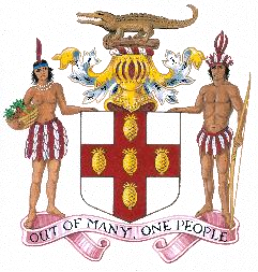
APPENDIX 1



THE NATIONAL SCIENCE, TECHNOLOGY AND INNOVATION POLICY

CATALYSING NATIONAL DEVELOPMENT

2019-2029

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Document last updated June 20, 2019.

MINISTER'S MESSAGE

Science, Technology and Innovation (ST&I) are necessary tools to empower Jamaicans to aspire to achieve their fullest potential; a secure, cohesive and just society; a prosperous economy and a healthy natural environment. Jamaica must join the rest of the developed world in leveraging ST&I as important tools in advancing national development, increasing global competitiveness, improving the quality of lives for its citizenry and paving the way for excellence as we explore this dynamic world around us.

A responsive and coherent policy is paramount as we strive towards a digital and knowledge-based economy. The policy will define our future expectations and course of actions to centralize ST&I in our national, regional and international development.

It is with great pleasure, that I present Jamaica's National Science, Technology and Innovation Policy: Catalysing National Development. It is the first long-term policy that envisages '*a dynamic Science, Technology and Innovation culture, unleashing the creative potential of our people, catalysing economic development and sustainable prosperity, contributing to social transformation, empowering Jamaicans to excel in an evolving world and contribute to the global frontiers of science.'*

The Government of Jamaica will adhere to this strategic framework to advance Jamaica's economic, social and environmental aspirations as it aligns and supports all outcomes of the National Development Plan, Vision 2030 Jamaica.

The Policy seeks to harness the excellence among our scientists, engineers, educators and students to contribute to improving profitability in local and global industry and enhance government efforts in providing a better quality of life for all Jamaicans. It also seeks to entrench a culture of entrepreneurship and innovation in our society and economy. Increased focus on national and international cooperation, research infrastructure and funding, Science, Technology, Engineering and Mathematics (STEM) education, science popularization and governance of the ST&I landscape are the key pillars of the Policy.

This is a bold attempt to fully weave knowledge and its applications into the rubric of Jamaican culture and society. It is through cooperation among all players in the ST&I sector and successful implementation of this Policy that Jamaica will become '*the place of choice to live, work, raise families and do business*.'

Honourable Fayval Williams, M.P.
Minister of Science, Energy and Technology

LIST OF ACRONYMS

CARICOM	Caribbean Community
GoJ	Government of Jamaica
GDP	Gross Domestic Product
GERD	Gross Expenditure on Research and Development
GII	Global Innovation Index
ICENS	International Centre for Nuclear and Environmental Science
ICT	Information and Communication Technology
ICVIS	Integrated Crime and Violence Information System
IP	Intellectual Property
IPR	Intellectual Property Rights
JMA	Jamaica Manufacturing Association
JSI	Jamaica System of Innovation
MDAs	Ministries, Departments and Agencies
MSET	Ministry of Science, Energy and Technology
NCST	National Commission on Science and Technology
NCSTI	National Commission on Science Technology and Innovation
NDP	National Development Plan
NFDST	National Foundation for the Development of Science and Technology
NRF	National Research Fund
OECD	Organisation for Economic Co-operation and Development
PIOJ	Planning Institute of Jamaica
PPP	Purchasing Power Parity
PPPs	Public-Private Partnership
PSOJ	Private Sector Organisation of Jamaica
R&D	Research and Development
RICYT	Ibero-American and Inter-American Network of Science and Technology Indicators
S&T	Science and Technology
SDG	Sustainable Development Goals
SIDS	Small Island Developing States
SIPP	Security Interest in Personal Property
SME	Small and Medium Enterprises
SRC	Scientific Research Council
ST&I	Science, Technology and Innovation
STEM	Science, Technology, Engineering and Mathematics
SWOT	Strengths, Weaknesses, Opportunities and Threats
TVET	Technical Vocational Education and Training
UN	United Nations
UTECH	University of Technology Jamaica
UWI	University of the West Indies

EXECUTIVE SUMMARY

Presented in this document is the National Science, Technology and Innovation (ST&I) Policy: Catalysing National Development. This Policy sets a framework of action for Jamaica to achieve by 2029:

> ***A dynamic ST&I culture, unleashing the creative potential of our people, catalysing economic development and sustainable prosperity, contributing to social transformation, empowering Jamaicans to excel in an evolving world and contribute to the global frontiers of science.***

The policy is an update to the National Science and Technology Policy (1990). A new policy was prioritized by Jamaica's National Development Plan Vision 2030 to achieve Outcome 11: A Technology-Enabled Society. This outcome aims to deepen the application of science, technology and innovation (ST&I) to benefit all aspects of national development.

The policy was developed through nationwide consultations with public, private, academic, non-profit and civil society representatives. It represents the collective agreement that Jamaica will achieve its Vision for 2030 and beyond by aspiring to have:

1. **A Dynamic and Responsive National System of Innovation:** Jamaica has a well-established system of innovation which yields competitive world-class S&T achievements that will advance national development.

2. **A Culture of Innovation:** Jamaicans in all private, public and productive spheres values the role of science, technology and innovation in expanding the base of wealth creation and improving the overall quality of life for all.

3. **A Development Agenda Advanced by ST&I:** Jamaica achieves its development agenda by integrating science, technology and innovation to enhance its economic, social and environmental goals.

4. **An Excellent Research and Development Capability:** Jamaica has an excellent world-class and distinctive research and development (R&D) capability and a reputation for innovation.

5. **An Enabling ST&I Policy Environment:** Jamaica has a dynamic policy, legislative and institutional framework that capitalizes on ST&I for all aspects of national development.

Strategic Framework

These five (5) goals will be achieved through a mix of short to medium-term actions, as well as, long-term strategic priorities for the government, private sector, industry and civil society. The Policy will

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address the creation, adaptation and use of scientific knowledge, technology and innovation, and will also govern the development of institutions, legislation, policy, programmes and human resources.

The framework underpinning this Policy outlines goals, objectives and strategies. They are comprehensive, flexible and adaptable to meet new challenges and opportunities as they arise. The policy framework is designed to:

- promote a sense of commitment in public and private sector institutions and individuals toward research and innovation as bases for human capital development, economic growth and job creation, international competitiveness and the management and protection of the environment;
- ensure that the government promotes ST&I in the public and private spheres;
- anticipate and embrace new and emerging technologies and innovation (including disruptive technologies) and assess their potential impacts – positive or negative – on national development;
- place strategic focus on endogenous knowledge creation, technologies and innovation, specifically those which advance our traditional and unique sectors, commodities and services, making them more internationally competitive;
- underscore the importance of incremental and adaptive innovation, placing strategic focus on identifying, acquiring and adapting these innovations;
- create strategic alliances and linkages within the Diaspora, recognising it as an untapped resource for ST&I development;
- enhance the country's knowledge, human, technology and institutional capital forms;
- facilitate access to capital for industry to use science and technology to foster innovation;
- strengthen the country's technology-related infrastructure and support the development of the Intellectual Property Strategy; and
- ensure that the country uses science and technology to fast track the implementation of Vision 2030 Jamaica to advance sustainable development.

Policy Implementation

The successful implementation of the ST&I Policy will be governed by a National Implementation Plan to be developed through comprehensive stakeholder consultations. Ministries, Departments and Agencies (MDAs) will align their work plans with the National Plan; academic institutions and private sector entities will also be encouraged to do the same.

The Ministry with responsibility for the science and technology portfolios will steer, monitor and evaluate the implementation of the ST&I policy for Jamaica. The National Commission on Science, Technology (proposed National Commission on Science, Technology and Innovation (NCSTI)) will be responsible for coordinating the various implementation activities across sectors. The NCST will provide quarterly reports to the Ministry on implementation activities.

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INTRODUCTION

Science and technology (S&T) has always been pivotal to the advancement of human civilization. The advent of tools and fire during the Stone Age, Mayan astronomy and engineering in the Classic Period, the birth of philosophy during the Renaissance, Columbus' fleet and maps during the Age of Discovery, and the internet of things in the 21st Century are but a few examples of how the creation and application of knowledge has revolutionised man's development and place in the world; where the application of knowledge has birthed numerous innovations.

Today, countries all over the world continue to use ST&I as means of advancing economic and social development and environmental sustainability[1]. Governments and institutions that have been able to use S&T as drivers of innovation are better able to maintain competiveness in the global space, leading to an increase in wealth and prosperity (Umut and Taskin 2015[2]). The Global Competitiveness Report 2015/16 cited the capacity to innovate or the existence of robust innovation ecosystems as a factor in driving a country's competitiveness (Schwab *et al.* 2015[3]).

ST&I is essential to the development and management of agriculture, agro-processing, energy, waste, biodiversity, education, adaptation to climate change, the management of hazards and crime prevention and control. As a cross cutting enabler, ST&I plays a fundamental role in the creation of wealth, economic growth and development and in the improvement of the quality of life of all citizens. In addition, it helps to generate employment, enables the design and commercialisation of new products and services; reduces poverty, improves education, health, nutrition and trade; and builds new capacities that are essential in the 21st century

In a similar manner, the application of ST&I is one of the ways to transform Jamaica to developed country status by 2030. As such, Jamaica's Development Plan -Vision 2030, through Goal 3 ('Jamaica's Economy is Prosperous'), and the corresponding National Outcome 11('A Technology Enabled Society'), aims to deepen the application of science and technology to benefit all aspects of national development and unleash the full creative potential of our people. The Plan dictates that S&T should be used to foster innovation in Jamaica's knowledge, human, institutional and cultural capital across all sectors. Furthermore, ST&I must be used to add greater value to lower and more traditional forms of capital. This broad-based approach will enhance Jamaica's resilience and lay the foundation for long-term transition to a knowledge-based society, digital and innovation-based economy.

[1] Organization for Economic Co-operation and Development 2000. Science, technology and innovation in the new economy. OECD Observer Policy Brief.

[2] Al, Umut, and Zehra Taşkın. "Relationship between economic development and intellectual production." *COLLNET Journal of Scientometrics and Information Management* 9.1 (2015): 25-35.

[3] Schwab, K., X. Sala-i-Martin, and B. Brende. "The Global Competitiveness Report 2015-2016 (Vol. 5)." (2015).

RATIONALE

Recognising the shifts in the global political economy, and the unrelenting pace of the technology revolution and other developmental challenges affecting countries worldwide, Jamaica as a small island developing state (SID) must build its capabilities to achieve sustainable development.

In this regard, it is vital that Jamaica embraces and becomes more engaged in using ST&I in deriving greater economic, social and environmental benefits for the country. As such, ST&I in Jamaica will enable us to:

- Make demonstrable progress in addressing health and nutrition problems, avoid and/or mitigate the impacts of natural disasters, embark on a path of sustainable poverty reduction, safeguard fragile eco-systems, and improve the quality of life for the rural and urban poor;

- Transform the economy from one that is based on subsistence agriculture, enclave extractive industries, and simple, low skilled manufacturing into one that is based on the production of more knowledge intensive, higher value added goods and services;

- Raise productivity, wealth, and standards of living by developing new, competitive economic activities to serve local, regional, and global markets; and

- Develop appropriate R&D capacity to support technology-based economic growth and to address social, economic and ecological problems specific to the country.

WAY FORWARD

As we work towards national prosperity, Jamaica must achieve policy coherence to fully integrate ST&I as a strategic tool. The Policy will:

- catalyse national development by ensuring that the developmental goals under Jamaica's Vision 2030 are enabled and supported by the application of knowledge across productive sectors and in the delivery of public goods and services;
- improve competitiveness of the country's industries to support faster growth, create jobs and improve health, education, security and governance; and
- develop new unique and indigenous products and services, while adding value to the lower forms of capital stocks.

This Policy will help to mainstream ST&I across all sectors and services at the national level by facilitating the design, coordination and implementation of the multi-sectoral process that will promote ST&I as central to the transformation and development of Jamaica.

Historical Profile of S&T in Jamaica

Jamaica has a long history of leveraging science and technology to exploit natural resources, drive economic growth and improve the quality of life. In the 18th and 19th century, Jamaica was the first in the Western Hemisphere to establish a botanical garden, generate electricity and construct a railway outside of North America and Europe [4]. Additionally, Jamaica used research results to boost sugar cane production.

Jamaica's early approach to systematic development of S&T is reflected in a 1960 Act of Parliament which created the Scientific Research Council (SRC). In the 1970s, Jamaica made major strides economically by increasing its investments in agricultural research and development (R&D) and infrastructure. Scientific applications in animal husbandry, fisheries and plant epigenetics yielded high returns in the agriculture sector and formed the basis for much of the scientific developments in those fields across the world. For example, scientist Thomas P. Leeky pioneered extensive research in the agricultural sector resulting in the first breed of indigenous Jamaican cattle. Through genetic manipulation of the cattle (bull) species, he was able to produce a more resilient hardy species that could live in our climate and provide more meat and milk for consumers.

At the turn of the 20th Century, Jamaica's primary products for economic viability were being threatened by the newer technology driven methods of production, as well as, the subsequent use of new materials. Furthermore, robotics and computer-assisted manufacturing technology undermined the traditional advantages of cheap labour. Therefore, an appropriate S&T Policy response to address these challenges was deemed necessary.

Role of S&T in National Development

The Science and Technology Policy (1990) was aimed at increasing the role of science and technology in achieving economic and social development in Jamaica. The policy's objectives were to *inter alia*, establish the linkages among the sub-systems, develop productive sectors, increase the nation's competitiveness in trade, develop education and training programmes. This policy led to the establishment of a national coordinating entity for S&T, the National Commission on Science and Technology (NCST) and its funding arm, the National Foundation for the Development of Science and Technology (NFDST).

During this period, several other policies were developed. Of importance was the National Industrial Policy (1996) which recognized S&T as a strategy to enhance growth and international competitiveness. In essence, it promoted the integration and coordination of various institutions that would help to grow Gross Domestic Product (GDP).

The policy anticipated Jamaica's per capita GDP to grow at an annual average rate of 5.8% between 1994 and 2010. However, according to the World Bank's data, Jamaica's per capita GDP grew at an annualized rate of approximately 1.73% between 1994 and 2014. The disparity between the anticipated goal and

[4] National Commission on Science and Technology (2005). Science and technology for Socio-Economic Development: A Policy for Jamaica.

the current reality continues to be as a result of limited resources, inadequate funding and lack of coordination between stakeholders. Furthermore, the absence of empirical data, makes it difficult to link the contribution of S&T to the economic growth in Jamaica. Undoubtedly, the anticipated benefits of both policies did not result in the expected economic growth.

Recognizing these challenges and acknowledging the rapid changes in the global political economy, calls for Jamaica to enhance its economic resilience, improve its global competitiveness, and to foster and promote innovation. In response, the government along with its stakeholders within the S&T sector, identified that the role of innovation is a critical aspect for driving Jamaica's global competitiveness and to address its developmental challenges.

Current Profile of ST&I in Jamaica

Jamaica has made strides in developing and implementing S&T related initiatives, which have led to noteworthy innovations across various sectors. Notwithstanding these achievements, the S&T sector continues to grapple with various challenges, which impacts the country's ability to fully utilize its indigenous resources to foster sustainable development. The challenges are further discussed below:

I. Governance and Coordination

The coordinating body responsible for fostering and advancing the national policy for science and technology is the NCST. The current size and structure of the entity remains constrained in its ability to effectively coordinate activities and programmes across the ST&I landscape and to effectively achieve its mandate due to limited funding. This is further compounded by the fact that other MDAs have 'independent' ST&I-related agendas, mandates, functions and associated infrastructure. As a result, there is the duplication of efforts to a significant degree.

The NFDST was established to fund the activities and programmes of the NCST[5]. To date, no major advancements have been forthcoming as a result of this initiative which may be due to the fact that it too has not been able to operate effectively according to its mandate.

II. ST&I Landscape Under Resourced

Despite acknowledging the critical role of ST&I in national development, the GoJ has made little to no sustainable efforts towards bolstering the sector's resources and initiatives.

The following key areas, once addressed would help to foster growth and development:

a) Funding and Investments in ST&I

The persistently low levels of support to Jamaica's ST&I landscape impacts negatively on the (i) imperative of building, maintaining and equipping proper R&D laboratories; (ii) accountability of responsible parties with respect to stipulated R&D outcomes; and (iii) aggressive acquisition and infusion into the economy

[5] This fund is overseen by a Board which is comprised of representatives from the private sector, academia and government.

of new ideas, practices and knowledge derived from the competitive and dynamic global ST&I ecosystem.

Admittedly, the GoJ has taken steps to recognize Intellectual Property (IP) as a form of collateral through the Security Interest in Personal Property (SIPP) Act (2013), however, financial institutions are still reluctant to fund R&D projects for entrepreneurs and innovators as they are unable to establish a direct link between ST&I initiatives and projected revenue. As such, efforts towards gaining access to finances remain difficult.

b) Education & Training Development

Presently, science is taught at all levels in schools, however its application at the primary level is rudimentary. This process stagnates students' ability to develop critical thinking skills through the process of inquiry utilised for problem solving and decision making.

Although technology is incorporated in the school curriculum and as a teaching tool, its application, access and reach remains limited. This may be as a result of limited government funding and resources, and the rapid changes in technology which challenges the educational sector to keep abreast with these advancements.

Furthermore, the educational sector places emphasis on traditional occupations such as lawyers, doctors, et al., and as a result, children lack nurturing in relation to S&T careers, while on the other hand, adults who have been exposed to S&T are unable to get jobs in the sector or have opted to pursue more viable careers.

Recognising these challenges, it is critical for the new ST&I Policy to develop and implement strategies geared towards improving scientific literacy at an earlier age to give students the skills and knowledge they need to succeed in school and beyond.

c) Human Resources and Employment Opportunities

To-date, Jamaica has made strides in establishing science-related organisations to streamline R&D functions and science-based initiatives. Still, these entities remain under-resourced as it relates to human resources (staff complement) and capacity building. It should be noted that although there are established departments and agencies within the government sector, there still exists a need for the inclusion of scientists across all MDAs. This will ensure that, through R&D better policy cohesion and direction will be made to alleviate all sector-related problems.

The challenges are further exacerbated by the fact that graduates in S&T vastly outnumber the available employment opportunities across public and private sectors. In the instances where some of these graduates decide to pursue entrepreneurial endeavours, they too are faced with challenges as it relates to accessing funding from financial institutions to support the development, testing, production and marketing of their innovative products and services.

III. Measuring the Benefits of ST&I

One major issue related to the system of ST&I in Jamaica is that there is no established mechanism to measure spend on research and development in order to track its contribution to the country's

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development. This is an important indicator for identifying the potential benefits of investment. The implementation of a standardised tracking mechanism will allow for an assessment of the impact of current initiatives in the ST&I arena, and will serve as the basis for promoting spending by the public and private sectors.

In an attempt to address this challenge, the GoJ adopted a methodology based on the internationally recognized Organisation for Economic Co-operation and Development's (OECD) Frascatti Manual (2015) which provides statisticians and ST&I policy makers with guidelines for collecting and reporting data on R&D. A pilot study was launched in 2017 to commence assessment of the R&D landscape; however some institutions have not been forthcoming with the data required to measure spend.

IV. Infrastructure (Government Laboratory System)

In 1985, an audit commissioned by the SRC of the public laboratories in the Hope Gardens Complex revealed severe shortcomings in human resources, equipment maintenance, budgets and overall performance. The findings of this review are not different from the last review conducted in 2015, by the former Ministry of Science, Technology, Energy and Mining. Several facilities which participated in the review, were found to be operating in silos, under resourced and not able to reliably deliver their services at acceptable levels of quality and quantity.

The review noted, that portfolio oversight for these laboratories was spread across five different Ministries and as a result there was little time or inclination for scientific collaboration and coordination.

It should be noted that across the ST&I landscape, there exists limited infrastructure to conduct R&D activities, and where they do exist, the equipment is either outdated or in need of continuous repair. This challenge limits scientists' and innovators' potential for scientific and technological advancements/breakthroughs.

Furthermore, these laboratories and centres are concentrated in the Kingston Metropolitan Area, making them less accessible to innovators in other parts of the island.

While there have been a few noteworthy discoveries and/or economically enabling R&D breakthroughs, notwithstanding these challenges, greater coordination, improved infrastructure and expanded access is required.

V. Monitoring and Evaluation

Monitoring and evaluation of the progress and impact of the ST&I development efforts and utilization of S&T products is critical to the success of ST&I policies.

ST&I outputs are measured by R&D activities including expenditure and human resources across a variety of institutional sectors and units. In addition, other ST&I outputs are measured using instruments such as publication rates, patents and export volumes, and earnings from high technology products.

Jamaica and other CARICOM countries have only now begun to embrace the necessity to examine ST&I performance at the detailed level required for informed decision-making.

As such, there are no robust systems in place to collect data of ST&I indicators and provide targets and benchmarks.

Noteworthy Successes in ST&I

Several initiatives have been launched over the years that have benefitted entrepreneurs, scientists, research practitioners and investors. Of notable mention is the Development Bank of Jamaica, which provides grants of up to J$4 Million towards business innovation to assist locally registered start-ups with the commercialization of their products and services.

Other initiatives have played a major role in providing benefits on a public and private level. Although it has proven difficult to quantify these benefits, their impact on the country's economy is evident:

- SRC facilitates the production of sorrel all year round. Beverage manufacturer Red Stripe (part of the Heineken Company) has capitalized on this initiative through the production of its sorrel beers.
- Wigton Windfarm is the largest wind facility in the English-speaking Caribbean, and contributes to Jamaica's energy mix. This is in alignment with the Vision 2030's indicator of the use of alternative forms of energy, to reduce the dependence on fossil fuels.
- The International Centre for Environmental and Nuclear Sciences (ICENS), currently assesses contamination of agricultural produce by heavy metals and toxins (mercury, lead, cadmium).
- Nutraceutical Industry – Jamaica's indigenous plants are known for their medicinal benefits. Plants such as ginger, turmeric, cannabis, etc., are currently being tested and/or utilized in the cosmetic, agriculture and health industries for their medicinal properties.

Conclusion

Jamaica's ST&I system is not delivering outputs in quantities and at rates that are most needed to transform the Jamaican economy as envisaged in the Industrial Policy (1996), the S&T Policy (1990) and the various Acts of Parliament establishing public ST&I institutions since independence. Despite its vast potential and successes, Jamaica's R&D system is at best under-performing, poorly managed, under-resourced and in need of effective and coherent coordination, repositioning and transformation that will link it to the national economy.

SWOT ANALYSIS

The strength, weaknesses, opportunities and threats (SWOT) analysis of ST&I in Jamaica was developed to assess and streamline the policy goals within the Jamaican context. The results are as follows:

TABLE 1 SWOT Analysis in Jamaica

S STRENGTHS	W WEAKNESSES	O OPPORTUNITIES	T THREATS
GOAL 1: A Dynamic and Responsive National System of Innovation: Jamaica has a well-established system of innovation which yields competitive world class science and technology achievements that will advance national development.			
a) Track record of significant international contributions to science and innovation. b) Dedicated institutions with mandate for ST&I development, utilisation and coordination (e.g. NCST, SRC, ICENS & Portfolio Ministry).	a) Absence of a National Innovation System, resulting on no formal mechanism/ platform for the integration of indigenous knowledge and the rapid transfer of technology. b) Fragmented Sector with many ST&I actors and inadequate coordination.	a) Develop a strategic Action Plan for the Jamaica System of Innovation (JSI).	a) With no innovative system in place, Jamaica will not be able to optimize its human and natural resources. b) Limited capacity and awareness to generate, protect and enforce IP rights.
GOAL 2: A Culture of Innovation: Jamaicans in all private, public and productive spheres value the role of science, technology and innovation in expanding the base of wealth creation and improving the overall quality of life for all.			

S STRENGTHS	W WEAKNESSES	O OPPORTUNITIES	T THREATS
a) A creative society. b) High level of endemism and natural capital-strong country brand "Brand Jamaica".	a) Barriers for accessing finance to implement research and engage in new and emerging ventures. b) Low priority placed on calculating returns on investment in publicly funded research institutions. c) Slow pace of technology adoption and lack of innovation in the main goods and services-producing sectors and industries resulting, *inter-alia,* low productivity levels, inefficient resource use, limited value-added production, and poor environmental performance. d) Low levels of public awareness and knowledge regarding Intellectual Property Rights.	a) Leverage natural assets and traditional knowledge as a basis for the formation of a bio-economy. b) Ability to commercialise domestic IP assets to generate income, promote clean tech entrepreneurship, and improve quality of life.	a) High levels of business informality impinges on the development of competitive ST&I–driven industries.
GOAL 3: A Development Agenda Advanced by ST&I: Jamaica achieves its development agenda by integrating science, technology and innovation to enhance its economic, social and environmental goals.			
a) ST&I entrenched in Vision 2030 Jamaica; specifically Outcome 11: Technology Enabled Society.	a) No national research agenda linked to national development priorities. b) Low levels of investment in ST&I. c) No formal data collection system for ST&I indicators.	a) Develop mechanisms and tools to ensure that ST&I are mainstreamed into all developmental planning processes and governance structures. b) Strengthen and promote efforts in R&D work focusing on engaging ST&I to	a) Country still at the factor-driven stage of economic development (that is driven by unskilled labour and natural resources), therefore unable to attract direct investment.

S STRENGTHS	W WEAKNESSES	O OPPORTUNITIES	T THREATS
	d) Limited advocacy for ST&I as a driver for development.	explore solutions to local problems. c) Integrate S&T to ensure efficient and impactful delivery of public goods such as education, health care, energy access, waste disposal and security. d) Facilitate direct opportunity for trained ST&I students to access employment in the private sector.	b) Changes in political administrations may possibly influence the prioritisation of strategies and programmes. c) Global, rapid changes in technology and countries' transition to innovation-driven economies create an increasingly complex and competitive market environment for Jamaica and other SIDS.
GOAL 4: An Excellent Research and Development Capability: Jamaica has an excellent world-class and distinctive R&D capability and a reputation for innovation.			
a) A small cadre of highly qualified ST&I professionals locally and in the Diaspora.	a) Poor ST&I infrastructure and limited resources to propel national development. b) No established National Research and Development Fund to support ST&I. c) Small developing economy with low levels of economic growth and high debt to GDP ratio.	a) Review incentive schemes to facilitate public sector bodies benefitting from commercialisation of their R&D findings. b) Construct science/knowledge parks, centres of excellence and science museums and knowledge/technology transfer units. c) Provide dedicated funding for competitively selected research, aligned to the country's development goals.	a) Country still at the factor-driven stage of economic development (that is driven by unskilled labour and natural resources), therefore unable to attract direct investment.

S STRENGTHS	W WEAKNESSES	O OPPORTUNITIES	T THREATS
GOAL 5: An Enabling ST&I Policy Environment: Jamaica has a dynamic policy, legislative and institutional framework that capitalizes on ST&I for all aspects of national development.			
a) Dedicated institutions with mandate for ST&I development, utilization and coordination (e.g. NCST, SRC, ICENS & Portfolio Ministry) b) A newly approved (September, 2018) Science Division within the portfolio Ministry.	a) Outdated/inflexible policy and regulatory framework does not engender adaptability to changing economic, social and environmental conditions. b) No established mechanisms for the evaluation of development impact of new technologies.	a) A new and updated policy will facilitate a responsive policy and regulatory environment which promotes multi-sectoral integration for sustainable national development. b) Use labour market information to design and adapt curricula at all educational levels.	a) Shifts in global economic policy and power. b) Rapid changes in technology and global standards related to ST&I.

Global Trends and Emerging Issues in ST&I Landscape

Creation, distribution and exploitation of knowledge lead to competitive advantage, wealth creation and high quality of life [6]. Intellectual capital and its interaction with physical and human capital are at the centre of the modern economy. With rapid developments in information communications technology (ICT), knowledge capital flows are now international. The internationalisation of innovation has led to many revolutions in new and emerging fields of S&T. National, regional and global policies must embrace these swells in knowledge to address profound challenges such as climate change, infectious diseases, energy and food security. Public policy must also leverage knowledge to increase productivity and create new economies based on S&T such as ICT, mining, nanoscience and space exploration.

MEGATRENDS

Slow but significant changes in the social, economic, political, environmental and technological landscape have immense potential to create an uncertain, unpredictable and highly disruptive future. Megatrends such as demographic and social changes, rapid urbanisation, shifts in global economic power, scarcity of natural resources, energy security, climate change, technological breakthroughs, and globalisation have the potential to create a profound and lasting impact on human activity. Therefore, these changes are likely to create new markets and labour demands. As such, the development of ST&I policies and strategies as a response to changing environments and solutions will have to be suited to mitigate loss and improve resource use efficiency.

DISRUPTIVE TECHNOLOGIES

The Fourth Industrial Revolution is characterized by a fusion of technologies within the physical, digital, and biological spheres. Marked by emerging technology breakthroughs, the fourth wave of the industrial revolution will see the heavy implementation of several emerging technologies creating new or disruptive markets.

As such, the rapid development of technologies across the globe require that national policies forecast not only beneficial innovations but disruptive ones as well. Robotics, drone technology, the internet of things, big data, bioengineering, artificial intelligence and space exploration are examples of exponential technologies that will transform or disrupt people's lives. In response, many countries have developed foresighting polices that predict and analyse potentially disruptive R&D, and applications recognizing that some of these technologies creates new or disrupts markets and value networks. Foresighting exercise or predictions will also open the dialogue on determining what strategic investments in transformative technologies are

[6] Organization for Economic Co-operation and Development 2000. Science, technology and innovation in the new economy. OECD Observer Policy Brief.

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most likely to yield the highest returns, particularly within the industrial sectors.

TECHNOLOGICAL GAP

Globally, $1.948 Trillion Purchasing Power Parity (PPP) was spent on R&D in 2016. This accounted for 1.96% of the world's GDP. The United States spends approximately 2.8% of its GDP on R&D – the largest proportion in the world - followed by China (2.1%). The Caribbean, accounts for approximately 0.001% of the total global R&D expenditure (Figure 1)[7].

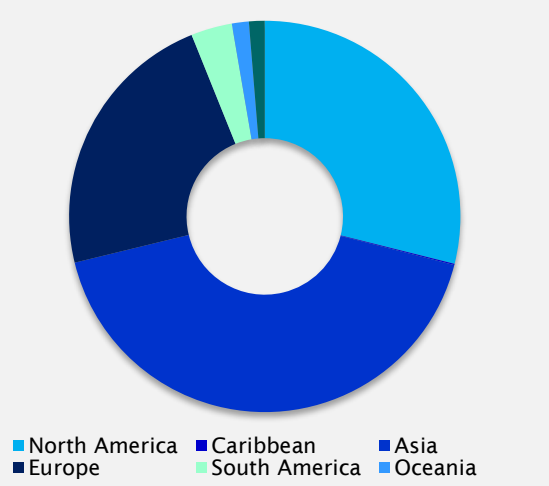

FIGURE 1 Total Share of Global R&D Expenditure on R&D ($1.948 Trillion Purchasing Power Parity).

Although there have been increasing investments in innovation, countries of the Global South that are on the lower end of the technological or innovation scale, are likely to fall behind in economic growth and development as the gaps continue to widen.

Therefore, developing countries must implement policies and strategies to facilitate greater investments in R&D and ST&I activities as they strive towards reduced insecurity and dependence, social resilience, wealth creation and a competitive advantage in a globalised world.

PUBLIC VS. PRIVATE RESEARCH AND DEVELOPMENT

R&D investments in many developed and emerging economies have been weakening in recent times. Policy makers have to strategically distribute capital in the areas where there is the greatest potential for high returns. Policy trends demonstrate greater focus on financing business innovation and entrepreneurship specifically among Small and Medium Enterprises (SMEs) and start-ups. In addition, greater policy attention has been given to supporting technology transfer, specifically internationalization of innovation, thereby giving SME's access to global knowledge networks and commercialisation beyond national shores and into the international market place.

A growing share of public investment in R&D has been allocated to the business sectors in an effort to increase business capacity to innovate. The rationalisation of public sector research has improved ties between public and private research to encourage inter-disciplinary research. Industry is playing a bigger role in resourcing public research, through public-private partnerships, in an effort to share risk, resources and orientation.

The Way Forward

To advance the ST&I vision, the Policy will seek to give priority to key areas through implementing strategies that will facilitate the

[7] UNESCO (2015). UNESCO State of Science Report: Toward 2030. UNESCO Publishing, Paris

integration and alignment of ST&I within the broad development agenda.

The following priority areas will be addressed in the short to medium term:

1. **Agriculture** - To implement Pest control measures in the agricultural sector to ensure the protection of the country's food crops and their export potential.
2. **Health Management** – To implement infectious and vector disease control measures to ensure the protection and well-being of citizens.
3. **Waste Management** – To develop and implement measures and strategies to address contamination of the country's aquifers; and to implement mechanisms to address waste disposal and management.
4. **Education and Training** – To implement STEM curriculum for students from an earlier age.
5. **Crime and public safety** – To utilise modern technological advancements to address various areas in crime fighting and to restore public safety.
6. **Funding** - To establish a grant fund in tertiary institutions to allow potential innovators, scientists and entrepreneurs, at the tertiary level and equivalent institutions, to vie for funds through a competitive process.

Strategies

These priority areas will be addressed through the following strategies:

I. Develop mechanisms and tools to ensure that ST&I are mainstreamed into all developmental planning processes and governance structures.
II. Integrate S&T to ensure efficient and impactful delivery of public goods such as education, health care, waste disposal and security.
III. Repair, refurbish, re-equip and rationalise existing laboratory facilities ensuring efficient, effective, collaborative and coordinated use across sectors.
IV. Develop national standards/codes of operation for all national/training infrastructure to ensure facilities are safe and conducive for learning and innovation.
V. Encourage private sector involvement in the development of ST&I infrastructure through Public-Private-Partnerships (PPP).
VI. Develop policy for STEM education, to include curriculum development and delivery and teacher capacity.

LEGISLATIVE FRAMEWORK

Due to the cross-cutting nature of ST&I, the Policy is governed of several pieces of legislation, as outlined in Table 2 below:

TABLE 2 Legislation governing Science, Technology and Innovation in Jamaica

ACT	OPERATIONAL DATE
Copyright Act	1993
Designs Act	1890
Protection of Geographical Indications	2009
National Commission on Science and Technology	2007
Patent Act	1857
Scientific Research Council	1960
Trade Marks Act	2001

Other legislation related to the Policy are listed in **Appendix 3**.

LINKAGES WITH OTHER POLICIES

Vision 2030 Jamaica: National Development Plan

The National Development Plan (NDP) identifies ST&I as a cross-cutting enabler of development. The proposed role of ST&I is articulated in National Outcome 11: A Technology-Enabled Society and two (2) national strategies:

1. Integrate science and technology into all areas of development.
2. Establish a dynamic and responsive National Innovation System.

From the NDP, a ST&I Sector Plan was developed with the following goals and objectives:

1. A Scientific culture entrenched into all aspects of national life.
   1.1. Jamaica is a major generator and user of ST&I knowledge.
   1.2. National capability for the development of indigenous ST&I knowledge, intellectual property and business elevated and strengthened.
   1.3. Popularize a ST&I culture as a viable agent of social and economic transformation.

2. Excellent and distinctive R&D capability and a reputation for innovation
   2.1. Dynamic, responsive National Innovation System exists.
   2.2. A world-class dynamic enabling environment for persistent R&D and innovation in line with national development goals developed.

2.3. The national productive capacity and competitiveness, through efficient application of innovation improved.
2.4. Regional center of excellence in ST&I.
2.5. Foster Creativity.

3. A Knowledge-Based Society
   3.1. Networks developed and facilitated for knowledge exchange both locally and internationally.

4. Jamaica repositions itself to take advantage of ST&I in all aspects of development
   4.1. Existing knowledge both local and international for socio-economic advancement adopted and adapted/Public-Private Partnerships and commercialization of technologies.

Regional and International ST&I Linkages

This policy and Jamaica's Vision 2030, are consistent with the CARICOM Strategic Plan (2015-2019), which highlights ST&I as a cross-cutting enabler to be infused and mainstreamed in every aspect of planning and implementation to drive the region's development process. The CARICOM Strategic Plan also calls for a policy and legislative framework under which R&D agendas will be set, resources allocated and functional intra-regional cooperation undertaken.

The Policy is also consistent with the strategies for achieving the Global Goals for Sustainable Development Agenda 2030 (SDGs), in which ST&I was placed in a cross-cutting role with governments being called upon to invest in ST&I: (i) infrastructure; (ii) education; (iii) entrepreneurship activities; (iv) small and medium sized business; (v) effective advisory capacity for governments and the private sector (especially by Academies of Science); (vi) governance mechanisms; and (vii) transformation in universities to establish new links to industry and government businesses and services so as to enable knowledge creators to effectively support innovation.

The United Nations (UN) member-states made a commitment to launch a Technology Facilitation Mechanism (Article 70), which is a multi-stakeholder collaboration among member states, civil society, the private sector, the scientific community, UN entities (represented by a UN inter-agency Task Force), and others. These regional and international initiatives will be important links to Jamaica's innovation system.

OTHER POLICIES

Table 3 Linkages of the ST&I Policy with existing national policies

MINISTRY	POLICY
CULTURE, GENDER,	The National Culture Policy (being revised and renamed to the National Policy on Culture and Creative Economy)

ENTERTAINMENT AND SPORT	National Sports Policy
	National Policy on Gender Equity
ECONOMIC GROWTH AND JOB CREATION	Jamaica Water Sector Policy
	National Biodiversity Strategy and Action Plan on Biological Diversity in Jamaica
	Policy for Jamaica's System of Protected Areas
	National Forestry Policy
	National Land Policy
	National Population Policy
	Encouragement of Export Industries
	Special Economic Zones Policy
	Construction Policy
	Forestry Policy
	Orchid Policy
	Climate Change Policy
	Emissions Policy (draft)
EDUCATION, YOUTH AND INFORMATION	Education: The Way Upward
	National Policy for HIV/ AIDS Management in Schools
	Competence – Based Transition Policy
	The Task Force Report on Education Reform
	The National Youth Policy
	National Policy on Children
	Data Collection and Information Sharing Policy (draft)
FINANCE AND THE PUBLIC SERVCE	Government of Jamaica Public Sector Procurement Policy
	National Population Policy
FOREIGN AFFAIRS & FOREIGN TRADE	Ocean and Coastal Zone Management Policy
	National Foreign Trade Policy and Action Plan
HEALTH & WELLNESS	National Health Policy
	National Healthy Lifestyle Policy
	Drugs for the Elderly
	National HIV/AIDS Policy
	Mental Health Reform
INDUSTRY, COMMERCE, AGRICULTURE AND FISHERIES	National Quality Infrastructure Policy
	Investment Facilitation
	National Plant Health Policy
	Food Safety and Implementation Plan
	National Food and Nutrition Security Policy and Action Plan
	Intellectual Property Strategy (draft)
	MSME & Entrepreneurship Policy (draft)
LABOUR AND SOCIAL SECURITY	National Policy for Persons with Disabilities
	National Policy for Senior Citizens (Draft)

LOCAL GOVERNMENT AND COMMUNITY DEVELOPMENT	Integrated Solid Waste Management Policy
NATIONAL SECURITY	National Security Policy
JUSTICE	Jamaica Justice System Reform Policy Agenda Framework
SCIENCE, ENERGY AND TECHNOLOGY	Information and Communication Technology Policy
	National Energy Policy
	National Science and Technology Policy (1990) (currently being revised and renamed to the Science, Technology and Innovation Policy)
TRANSPORT AND MINING	National Transport Policy
	National Road Safety Policy
TOURISM	National Community Tourism Policy and Strategy
CABINET OFFICE	Public Sector Modernization Vision and Strategy Paper
	Strategic Environmental Assessment Policy

DEFINING THE POLICY FRAMEWORK

VISION

A dynamic ST&I culture, unleashing the creative potential of our people, catalysing economic development and sustainable prosperity, contributing to social transformation, empowering Jamaicans to excel in an evolving world.

GUIDING PRINCIPLES

The principles guiding the implementation of this policy are:

(i) **TRANSPARENCY**: The sector will have a transparent system of setting targets, accountability, measuring and benchmarking its achievement against international norms and standards.

(ii) **SHARED APPRECIATION**: There is shared appreciation of the ST&I role in transforming the nature of societies world-wide from factor through efficiency to innovation economies. This will need to be accompanied by a realization of the possibility of Jamaica leap-frogging from the current factor economy to innovation through relentless implementation of this Policy.

(iii) **PARTENERSHIP**: While the ST&I players are diverse in their missions, strategic plans, nature of business, affiliations, size, resources and challenges it is believed that, they will find a common thread linking their shared struggle to succeed through the benefits of Jamaica's robust system of innovation.

(iv) **EQUITY**: The policy will promote fair and just management of all persons, institutions and sectors serving or impacted by ST&I.

(v) **PARTICIPATORY**: The approaches herein are based on a collaborative and collective decision making process and reflect the broad ranges of interest, industries, perspectives and values of those directly and indirectly affected by the policy.

(vi) **SOCIAL COHESION**: ST&I will be embedded in the way of life and culture of the Jamaican people. It should be used to promote well-being, meet the social needs and sustain the development of the society.

(vii) **SUSTAINABILITY**: The strategic planning and implementation process must yield self-reliant and sustainable economic, social and environmental sectors.

(viii) **EVIDENCE-BASED**: The development and implementation of the policy and its evaluation must be based on research findings, robust data, analytics and expert input.

GOAL 1: A Dynamic and Responsive National System of Innovation: Jamaica has a well-established system of innovation which yields competitive world-class science and technology achievements that will advance national development.

Jamaica will have a robust integrative approach to generate, store, transfer and apply knowledge and technologies that will promote growth and competitiveness. Jamaica's innovation system must continuously enhance service delivery; production processes; be responsive and adaptable to change (e.g. climate change); contribute to economic, social, environment and governance. There will be continuous interaction among knowledge creators (universities, government research organizations, creative firms) and knowledge users (industry, policy makers, markets, personal end consumers). These partnerships will ultimately result in enhanced quality research, spurring synergies and complementarities towards influencing more actors in the ST&I arena.

KEY ISSUES ADDRESSED

- Limited facilities and fora to encourage broad-based or multi-sectoral dialogue and synergies.
- Disconnect between public and academic research agenda (knowledge creation) and industry and policy demands (knowledge use).
- Absence of responsive innovation policies and legislation.
- Absence of baseline data to measure innovation outputs against R&D inputs.
- Limited activity or access to technology transfer and innovation financing/investment schemes.

KEY PLAYERS

- Ministry of Science, Energy and Technology
- National Commission on Science and Technology
- Planning Institute of Jamaica
- Jamaica Intellectual Property Office
- Research Enterprises (Universities, Public and Private R&D institutions)

OBJECTIVE

1.1. Establish a system of innovation for Jamaica.

STRATEGIES

1.1.1. Map Jamaica's ST&I system to identify the key economic, socio-political, institutional and organizational components and their relationships.
1.1.2. Develop a strategic action plan for the Jamaica System of Innovation (JSI).
1.1.3. Develop methods for measuring, assessing impact and benchmarking of JSI against the Global Innovation Index (GII).

OBJECTIVE

1.2. Promote collaboration among all the key components of the national innovation system.

STRATEGIES

1.2.1. Develop a national institutional and regulatory framework to promote commercialisation and legislative use of endogenous R&D results, technologies and innovation that can gain market access nationally and internationally.
1.2.2. Prioritise and incentivise multi-sectoral, joint industry and interdisciplinary networking activities, programmes and facilities.
1.2.3. Promote regional and international research and technological cooperation in areas of interest to Jamaica with special focus on South-South cooperation.
1.2.4. Create robust knowledge transfer and technology diffusion facilities, systems, regulatory framework and funding instruments to encourage the transfer of research and technologies from local universities and public research organizations to strengthen and develop business innovation.
1.2.5. Develop the national regulatory framework for sharing intellectual property across players ensuring that key players receive fair and equitable benefits from research and innovation outputs.
1.2.6. Facilitate personnel mobility to ensure that tacit knowledge flows throughout the innovation system.
1.2.7. Improve ICT network and associated facilities particularly those linked to economic activities.
1.2.8. Promote electronic networking for knowledge transfer, information sharing and collaboration.

Document last updated June 20, 2019.

GOAL 2. A Culture of Innovation: Jamaicans in all private, public and productive spheres value the role of science, technology and innovation in expanding the base of wealth creation and improving the overall quality of life for all.

Under this goal, all Jamaicans at the personal, public, private and political levels will understand the role of science and technology in our pursuits for prosperity. This enhanced awareness will shift behaviors and attitudes toward inquiry, discovery, risk and new knowledge to foster a culture of creativity, entrepreneurship and innovation and increased interest in S&T careers. Entrenching a scientific culture across all sectors will require capacity building, research, outreach and advocacy. These strategies will advance economic growth through the widespread creation and deployment of ST&I capacity.

KEY ISSUES ADDRESSED

- Limited appreciation for the role or importance of research and innovation at all levels of society.
- Low or inadequate investments in ST&I on projects, programmes and initiatives.
- Barriers for accessing finance to implement research and engage in new and emerging ventures.
- Society is largely a consumer of technologies from other countries.
- Low entrepreneurship and innovation.
- Popularization of ST&I.

KEY PLAYERS

- Ministry of Science, Energy and Technology
- Ministry of Education, Youth and Information
- Ministry of Finance and the Public Service
- Ministry of Economic Growth and Job Creation
- Ministry of Industry, Commerce, Agriculture and Fisheries
- Planning Institute of Jamaica
- National Commission on Science and Technology
- Scientific Research Council
- Private Sector Umbrella Organizations (e.g. Jamaica Manufacturing Association, Private Sector Organization of Jamaica)
- Media
- Universities
- Small Businesses
- Jamaica Information Service
- Other media houses
- Bureau of Standards of Jamaica

- JIPO

OBJECTIVE

2.1 Raise awareness of the benefits of ST&I to national development in order to fully engage and empower people, communities and sectors in public and private spheres.

STRATEGIES

2.1.1 Promote the awareness and understanding of ST&I (including traditional knowledge systems) and its relevance in its broadest sense, through the development and implementation of a ST&I popularisation/communication strategy.

2.1.2 Establish, formalise and/or strengthen networks that popularise ST&I via different forms of capital especially human, cultural, knowledge and institutional.

2.1.3 Develop the national capacity and expertise in S&T communication.

OBJECTIVE

2.2 Increase knowledge, technology outputs and innovative potential within industry to expand production, enhance productivity and service quality, firm profitability, international competitiveness, and sustainability.

STRATEGIES

2.2.1 Promote R&D and innovation in industry by developing financing mechanisms to facilitate R&D activities. Major instruments should include loans, grants, subsidies, business angels, venture capital, crowd funding and tax incentives.

2.2.2 Publicly recognize achievements in innovative application of ST&I industry.

2.2.3 Promote business incubation and formation of ST&I-based start-ups and SME's.

2.2.4 Increase local share of earnings from ST&I-demanding consultancies from 30% to 60% by 2029.

2.2.5 Develop and implement professional programmes and incentives geared at enhancing capacity and mobility of and preferential selection of R&D personnel in the private sector.

2.2.6 Strengthen and/or establish university-industry partnerships to mainstream trained graduates into technical areas within private sector.

2.2.7 Promote awareness of innovators and scientists of the importance of protecting their IP Rights.

GOAL 3: A Development Agenda Advanced by ST&I: Jamaica achieves its development agenda by integrating science, technology and innovation to enhance its economic, social and environmental goals.

To advance the ST&I vision, the strategies to be implemented under this goal, will facilitate the integration and alignment of ST&I within the broad development agenda, by ensuring that it is integrated into public policy, culture, education and other developmental arenas. Science will be used to solve Jamaica's biggest developmental challenges such as environmental degradation, safety and security and natural disaster risk. New knowledge and technologies will fully exploit opportunities, especially in areas of comparative and competitive advantage such as music, energy, sport, tourism and the bio-economy. Jamaica will also be able to forecast disruptive and transformative technologies and orient policy to minimize risk to Jamaica's development agenda.

KEY ISSUES ADDRESSED

- Chasm between national development and ST&I
- Factor driven economy, largely dependent on the lower form of capital
- Inefficient integration of ST&I in sector-based policy and planning framework

KEY PLAYERS

- Ministry of Science, Energy and Technology
- Ministry of Finance and the Public Service
- Ministry of Economic Growth and Job Creation
- Ministry of National Security
- Ministry of Gender, Culture, Entertainment and Sport
- Ministry of Tourism
- Ministry of Education, Youth and Information
- Ministry of Health and Wellness
- Ministry of Local Government and Community Development
- Ministry of Industry, Commerce, Agriculture and Fisheries
- National Commission on Science and Technology
- Planning Institute of Jamaica

OBJECTIVE

3.1 Optimise the use of ST&I in key economic, social and environmental priority areas.

a) Develop mechanisms and tools to ensure that science, technology and innovation are mainstreamed into all developmental planning processes and governance structures.

b) Forecast new and emerging technologies, paying particular attention to those which promote leap-frogging into the innovation economy.

c) Strengthen and promote efforts in R&D work focusing on engaging ST&I to explore solutions to local problems.

d) Promote and incentivise the application of science and transformative technologies that develop innovative uses and add value to national resources and capital.

e) Integrate S&T to ensure efficient and impactful delivery of public goods such as education, health care, energy access, waste disposal and security.

GOAL 4: An Excellent Research and Development Capability: Jamaica has an excellent world-class and distinctive R&D capability and a reputation for innovation.

Jamaica will have a framework to ensure valid investments by government and industry in ST&I. These strategic activities will result in an increased percentage of GDP being allocated to R&D. The aim, by 2030 is to achieve 1.5% of GDP. As a result, Jamaica will have modern world-class infrastructure to support frontier scientific work and training. Increased investments in human capital will ensure that there is a critical mass of competent scientists, technicians, engineers and STEM educators. Jamaica will become a world leader in providing knowledge and strategic innovations for Jamaica and beyond.

KEY ISSUES ADDRESSED

- Low R&D expenditure relative to GDP (GERD)
- Absence of systematic collection of ST&I data
- Under-resourced and under-performing government laboratories
- Shortage in key ST&I personnel
- Low innovation outputs

KEY PLAYERS

- Ministry of Science, Energy and Technology
- Ministry of Finance and the Public Service
- Ministry of Industry, Commerce, Agriculture and Fisheries
- Ministry of Education, Youth and Information
- Ministry of Labour and Social Security
- Ministry of Economic Growth and Job Creation
- National Commission on Science and Technology
- Statistical Institute of Jamaica
- Universities
- Private Sector Umbrella Organizations
- Urban Development Corporation
- Private Sector Enterprises
- Planning Institute of Jamaica
- Development Bank of Jamaica

OBJECTIVE

4.1 Create sustainable mechanism for financial support of R&D programmes targeting a GERD of at least 1.5% by 2029.

STRATEGIES

4.1.1 Establish a mechanism to quantify financial allocations to ST&I and the returns on R&D investments in high impact and mission-directed R&D and endogenous technology (e.g. national research fund).

4.1.2 Promote the use of existing legal and regulatory frameworks (such as SIPP Act) that support the use of IP as collateral.

4.1.3 Review incentive schemes to facilitate public sector bodies benefitting from commercialization of their R&D findings.

4.1.4 Strengthen and leverage existing public sector funding schemes to support related ST&I initiatives.

OBJECTIVE

4.2 Strengthen and establish state of the art ST&I infrastructure (laboratories, libraries, museums, electronic platforms etc.).

STRATEGIES

4.2.1 Conduct regular audits on national ST&I infrastructure, particularly those funded through public schemes.

4.2.2 Repair, refurbish, re-equip and rationalise existing laboratory facilities ensuring efficient, effective, collaborative and coordinated use across sectors.

4.2.3 Mandate, develop and implement a National Quality Infrastructure for certification and accreditation of services to increase competitiveness, market access, investor/consumer confidence.

4.2.4 Develop national standards/codes of operation for all training infrastructure to ensure facilities are safe and conducive to learning and innovation.

4.2.5 Encourage private sector involvement in the development of ST&I infrastructure through public-private-partnerships (PPPs).

4.2.6 Construct science/knowledge parks, centres of excellence and science museums and knowledge/technology transfer units.

OBJECTIVE

4.3 Increase and improve the human resource capital for ST&I.

STRATEGIES

4.3.1 Conduct comprehensive training needs assessment against medium to long term market needs.

4.3.2 Undertake human resource capacity building to levels required to conduct competitive research and innovation activities.

Document last updated June 20, 2019.

4.3.3 Restructuring the organisational design of public ST&I entities to further coherence and efficiency.

4.3.4 Develop policy for STEM education, to include curriculum development and delivery and teacher capacity.

4.3.5 Align STEM curricula with medium to long-term key ST&I priority areas as identified by foresighting processes.

4.3.6 Encourage inquiry-based learning at all educational levels

4.3.7 Encourage talented and competent ST&I subject teachers to remain active in Jamaica's education environment.

4.3.8 Develop special support mechanisms and facilities to identify gifted students and direct them toward ST&I disciplines.

4.3.9 Ensure ready access to local or overseas R&D facilities by key ST&I personnel.

4.3.10 Create and systematise a robust ST&I system to access incentives, volunteering, mentorship, internship, exchange and access programmes.

4.3.11 Create critical mass of ST&I graduates in relevant fields.

GOAL 5: An Enabling ST&I Policy Environment: Jamaica has a dynamic policy, legislative and institutional framework that capitalises on ST&I for all aspects of national development.

The achievement of this goal, will ensure that there is a robust and responsive policy and regulatory environment that enables all key players in the complex innovation system. Competent oversight bodies will foster cohesion within the multi-sectoral ST&I machinery, enforce regulations to ensure high quality innovation outputs, and monitor progress of innovative sectors and develop balanced policy instruments.

KEY ISSUES ADDRESSED

- Limited cohesion or oversight of science policy.
- Inadequate capacity of ST&I policy development, implementation and coordinating bodies.
- Non-responsive, outdated or lack of legal framework, especially in new and emerging fields of science.
- Limited over-arching protocols governing R&D and ST&I facilities.

KEY PLAYERS

- Ministry of Science, Energy and Technology
- Ministry of Finance and the Public Service
- National Commission on Science and Technology
- Office of the Cabinet
- Office of the Parliamentary Council

OBJECTIVE

5.1 Ensure legislation and policies remain relevant and impactful.

STRATEGIES

5.1.1 Regularly assess, forecast and steer policy development to ensure full policy coherence and alignment with the National ST&I Policy. Policy development areas should include:

- Intellectual Property Rights
- Knowledge and Technology Transfer
- Gender and Equity
- STEM Education
- Disruptive/Exponential Technology

- Indigenous Knowledge Systems
- Research Ethics
- National Quality Policy
- National Safety and Security
- Labour Force
- Energy/Environment/ Waste Management
- Bioeconomy/Biotechnology
- Climate Change Adaptation and Mitigation

OBJECTIVE

5.2 Strengthen the National Commission on Science and Technology.

STRATEGIES

5.2.1 Re-scope NCST to the National Commission for Science, Technology and Innovation (NCSTI) to emphasize its key role in innovation.

5.2.2 Revise the NCST Act to entrench the new NCSTI, expanding its mandate to include ST&I-related policy formulation and review, advocacy, coordination, oversight, monitoring, capacity building and administration of funds to diversify Jamaica's base for wealth creation by 2029.

5.2.3 Create a structure for governance and management which enables the NCSTI to effectively undertake its coordinating functions.

5.2.4 Build capacity in NCSTI to function as the driving force for ST&I.

OBJECTIVE

5.3 Comprehensively monitor Jamaica's ST&I inputs, outputs, challenges and opportunities using globally accepted standards and against national policies and legislations.

STRATEGIES

5.3.1 Build capacity in NCSTI to collect and analyse scientometrics of the ST&I landscape.

5.3.2 Build capacity of stakeholders within the innovation system to collect and provide innovation input and performance data.

5.3.3 Establish baseline ST&I data mapping using the modern scientometric methods.

5.3.4 Produce and disseminate a detailed evaluative and critical annual report on the performance of ST&I and its institutions, adequacy and effectiveness of ST&I inputs and the quality and potential benefits of its outputs as well as their contribution or potential contribution to economic development.

Document last updated June 20, 2019.

5.3.5 Develop a performance evaluation mechanism on the following levels: individual, institutional, sub-national and national.

5.3.6 Establish a network of focal points throughout the innovation system that will be responsible for providing information on sectoral performance and activities.

IMPLEMENTATION

The successful implementation of the National Science, Technology and Innovation Policy will be governed by the development of a National Implementation Plan. The Implementation Plan will detail specific programmes, activities, timelines, responsible entities and key performance indicators aligned with internationally accepted metrics.[8]

MDAs and academic entities will align their institutional work plans with the National Plan, and the private sector will be encouraged to do the same. The sectors outlined below will have the following responsibilities in the policy implementation process:

GOVERNMENT

- To develop, promote and enforce enabling policy and legislative framework.
- Establish a dedicated National Research Fund (NRF) for ST&I and all areas prioritised for development.
- Incentivize R&D and innovation via grants, awards, tax schemes and other mechanisms.
- Develop ST&I capacities and research competence particularly in prioritised economic sectors.
- Facilitate and incentivise technology and knowledge transfer, adaptation and diffusion through public-private partnerships.
- Foster STEM education throughout the formal educational systems.
- Upgrade ST&I infrastructure in public facilities.
- Develop Communication strategy to popularise ST&I.
- Foster equitability of involvement, innovation and entrepreneurship within all gender groups.

ACADEMIA

- Knowledge creation/discovery.
- Align curriculum to development needs and labour market requirements.
- Produce critical mass of trained ST&I professionals (including researchers).
- Screen research for commercial potential.
- Transfer technology through mechanisms such as incubators.
- Host and promote knowledge exchange fora.
- Provide high quality training for teachers of science.
- Provide advice for advancing industry/ GoJ.

PRIVATE SECTOR

- Collaborate with knowledge centres to solve industry problems.

[8] The Global Innovation Index (GII), which details measures indicators of science, technology and innovation across 141 countries, including Jamaica will be used to align the indicators for the national policy.

- Utilise local services and indigenous technologies where available.
- Promote innovation at the organisational level.
- Provide Venture Capital and Public-Private Partnerships.
- Grow internship programmes to foster knowledge exchange, training and professional attachment programmes.

Document last updated June 20, 2019.

KEY IMPLEMENTATION ACTIONS

The Ministry, with responsibility for Science and Technology, will continue to develop and drive ST&I-related policies and legislative programmes to support the ST&I Policy and align these activities with the National Development Plan. The new NCSTI will be the leading coordinating body to execute these activities along with collaborating with the other MDAs, academia, civil society and private sector to ensure the successful implementation of the Policy within/among the broad, multi-sectoral innovation system.

The ST&I Policy will be implemented over 10 years. The Policy's Implementation Plan (below) details the activities for the first 3 years, with the first year being budgeted at approximately J$13.9 Million.

Table 4: Implementation Actions 2020-2022

ACTIONS	TIMEFRAME			KEY PLAYERS
	'20	'21	'22	
PRIORITY AREAS Agriculture, Health Management, Waste Management, Education and Training, Crime and Public Safety, Funding				
Develop mechanisms and tools to ensure that ST&I are mainstreamed into all developmental planning processes and governance structures.	●			MSET, NCST. PIOJ, all MDAs
Integrate S&T to ensure efficient and impactful delivery of public goods such as education, health care, waste disposal and security.		●		MSET, NCST, All MDAs
Repair, refurbish, re-equip and rationalise existing laboratory facilities ensuring efficient, effective, collaborative and coordinated use across sectors.		●		MSET, MOFPS, NCST, NFDST, MNS
Develop national standards/codes of operation for all national/training infrastructure to ensure facilities are safe and conducive to learning and innovation.		●		MSET, NCST, MOEYI
Encourage private sector involvement in the development of ST&I infrastructure through public-private-partnerships (PPPs).	●			MSET, NCST, DBJ, Private Sector Organizations
Develop policy for STEM education, to include curriculum development and delivery and teacher capacity.		●		MSET, NCST, MOEYI

PROMULGATION Widespread dissemination and adoption of the National Policy, particularly among stakeholders central to its successful implementation				
Develop a policy communication/marketing strategy and materials.	●			MSET, NCST
Sensitization workshops with key stakeholders.	●			NCST
Capacity building with policy implementation bodies on adoption and alignment with institutional strategic plan.	●			MSET, NCST, PIOJ
Disseminate policy to implementation bodies within the innovation system.	●			MSET
LEGISLATIVE All acts and regulations and policies governing ST&I institutions.				
Conduct comprehensive legislative and regulatory review governing all agencies and institutions within the innovation system.		●		MSET, NCSTI
Develop agenda to amend, establish and rationalise legislation required for successful implementation of the National ST&I Policy.		●		MSET, NCST, Cabinet Office, Parliament, Ministries with ST&I-related portfolios
Engage with MICAF to repeal and replace the Patent Act and Designs Act		●		MICAF. NCST, MSET
Review of the National Commission on Science and Technology Act.	●			MSET, NCST, OPM
Obtain drafting instructions from Cabinet for onward submission to the Chief Parliamentary Council for the inclusion of innovation in the name and mandate of the NCST	●			MSET, NCST
Initiate process to amend and promulgate the NCSTI Act		●		MSET, NCST
INSTITUTIONAL Business and operational arrangements to ensure successful policy implementation and coordination.				

Define the mandate, role, organizational structure, staffing requirements and protocols for the NCSTI.		●		MSET, NCST, MOFPS
Identify and allocate the financial resources for the expansion of the NCSTI.		●		MSET, NCST, MoFP, NFDST, Cabinet, Development Banks
Recruit/procure personnel and organizational resources.		●		MSET, NCST
Establish the NCST Council and Inter-ministerial Committee.		●		OPM, NCST
Develop strategic partnership with underserved sectors- NGOs, Private Sector, etc.	●			MSET, NCST
MAPPING Situational analysis of the national innovation system.				
Assign multi-sectoral working group to lead data gathering for a national mapping of the innovation system.	●			MSET, NCST
Conduct a full resource audit and gap analysis of the ST&I landscape to include polices, programmes, personnel, infrastructure and agendas.	●			NCST, PIOJ, Universities, Private Sector Umbrella Organizations, All MDA's with ST&I-related Portfolios
Establish a ST&I database and information sharing mechanisms for decision making processes.		●		NCST, MSET, eGOV
PLANNING The development of the National Implementation Plan that will detail how the policy will be actioned and implemented by all stakeholders.				
Assign consultant or working group to lead the comprehensive stakeholder consultations.	●			MSET, NCST
Develop a comprehensive National Implementation Plan for the ST&I Policy aligned with Vision 2030 Jamaica ST&I Sector Plan and Medium-Term Framework and Short-Term Growth Agenda	●			MSET, NCST, Universities, Private Sector Umbrella Organizations, All MDA's with ST&I-related Portfolios
Submit National Implementation Plan for Cabinet's approval	●			NCST, MSET

Promulgate the National Implementation Plan.		●		MSET, NCST
Conduct wide sensitisation sessions with key agencies stakeholders.		●		NCST
Align the institutional strategic and operational plan with all key national bodies.		●	●	NCST
FINANCIAL Financial resources allocated to the successful implementation of the National Policy.				
Determine (quantify) necessary financial resources required for the execution of the Policy though the National Implementation Plan.		●		MSET, NCST, MOFPS
Identify and establish specific sources of funding and requisite facilities to support the Policy, particularly key priority areas as identified by the National Implementation Plan.		●		MSET, NCST, MOFPS, PIOJ, NFDST, Cabinet, Office
MONITORING AND EVALUATION Key performance indicators and targets to monitor the successful implementation of the policy, the returns of the investments in ST&I and the performance of national bodies of the implementation.				
Agree to national ST&I Indicators for successful alignment with the Global Innovation Index and other globally recognized standards, Vision 2030 Jamaica Indicators and the Sustainable Development Goals.		●		MSET, NCST, PIOJ, STATIN
Establish mechanisms for the systems collection, reporting, translation and modelling of indicators.		●		MSET, NCST, MOFPS
Collect baseline data for all agreed indicators.		●		MSET, NCST, Universities, Private Sector Umbrella Organizations, All MDA's with ST&I-related Portfolios
Set national targets to align with the National Implementation Plan.		●		MSET, NCST, PIOJ
Sensitise all stakeholders of the innovation on targets and align these with institutional targets.		●	●	MSET, NCST
Establish protocols and feedback mechanisms (institutional) for performance of key national ST&I policy implementation bodies to include the NCSTI, SRC, Universities and government laboratories.		●	●	MSET, NCST, Universities, Private Sector Umbrella Organizations, All MDA's with ST&I-related Portfolios

INSTITUTIONAL FRAMEWORK

Among the most challenging tasks facing the policy's implementation effort are coordination and coherence, which are vital for the success of this new policy. The imperative of effective coordination and coherence is embedded in the cross sectoral (both public and private), inter-institutional, inter-ministerial and individually empowering ST&I policy's modus operandi.

ROLE OF THE MINISTRY WITH RESPONSIBILITY FOR SCIENCE AND TECHNOLOGY

The Ministry with the portfolio responsibility for science and technology will retain its development, oversight, support monitoring and review of all relevant policy framework.

OTHER KEY INSTITUTIONS

The other institutions that are critical to the successful implementation of the policy are:

- Planning Institute of Jamaica
- Ministry of Industry, Commerce, Agriculture and Fisheries
- Ministry of Finance and the Public Service
- Ministry of Economic Growth and Job Creation
- Tax Administration of Jamaica
- Ministry of Education, Youth and Information
- Jamaica National Association for Accreditation
- Bureau of Standards Jamaica
- Statistical Institute of Jamaica
- Jamaica Intellectual Property Office
- Scientific Research Council
- Office of the Prime Minister

DISTRIBUTION OF ACTIVITIES THROUGH ST&I

The organizational chart shows the distribution of activities throughout the ST&I landscape in Jamaica covering policy, innovation and services activities.

Document last updated June 20, 2019.

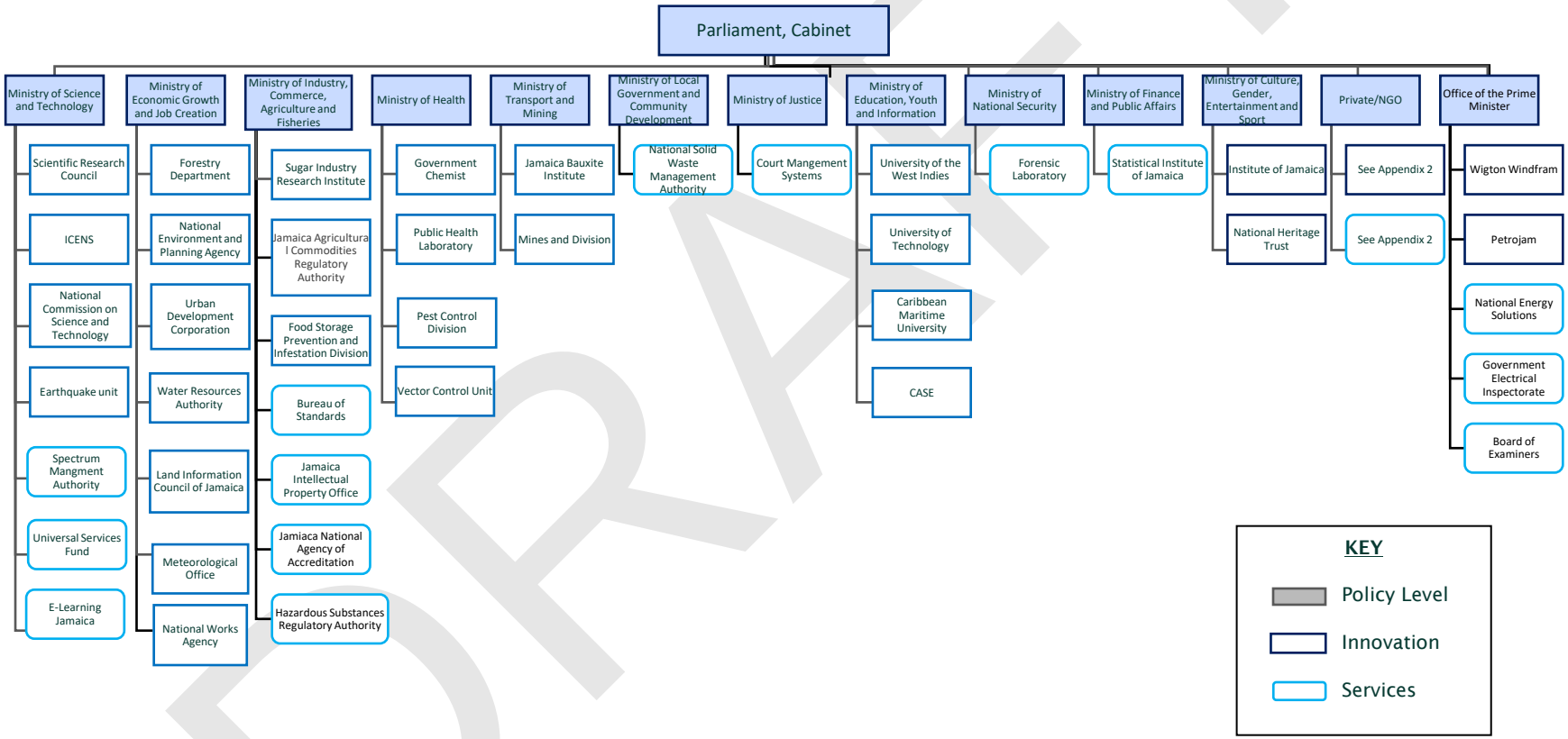

FIGURE 2: ST&I INSTITUTIONS IN JAMAICA

Document last updated June 20, 2019.

FINANCING

Dedicated funding is critical to the success of the ST&I Policy. No programme can be effectively implemented without adequate funding to produce significant outcomes. Therefore, one of the major outcomes of this Policy, is that Jamaica will learn to invest wisely and adequately in ST&I exploitation and strategic engagement to drive economic growth. Funding may be obtained from investments of endowment resources or regular income from special taxes, contributions from the private sector or tapping into the existing government agency funds. The latter is more hopeful, at least in the short term, till the country buys deeply into its ability to transform its economy through engagement of ST&I.

The estimated cost to implement the policy over 10 years will be calculated/established based on the National Implementation Plan. All policy development, facilitation, coordination and implementation across multiple stakeholders will be qualified. Development of the National Implementation Plan (NIP) will be financed through the Youth Entrepreneurship in the Digital and Animation Industries Project (YEDAIP) funded by the World Bank. All other activities are to be financed by:

- The Government of Jamaica
    - National Budget for ST&I Activities
    - Allocations to Research Fund
- Investment Opportunities/ Public-Private-Partnership Investments
- GOJ Revenue
    - Income from Commercialised Innovation
    - Redistribution of Appropriations in Aid

Document last updated June 20, 2019.

MONITORING AND EVALUATION

The Ministry with responsibility for the science, technology and innovation portfolios will steer, monitor and evaluate the implementation of the ST&I Policy. Stemming from the Vision 2030 Jamaica: National Development Plan, National Outcome 11: A Technology-Enabled Society outlines 3 main performance indicators:

- Number of scientific publications per million populations
- Number of Patents lodged
- E-readiness Index

The new NCSTI will be responsible for coordinating the various implementation activities by MDAs across sectors. The entity will provide a quarterly report to the portfolio Ministry on implementation activities. The Ministry will evaluate the activities and impacts, and submit a report to Cabinet on progress and possible changes to be made to the Policy.

The policy will be reviewed every 3 years to ensure its responsiveness and relevance.

Document last updated June 20, 2019.

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Schwab, K., X. Sala-i-Martin, and B. Brende. (2015)."The Global Competitiveness Report 2015-2016 (Vol. 5)."

The Global Innovation Index (GII), which details measures indicators of science, technology and innovation across 141 countries, including Jamaica will be used to align the indicators for the national policy.

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APPENDICES

Document last updated June 20, 2019.

APPENDIX 1: GLOSSARY OF TERMS

Artificial Intelligence (AI)	**The theory and development of computer systems able to perform tasks normally requiring human intelligence, such as visual perception, speech recognition, decision-making, and translation between languages.**
Big Data	Extremely large data sets that may be analysed computationally to reveal patterns, trends, and associations, especially relating to human behaviour and interactions.
Bioeconomy	Parts of the economy that use renewable biological resources from land and sea – such as crops, forests, fish, animals and micro-organisms – to produce food, materials and energy.
Bioengineering	A discipline that applies engineering principles of design and analysis to biological systems and biomedical technologies.
Biotechnology	The exploitation of biological processes for industrial and other purposes, especially the genetic manipulation of microorganisms for the production of antibiotics, hormones, etc.
Business Angels	Individuals who use their personal wealth to provide capital to start-up and early-stage businesses in return for a share of the company's equity.
Disruptive Technology	An innovation that creates a new market and value network and eventually disrupts an existing market and value network, displacing established market leading firms, products, and alliances.
Engineering	The process of utilizing knowledge and principles to design, build, and analyse objects.
Factor Driven Economy	A country (economy) which competes primarily on the use of unskilled labour and natural resources, buying and selling basic products or commodities.
Incubator	Facility which is a unique and highly flexible combination of business development processes, infrastructure and people designed to nurture new and small businesses by helping them to survive and grow through the difficult and vulnerable early stages of development.
Information Communication Technology (ICT)	All devices, networking components, applications and systems that combined allow people and organizations (i.e., businesses, non-profit agencies, governments and criminal enterprises) to interact in the digital world.

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Innovation	Scientific, technological, organisational, financial and commercial steps which actually, or are intended to, lead to translating (new and/or existing) knowledge or technologies into a good or service that creates value for a customer/consumer.
Innovation System	The flow of technology and information among people, enterprises, and institutions is key to an innovative process. It contains the interactions between the actors needed in order to turn an idea into a process, product, or service on the market.
Intellectual Property (IP)	Creations of the mind, such as inventions; literary and artistic works; designs; and symbols, names and images used in industry.
Vision 2030 Jamaica	A strategic road map to guide the country to achieve its goals of sustainable development and prosperity by 2030.
Mathematics	The abstract science of number, quantity, and space, either as abstract concepts (pure mathematics), or as applied to other disciplines such as physics and engineering
Nanoscience	The study of structures and materials on the scale of nanometers.
National Innovation System	The flow of technology and information among people, enterprises and institutions which is key to the innovative process on the national level.
National Quality Infrastructure	The institutional framework that establishes and implements the practice of standardization, including conformity assessment services, metrology, and accreditation.
Patents	A government authority or licence conferring a right or title for a set period, especially the sole right to exclude others from making, using, or selling an invention.
Publications	In academic publishing, a scientific journal is a periodical publication intended to further the progress of science, usually by reporting new research.
Public-Private Partnerships	A contractual arrangement between a public agency (federal, state or local) and a private sector entity.
Research and Development (R&D)	Creative and systematic work undertaken in order to increase the stock of knowledge – including knowledge of humankind, culture and society – and to devise new applications of available knowledge.
Robotics	The branch of technology that deals with the design, construction, operation, and application of robots.

Science	The intellectual and practical activity encompassing the systematic study of the structure and behaviour of the physical and natural world through observation and experiment.
Scientometrics	The study of measuring and analysing science, technology and innovation.
Small and Medium Enterprises (SME's)	Non-subsidiary, independent firms which employ fewer than a given number of employees. This number varies across countries. The most frequent upper limit designating an SME is 250 employees.
South-South Corporation	The exchange of resources, technology, and knowledge between developing countries, also known as countries of the Global South.
ST&I Indicators	Data that provide information that would allow successfully translating the activities and outputs of ST&I into development
Sustainable Development Goals (SDG's)	A universal call to action, set by the United Nations, to end poverty, protect the planet and ensure that all people enjoy peace and prosperity.
Technology	The application of scientific knowledge for practical purposes
Technology Transfer	Assignment of technological intellectual property, developed and generated in one place, to another through legal means such as technology licensing or franchising.
Traditional Knowledge Systems (IKS)	The knowledge systems developed and shared by a community as opposed to the scientific knowledge.
Venture Capital	Capital invested in a project in which there is a substantial element of risk, typically a new or expanding business.

APPENDIX 2: STAKEHOLDER CONSULTATIONS

Biotechnology Centre

Bodles Research Station

Broadcasting Commission

Bureau of Standards Jamaica (BSJ)

College of Agriculture, Science and Education

E-Gov Jamaica Ltd.

Environmental Health Foundation

HEART Trust NTA

International Centre for Environmental and Nuclear Sciences

Jamaica Intellectual Property Office

Jamaica Manufacturers Association

Jamaica National Agency for Accreditation

Jamaica Promotions Corporation

Ministry of Education, Youth and Information

Ministry of Industry, Commerce, Agriculture and Fisheries

Ministry of Labour & Social Security

Ministry of National Security

Ministry of Science, Energy and Technology

Ministry of Transport and Mining

Ministry of Economic Growth and Job Creation

National Certification Body of Jamaica

National Commission on Science and Technology

National Cultural and Creative Industry Commission - Office of the Prime Minister

National Environment & Planning Agency

Northern Caribbean University

Planning Institute of Jamaica

Private Sector Organization of Jamaica

Public Sector Transformation Unit - Office of the Cabinet

Scientific Research Council

Spectrum Management Authority

United Nations Development Programme

University of Technology Jamaica

United Nations Educational, Scientific and Cultural Organisation

University of the West Indies- Faculty of Science & Technology

University of the West Indies - Office of the Deputy Principal

UWI Solutions for Developing Countries

APPENDIX 3: Other Legislation governing Science, Technology and Innovation in Jamaica

ACT	OPERATIONAL DATE
Access to Information Act	2004
Agriculture Development Corporation	1952
Agro-Investment Corporation	2009
Anatomy	1949
Animals (Artificial Insemination Control)	1950
Animals (Control of Experiments)	1949
Animals (Diseases and Importation)	1948
Anti-Doping in Sport	2008
Aquaculture, Inland and Marine Products	1999
Architects Registration	1987
The Banana Board	1953
Bauxite and Alumina Industries (Encouragement)	1950
Beach Control	1956
Bees Control	1918
Broadcasting and Radio Re-Diffusion	1949
Calcium Carbide (Sale and Storage)	1979
Caribbean Accreditation Authority (Medicine and Other Health Professionals)	2006
The Caribbean Agricultural Research and Development Institute	1982
Caribbean Meteorological Organization	1979
Cement (Encouragement and Control)	1948
Clean Air	1964
Cocoa Industry Board	1957
Coconut Industry Board	1932
Conch (Export)	2009
Copyright	1993
Cybercrimes	2011
Dangerous Drugs	1948
Dental	1974
Designs Act	1890
Disaster Preparedness ad Emergency Management Act	1993
Education Act	1965
Electricity Lighting	1957
Electricity (Survey)	1956
Electricity Development	1971
Electronics Transaction	2007
Endangered Species (Protection, Conservation and Regulation of Trade)	2000
Evidence	1843
Fertilizers and Feeding Stuffs	1942
Finger Prints	1936
Fishing Industry	1976
Flood –water Control	1958
Food and Drugs	1975
Food Storage and Prevention of Infestation	1958

ACT	OPERATIONAL DATE
Forest	1996
Human Employment and Resource Training	1982
Institute of Jamaica	1978
Jamaica Agricultural Society Incorporation	1941
Jamaica Intellectual Property Office	2002
Jamaica National Heritage Trust	1985
Medical	1976
Mining	1995
National Commission on Science and Technology	2007
National Health Fund	2011
National Health Services	1997
National Solid Waste Management	2002
National Water Commission	1963
Natural Resource Conservation Authority	1991
Patents and Designs Act	1857
Pesticides	1987
Petroleum	1976
Petroleum Refining (Industry Encouragement)	1962
Pharmacy	1975
Planning Institute of Jamaica	1984
Plants (Quarantine)	1994
Professional Engineers Registration	1987
Professions Supplementary to Medicine	1969
Protection of Geographical Indications	2009
Public Health	1985
Quarantine	1951
Rice Industry Board	1956
Rural Agricultural Development Authority	1990
Scientific Research Council	1960
Telecommunications	2000
The Jamaica Diary Development Board	2009
University Council of Jamaica	1987
University Hospital	1948
University of Technology, Jamaica	1995
Urban Development Corporation	1968
Venereal Disease	1937
Veterinary	1976
Water Resources Authority	1996
Watersheds Protection	1958
Wildlife Protection	1945

APPENDIX 4: LIST OF TABLES

APPENDIX 5: LIST OF FIGURES