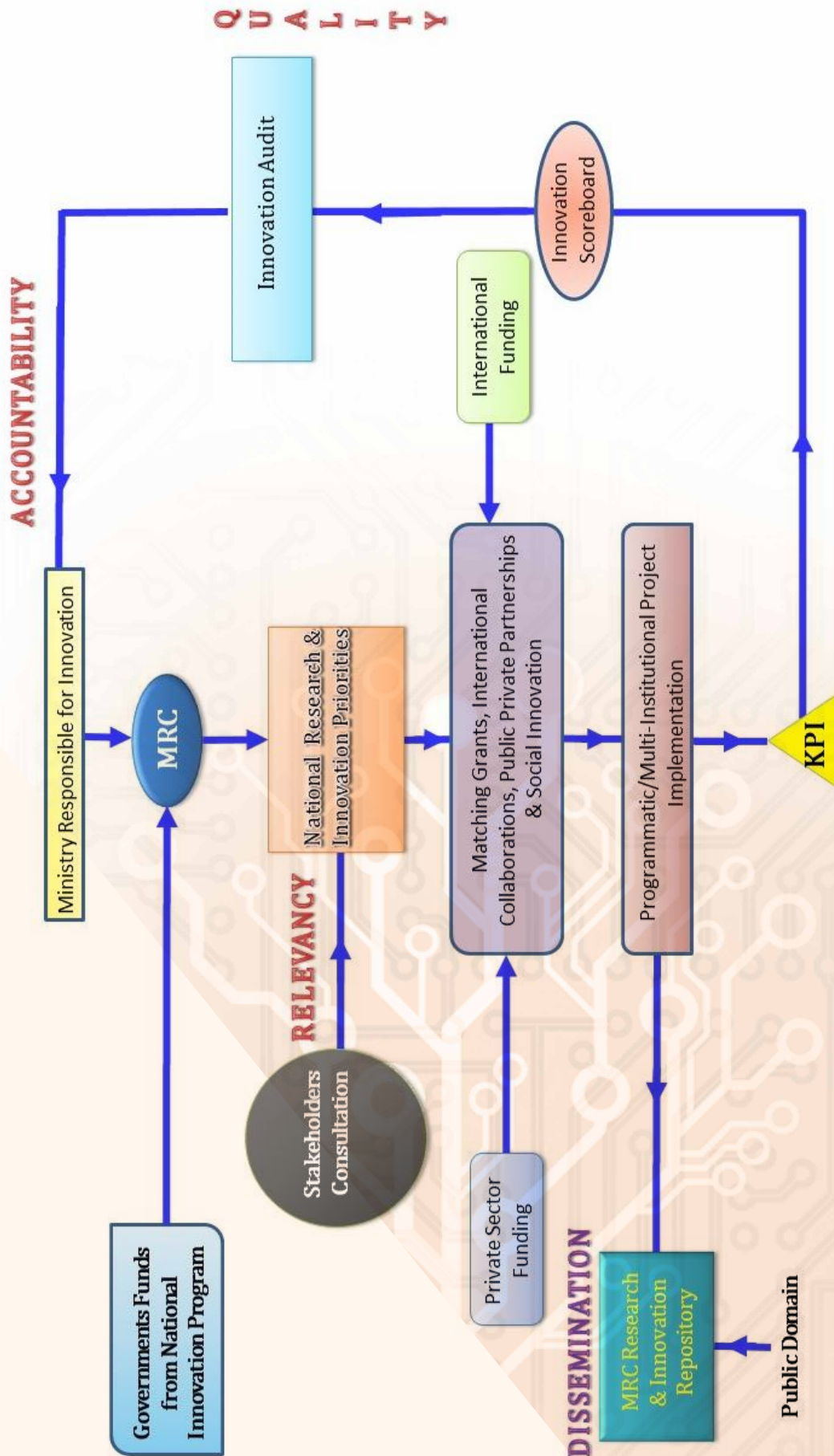
The development of the National Innovation System under the NIF (2018-2030) requires across-the-board administration under a dedicated, overarching governance structure. Developing an innovation system involves organizing efforts across many domains in various sectors. It includes identifying, capturing, organizing, analysing, disseminating and applying data, information and knowledge. A governance structure offers a way to coordinate with various government agencies, educational institutions, research organizations, private sectors, entrepreneurs, investors and general public. It ensures that all facets of the National Innovation System are functioning in synergy to achieve the aims and objectives identified under the NIF (2018-2030).

5.1.1 *Mauritius Research and Innovation Council (MRIC)*

The role of the MRC should be reinforced as the MRIC. The MRIC, operating under the Parent Ministry will be responsible for the NIF (2018-2030) and its implementation. It will set up the appropriate mechanism to provide the critical leadership for strategic directions and oversee the progress on the innovation Framework. The MRIC in consultation with Academia, Public Sector, Private Sector and the community at large will articulate a vision, define the scope and establish objectives for the National Innovation System.

The MRIC will promote and finance innovation activities and will serve as a one-stop shop for innovation-related inquiries. Such agency should have clear roles and responsibilities, adequate resources, sufficient independence to be able to perform dynamically, and its staff should have a good understanding of, and close relations with the private sector. This will require the establishment of a clear mandate for MRC to become the MRIC and if appropriate, revising the organizational status of the new agency so that it can act and manage its activities with sufficient independence and agility (for instance, in terms of contracting human resources or services). The regular budget of MRIC has to be enlarged so that it can recruit additional staff for and devote sufficient resources to its innovation promotion activities. The MRC Act is being reviewed accordingly.

The MRIC will prepare national research and innovation priorities in consultation with major stakeholders. Specific programs will be developed for various government agencies and private sectors to address the priorities. In so doing the MRIC will ensure that international funds and private sector funds be directed towards matching grant programs to promote partnerships between the public and private sectors as well regional and international collaborations. MRIC will develop, monitor and manage innovation program portfolio. It will provide guidance to program leaders in planning and designing the program scope, roadmap and implementation schedule. All programs will undergo a periodic review by MRIC, which will provide a regular report to the Parent Ministry.



5.2 Funding Schemes

Different funding schemes have been tailored to cater for the financing of projects under this Framework and they are being managed by the MRC. These schemes are detailed as follows:

Scheme 01:	RESEARCH AND INNOVATION BRIDGES (RIBS)
Target Group:	Consortia of company(ies), research organisation/ academic institution from Mauritius and Partner Countries
Purpose of Scheme:	To improve the competitiveness of Mauritius through bilateral and multilateral collaborative research and innovation partnerships between Researchers and Industry of the two or more countries.
Description of Scheme:	The 'Research and Innovation Bridges' expands the Research/Industry Partnership to establish sustainable joint venture opportunities for the Mauritian companies through bilateral and multilateral cooperation. This scheme encourages synergism in the proposed research and innovation project where a multi-disciplinary team approach is required. The Research and Innovation Bridges aim to combine the strength of all participating entities by coupling entrepreneurial skills to high technology research and innovation efforts. The ultimate objective of the project will be to develop innovative products, processes, and/or techniques for commercial competitiveness and sustainability of enterprises.
Funding	Matching grant of up to a maximum of Rs10 million per project. The local company will have to contribute to the project in cash and/or in kind. A minimum financial (Cash) contribution of 40% of the matching grant requested should be made by the applicant.
Project Duration	24 months
Selection Process	Proposals are selected based on priority areas and evaluated through a peer review mechanism.
Guidelines and Brochure are available on the MRC Website: http://www.mrc.org.mu	

Scheme 02:	COLLABORATIVE RESEARCH AND INNOVATION GRANT SCHEME (CRIGS)
Target Group:	Local Companies or a consortium ranging from Micro, Small and Medium Enterprises, to Large Companies in partnership with local Academic / Research / Tertiary Education Institution(s). The Local Company also has the choice to partner with other institutions located locally and/or internationally
Purpose of Scheme:	To improve the competitiveness of firms in the Mauritius, through collaborative Framework between research and industry.
Description of Scheme:	The CRIGS encourages synergism in the proposed research project where a multi-disciplinary team approach is required, in which the project leader is from the local company and the project investigator(s) is/are from local and/or overseas research institution(s). The CRIGS aims to combine the strength of all participating entities by coupling entrepreneurial skills to high technology research efforts. Project proposals are accepted in areas of industry-oriented research that will enhance socio-economic benefits. Proposals must contain innovative concepts with a view to sharpening the competitive edge in line with the agreed principles of sustainable development.

Scheme 02:	COLLABORATIVE RESEARCH AND INNOVATION GRANT SCHEME (CRIGS) (cont'd)
Funding	Matching grant of up to a maximum of Rs5 million per project. The local company will have to contribute to the project in cash and/or in kind. A minimum financial (Cash) contribution of 40% of the matching grant requested should be made by the applicant.
Project Duration	24 months
Selection Process	Proposals are selected based on priority areas and evaluated through a peer review mechanism.
	Guidelines and Brochure are available on the MRC Website: http://www.mrc.org.mu

Scheme 03:	PROOF-OF-CONCEPT SCHEME (PCS)
Target Group:	Enterprises, entrepreneurs, researchers, as well as institutions, willing to develop his/her innovative concept/idea/prototype
Purpose of Scheme:	To provide support for the validation of innovative technologies that have promising commercialisation potential. The scheme also covers advisory services for the protection of intellectual property as well as assessing the potential for integration into a marketable product/process.
Description of Scheme	The Proof of Concept Scheme is designed to encourage individuals having an innovative, potentially commercialisable and patentable concepts to prototype their invention/concept. Academics are also encouraged to apply under this scheme to explore the commercial potential of their laboratory results. The idea/concept can be in any field as long as the Applicant strongly demonstrates its uniqueness and commercial potential. The maximum allowable amount per grant will be Rs 1,000,000. The maximum duration for this award will be 1 year.
	The applicant may use the grant to hire relevant experts who will help in materializing the concept/prototype. The applicant must be a Mauritian national, or in the case of an organization/company must be registered in the Mauritius.
Funding	Maximum of Rs 1 million
Project Duration	Up to 1 year
Selection Process	Proposals are selected based on priority areas and evaluated through a peer review mechanism.
	Guidelines are available on the MRC Website: http://www.mrc.org.mu

Scheme 04:	NATIONAL SME INCUBATOR SCHEME (NSIS)
Target Group:	Incubators, an individual or a group of individuals having a business idea, a pre-start-up or a start-up company
Purpose of Scheme:	To assist innovative entrepreneurs to create, develop and accelerate their businesses in a sustainable entrepreneurial ecosystem established through a public/private sector collaborative approach.
Description of Scheme:	This scheme encourages the creation of Innovative businesses for the socio-economic benefit of the Republic of Mauritius through a nurturing and training process in a conducive environment provided by Accredited Incubators.

Scheme 04:	NATIONAL SME INCUBATOR SCHEME (NSIS) (cont'd)
	Accredited Incubators funded by the NSIS shall support selected Incubatees during the following three phases of business incubation: Pre-incubation, Incubation and Acceleration phase.
Funding	This scheme operates on a matching grant basis.
	Pre – Incubation phase: Maximum of Rs50,000
	Incubation phase: Maximum of Rs400,000,
	Acceleration Phase: Maximum of Rs300,000
Project duration	Each phase should be of a maximum of a duration of:
	Pre – Incubation phase: 9 months
	Incubation phase: 12 to 18 months
	Acceleration Phase: 6 months
Selection Process	Incubators are accredited by the NSIS Steering Committee. Each Accredited Incubator shall be responsible for calling for proposals for projects to be incubated at different phases. The MRC may consider working in collaboration with the Incubators to carry out a National Call for Incubatees.
	Guidelines are available on the MRC Website: http://www.mrc.org.mu

Scheme 05:	POLE OF INNOVATION GRANT SCHEME (PoIGS)
Target Group:	Academic and research institutions/organisations, both from public and private sectors, relevant Ministries/Parastatal bodies. Academic institutions need to be recognised/accredited tertiary education institutions or polytechniques. Collaborating Institution(s) can be public/parastatal institutions or private stakeholders including Research Organizations, Academic Institutions and local private companies. International partners are also eligible as collaborating institution. International partners can include tertiary/higher education institutions, polytechniques, public and private research institutions, recognised/accredited with the relevant authorities in their country of origin.
Purpose of Scheme:	Aims to enhance the impact of Research and Innovation on the economic development of the Republic of Mauritius by promoting creation of innovative products/services and goods and spurring innovation through advanced research and partnerships among local institutions and/or companies and/or international stakeholders.
Description of Scheme:	<p>The Pole of Innovation Grant Scheme will concentrate on existing capacity and resources to enable researchers/innovators to collaborate across disciplines and institutions on projects that are locally relevant and internationally competitive. This should lead to technological development and innovation. As such, this scheme will provide an additional dimension of the funding support that the MRC provides research groups and innovators that are at different points of development on the research spectrum.</p> <p>This Programme is geared towards the development of innovation. Poles of Innovation are intended to stimulate innovation activity, promote interaction between researchers/innovators, joint use of research facilities, exchange of know-how, knowledge transfer and information diffusion.</p>

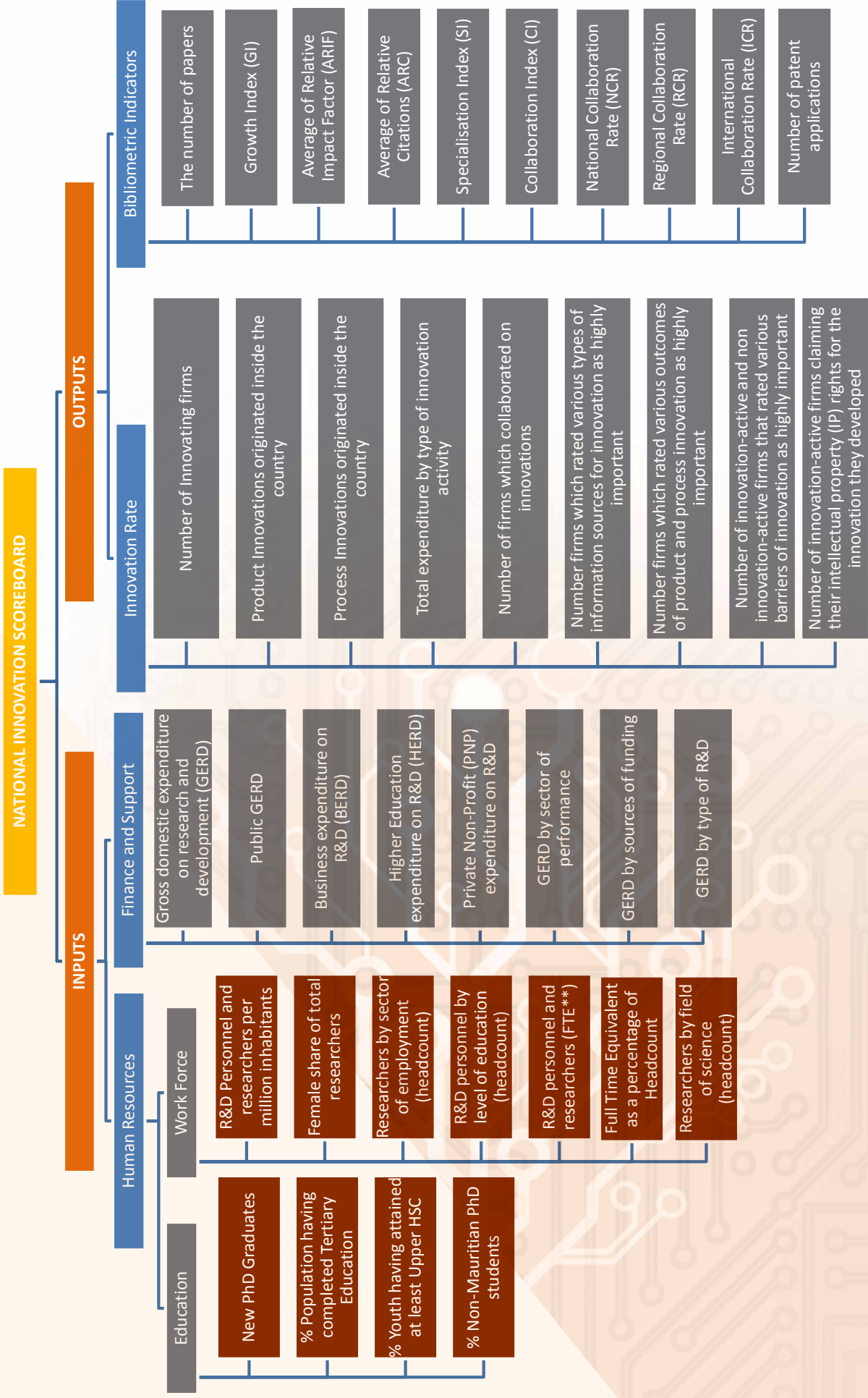
Scheme 05:	POLE OF INNOVATION GRANT SCHEME (PoIGS) (cont'd)
	The ultimate objective of the Pole will be to contribute towards the development of innovative products, processes, and/or techniques for commercial competitiveness and sustainability of enterprises.
Funding	A matching grant of up to Rs 9M per pole for a project duration not exceeding 36 months, with a maximum annual ceiling of Rs 3M.
Project duration	36 months (maximum)
Selection Process	Proposals are selected based on areas of national relevance and evaluated through a peer review mechanism.
Guidelines are available on the MRC Website: http://www.mrc.org.mu	

Scheme 06:	SOCIAL INNOVATION AND RESEARCH GRANT SCHEME (SIRGS)
Target Group:	NGOs or public funded bodies in collaboration with academic/research institutions/private sector companies
Purpose of Scheme:	To encourage academics, NGOs, public funded bodies and the private sector alike to come forward with projects which combine action-research and a social innovation potential with tangible outcomes in classic social development research areas such as poverty, empowerment, vulnerability.
Description of Scheme:	<p>The notion of innovation has in recent years been expanded to also encompass Social Innovation which basically refers to the adoption of new social practices in order to meet social needs in a different or more effective way. It is a novel solution to a social problem that is more effective, efficient, sustainable, or just than present solutions and for which the value created accrues primarily to society as a whole rather than private individuals.</p> <p>Fostering and adopting a culture of social innovation therefore holds many promises in terms of how many longstanding topical social issues which Mauritius has to contend with, can be addressed for the greater good of Mauritian society as a whole thereby meeting the goals of a more inclusive, fairer and sustainable society.</p> <p>The projects under this scheme need to have a strong research element embedded within to clearly define, describe, monitor and evaluate an intervention in an identified social problem and how in turn this intervention brings a novel and practical solution to the area under investigation. Projects will therefore be judged in terms of the potential practical merits as socially innovative solutions to the social problems identified.</p>
Funding	Up to a maximum of Rs 1 million per project
Project Duration	Up to 2 years
Selection Process	Proposals are selected based on priority areas and evaluated through a peer review mechanism.
Guidelines are available on the MRC Website: http://www.mrc.org.mu	

Scheme 07:	INTELLECTUAL PROPERTY PROMOTION SCHEME (IPPS)
Target Group:	Individuals, groups/teams, enterprises, industry, SMEs, research institutions and academic institutions
Purpose of Scheme:	The purpose of this scheme is to encourage individuals, enterprises, industry and R&D institutions to take advantage of the mechanisms for protecting innovation currently offered by the industrial property system in Mauritius.
Description of Scheme:	Patent and Industrial Design applications can be submitted by individuals, groups/teams, or organizations. The scheme provides for a 50% refund of the registration costs for patent and industrial designs applications. The applicant must be a Mauritian national, or in the case of an organization/company must be registered in the Mauritius. The applicant must be the true owner of the intellectual property.
Funding	50% of registration costs which amount to Rs 3,100 for industrial design applications and Rs 2,500 for patent application.
Selection Process	Application are processed on a first come first serve basis.
Guidelines are available on the MRC Website: http://www.mrc.org.mu	

5.3 Innovation Appraisal: Measuring & Managing Progress

The progress on the NIF (2018-2030) will be periodically appraised through a National Innovation Scoreboard. An overarching National Innovation Scoreboard will be developed to align with the key elements of the Framework. This Scoreboard will be cascaded down to individual innovation programs. Based on the strategic objectives defined in the Scoreboard, key performance indicators (KPIs) will be identified. The performance on these KPIs will be compared against the International Benchmarks on a periodic basis. Strategic Gap Analysis will be conducted on the variation from the targets and actuals. Specific initiatives will be undertaken within the programs for the course correction and achieving the overall objectives defined under the Framework in the specific timeframe.



Source: African Innovation Outlook II, April 2014 and Innovation Union Scoreboard (EU)



ACTION PLAN

(2018-2030)

6.0 ACTION PLAN

Five major areas of intervention have been identified for implementing the different strategies outlined in the NIF (2018-2030).

- 1) To build capacity for promoting innovation
- 2) To promote regional and international collaborative mechanisms
- 3) To set up the innovation infrastructure
- 4) To develop innovation incentives
- 5) To set up the institutional and governance framework to facilitate & monitor Innovation

Actions to be taken under the five elements are tabulated in the Action Plan below:

				2018 - 2022	2022 - 2026	2026 - 2030
Objectives		Sub-Objectives				
MAJOR ELEMENT 1: To build capacity for promoting innovation						
1.1	Sensitise pre-primary, primary, secondary and tertiary students on innovation	1.1.1	Organise innovation workshops/ events showcasing new and emerging technologies such as Robotics, Artificial intelligence.			
		1.1.2	Organise innovation outreach programs			
1.2	Increase awareness among key stakeholders (policy-makers, SMEs, researchers)	1.2.1	Conduct awareness seminars among key stakeholders. Provide information on existing services and collaborative avenues amongst institutions			
		1.2.2	Annual conference on specific innovation topics			
		1.2.3	Participation in international networks of innovation policy			
MAJOR ELEMENT 2: To promote regional and international collaborative mechanisms						
2.1	To attract foreign expertise to enhance knowledge/ technology transfer	2.1.1	To attract diaspora and foreign researchers in the country through specific funding schemes			
		2.1.2	To establish research and innovation bridges between Mauritian Companies and international stakeholders			
		2.1.3	To organise workshops/seminars in collaboration with international stakeholders on specific innovation issues			

				2018 - 2022	2022 - 2026	2026 - 2030
MAJOR ELEMENT 3: To set up the innovation infrastructure						
3.1	To establish ecosystems of innovation	3.1.1	To set up poles of innovation in different thematic areas			
		3.1.2	To promote emerging sectors including Artificial Intelligence, Machine Learning, Air Quality Index, Nano Technology and Stimulation of Natural Disasters			
		3.1.3	To set up an AI Council			
3.2	To create conducive environments for the creation and development of new and innovative business ideas	3.2.1	Create clusters driven by incubators specialised in different sectors such as Agritech, IT, Cooperatives and encourage interactions between these clusters			
3.3	To setup an Open data Portal and Research Repository to allow potential innovators to build on existing data/information	3.3.1	To provide visibility and accessibility of the research and innovation outputs produced by local researchers and experts, To promote interdisciplinary collaboration, and To create awareness of work done in different public and private institutions leading to innovation			
MAJOR ELEMENT 4: To develop innovation incentives						
4.1	Attract private sector funding on Innovation Initiatives	4.1.1	Managing research and innovative projects on a matching grant basis			
4.2	Facilitate IPR Implementation by local entrepreneurs & industries	4.2.1	Conduct awareness workshops and IP Open Days for the public			
		4.2.2	Promote commercialisation of IP assets through specific funding schemes			
4.3	Strengthen innovations created to facilitate citizen engagement in innovation	4.3.1	Showcase & reward innovative ideas through the National Innovation Challenge			

				2018 - 2022	2022 - 2026	2026 - 2030
MAJOR ELEMENT 4: To develop innovation incentives (cont'd)						
		4.3.2	Create a discussion forum for crowdsourcing of ideas to address national grand challenges with specific focus on improving quality of life			
MAJOR ELEMENT 5: To set up the institutional and governance framework to facilitate & monitor Innovation						
5.1	To review the legislation governing the role of the MRC	5.1.1	Enactment of the MRIC Bill			
5.2	To monitor the innovation program portfolio	5.2.1	Develop an innovation scoreboard			
		5.2.2	Conduct surveys to evaluate the status of innovation programs and the national performance in terms of innovation			
		5.2.3	To publish an annual innovation newsletter in relation to the country's performance in terms of innovation			
		5.2.4	Organise Consultative Workshops to develop recommendations in view of improving innovativeness in various fields			
5.3	To update the National Innovation Framework	5.3.1	Organise Workshop to review the performance to the NIF & make adjustment if recommended			

7.0 CONCLUDING REMARKS

The NIF (2018-2030) offers the Republic of Mauritius an opportunity to rapidly strive towards an innovation led economy. The success of the implementation plan relies on active engagement of all concerned stakeholders including the Public Sector, Academia, Industry, Entrepreneurs and the Society at large. This important human dimension engaging people at all levels should lead towards the inculcation of an innovation culture which will sustain the progress of the Republic of Mauritius towards an innovation-driven economy.

The sustainability of the NIF (2018-2030) will be further ensured through regular reviews of the strategies to ensure that they adapt to changes on the global scene.

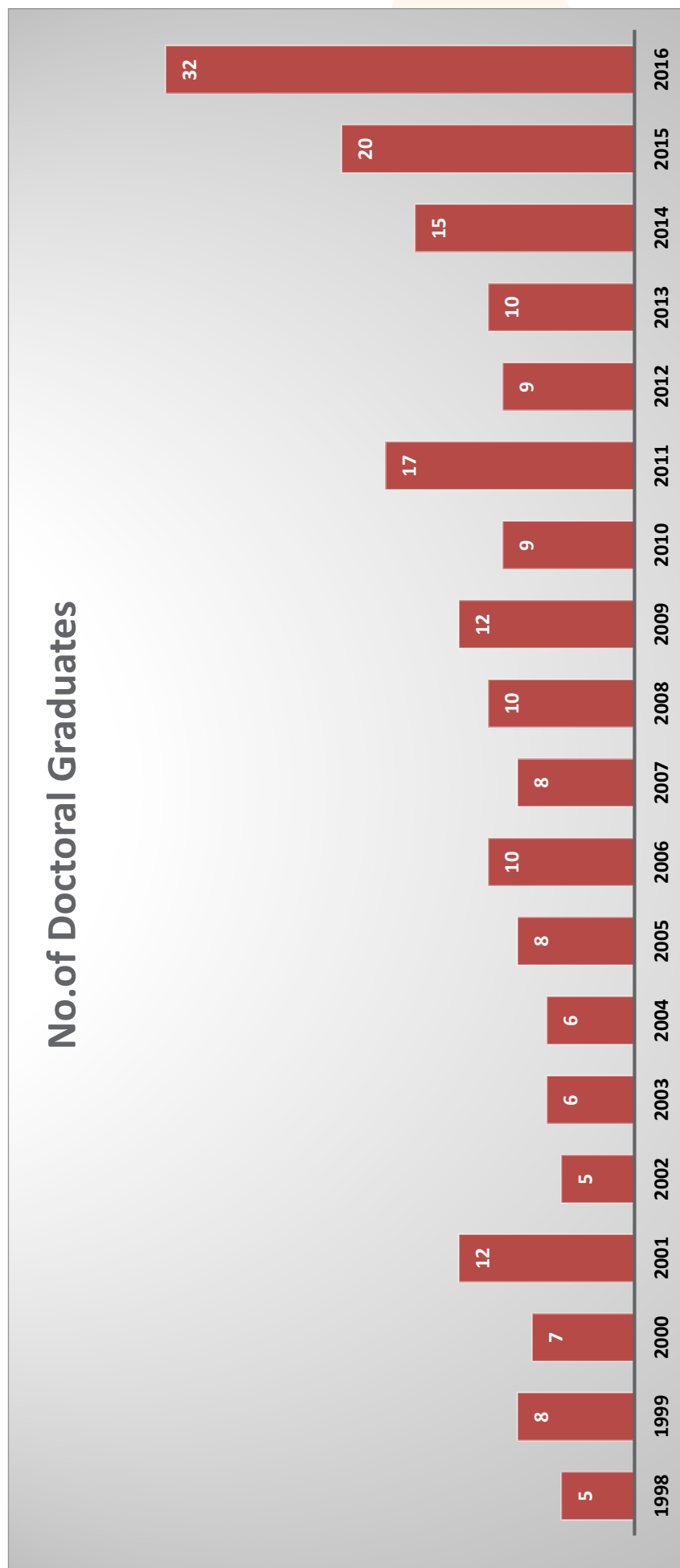


ANNEX

Annexure A: Research Indicators - Statistics

AI. PhD OUTPUT IN LOCAL TEIS

Number of yearly PhDs in Publicly-funded Tertiary Educational Institutions (TEIs) (1998-2016)

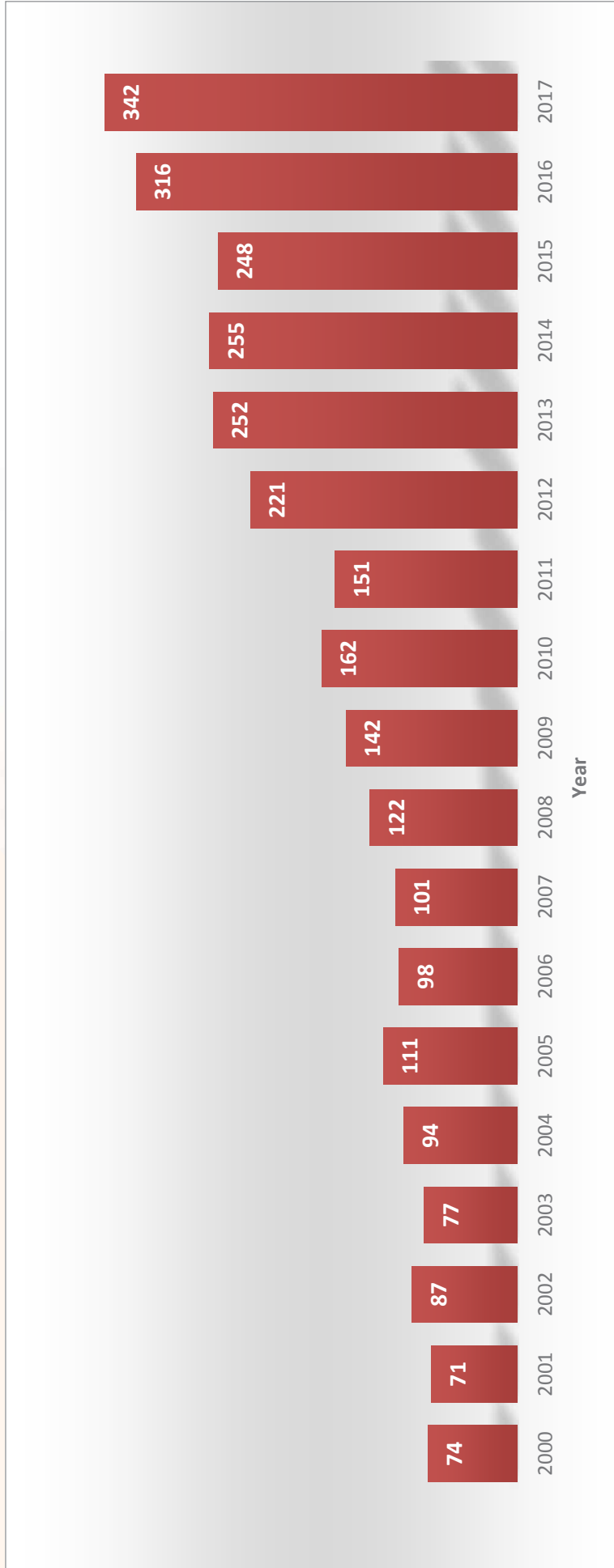


Source : Tertiary Education Commission, 1998-2016

The annual number of PhD students graduating has varied from 5 to 32 over the last 19 years. This momentum has to be maintained so that the pool of doctoral graduates increases over time.

All. Publication Rates

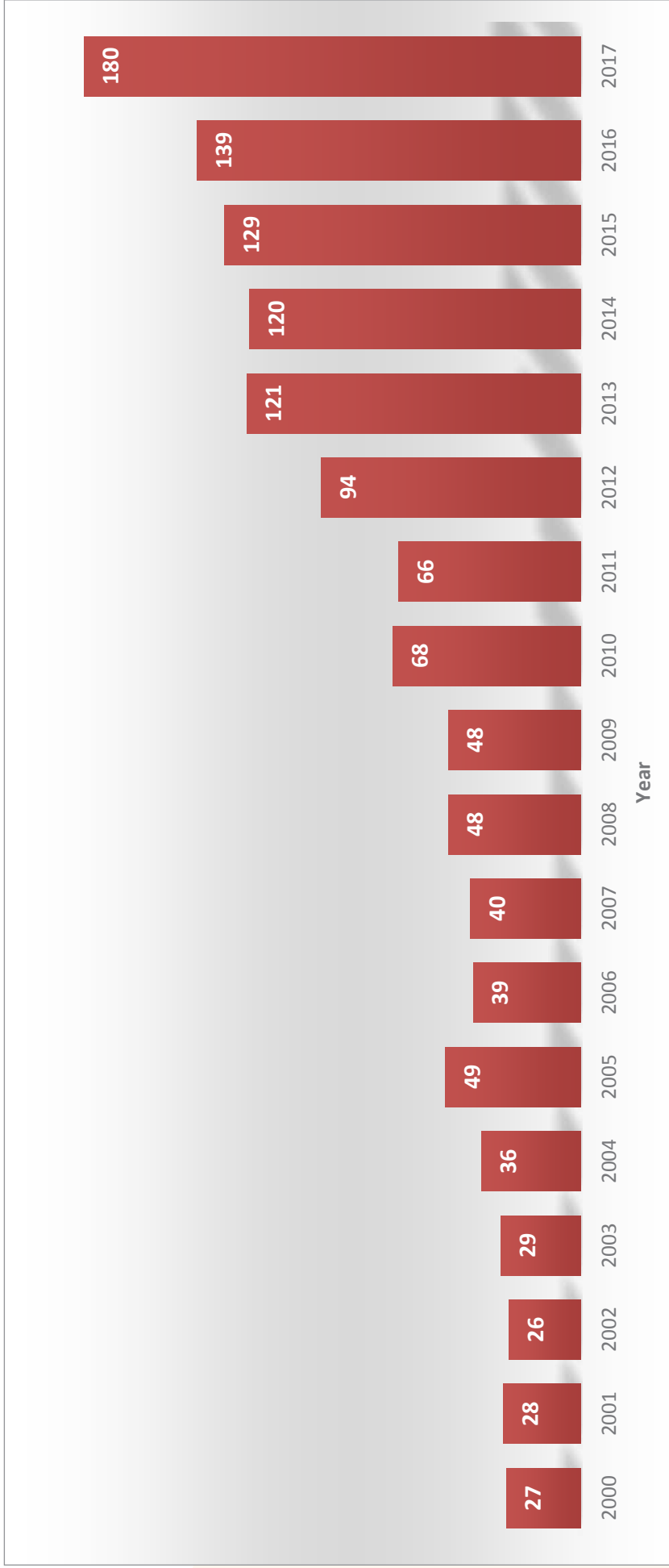
Peer-reviewed Scientific Publications (2000-2017)



Source : Scopus, 2018

The publication output has increased over the years where the production of papers was 74 in 2000 and went to 342 in 2017.

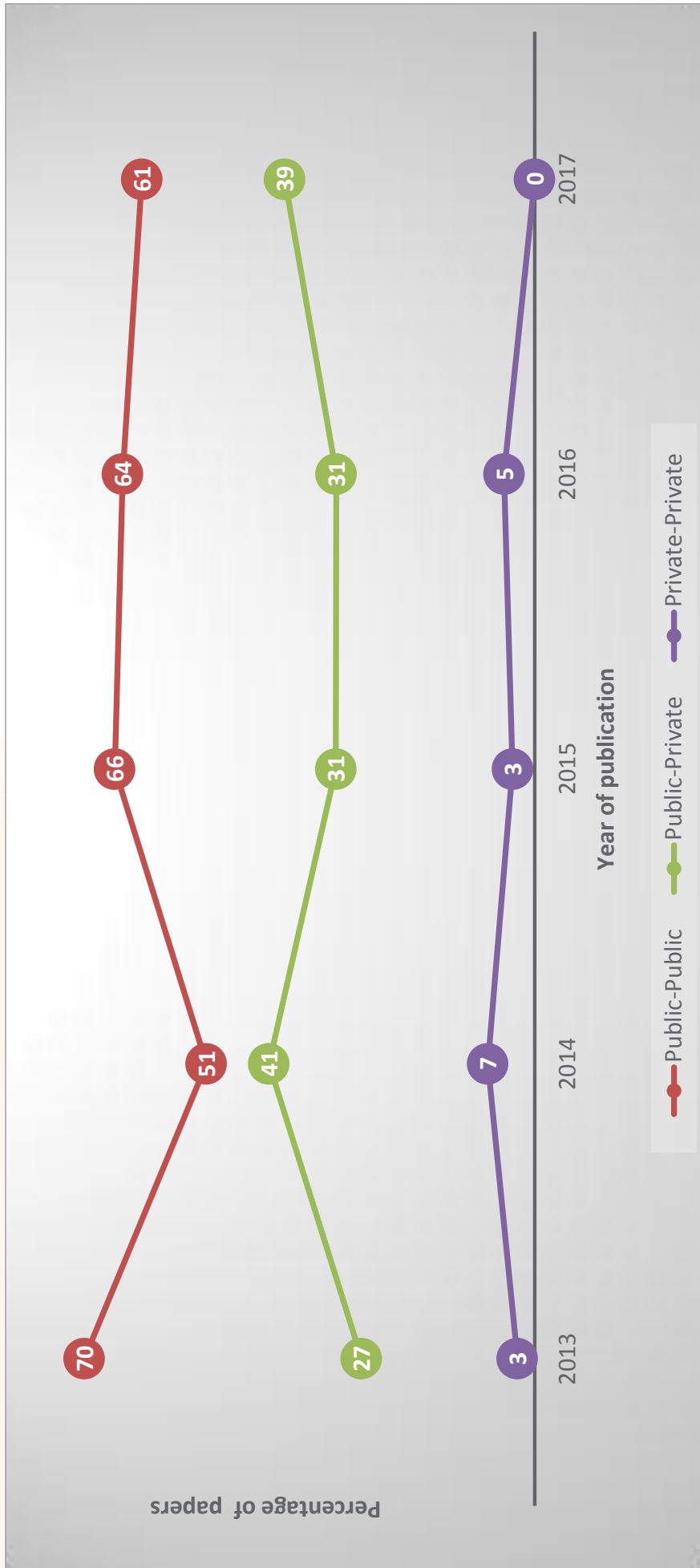
AIII. INTERNATIONAL SCIENTIFIC CO-PUBLICATIONS (2000-2017)



Source : Scopus, 2018

There has been a general increase in international scientific co-publications over the years indicating that transfer of knowledge and technology are increasing, which is important for driving innovation.

AIV. Inter-institutional Co-publications (2013-2017)



Source : Scopus, 2018

It has been observed that private-private co-publication is comparatively low and therefore, linkages between private and private institutions need to be further strengthened to boost competitiveness and innovation.

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