

**Bridging the Technological Divide between and
Within Countries – The Jamaican Approach**

By

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**For
The UNCSTD Panel
Rabat, Morocco
11-12 November, 2005**

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Introduction

The existing scientific and technological gap not only profoundly restrains the contributions of the poor to their own advancement and prevent them from adding to global progress, but also this growing disparity between the rich and the poor is also proving to be very costly in social, environmental and behavioral terms, in all corners of the planet.

I shall therefore, begin this talk by indicating what the divide means to Jamaica, and follow this up with the reasons why this gap should be urgently addressed. The presentation will be closed by an outline of what is being done strategically on the island to reduce the science and technology (S&T) divide locally and internationally.

Nature of the Gap

As it presently stands, poverty continues to grow worldwide, while the expansion of the global economy is outstripping the capacity of the earth's life support system. The world's economy has grown some thirty-fold in the

last three decades without any sign that poverty can be contained through these means. Therefore, other ways will have to be found to reduce this chronic dilemma. Consequently, I posit that the remedial focus should be shifted from mere economic growth to economic development, in which S&T have vital transforming roles. But for this to happen, the inordinate stress on international S&T competition must give way to more considered cooperation.

Accordingly, when contemplating the narrowing of the scientific and technological divide, among and within countries, a distinction must be made between blindly trying to catch up with the development patterns of the leading rich States, and the building of a nation's knowledge infrastructure, to benefit from international partnerships, with the intent of reducing the numbers excluded from economic and social progress. We believe that caution should be exercised so as not to blindly ape the values of ever increasing consumption and the associated neglect of cultivating a much-needed common human cause.

Jamaica perceives the S&T divide as one between what the island should know and what it presently knows, in other words what is required to bridge the gap between expectation and fulfillment. The S&T gap therefore is

practically expressed as the insufficient ability to execute actions to cope with mounting economic and social pressures.

Living on a small island with fragile ecosystems, Jamaicans are on the frontline of environmental destabilization, and are acutely aware that the dominant economic dispositions are leading to the exhaustion of the earth's renewable resources faster than they can be replenished, and that many of the important non-renewable resources are being depleted at ever-increasing rates. Since the island imports 90% of its energy needs, nowhere is this more evident than in the prevailing situation with oil and energy.

Essentially, forests are shrinking, grasslands are deteriorating, water tables are falling, fisheries are collapsing and soil erosion takes place at ever-increasing rates. On top of this, green house gases are being discharged at rates faster than nature can absorb them. The resulting warming effect, has already begun to create great hardships for small tropical islands, as sea level encroaches inland and ambient temperature rises are moving above what is required for efficient agriculture, as they precipitate more frequent extremes of weather.

Strategies to Close the Gap

Jamaica therefore regards the gap as a paucity of knowledge generation, transfer and application, for meeting the needs and solving the problems of the island, and not one preconditioned on mimicking the development paradigms of the rich countries.

The island's aim is to increase production and productivity, especially in agriculture and agro-industry, to satisfy the needs of all Jamaicans, rich and poor alike, without sacrificing the salubrity of our environment. (See Slide 1 –Major S&T Strategies for Closing Gaps).

This means we need to conduct relevant research and development (R&D) to keep abreast of global S&T movements to harness those which are beneficial and contain the inimical effects of others. The strategy to close the S&T gap is based on improving local skills and creating a wider civil understanding of science, while conducting R&D to enable the fashioning and transfer of technologies to suit our special circumstances. The R&D is done not only to spark innovation to increase production and productivity, but is also undertaken to ensure more effective education, infrastructure

improvement, marketing and management, among other initiatives of national importance.

Constructive learning is at the center of this approach. Jamaica is aggressively building capacity to solve its own problems, including social science competence to improve organizing, networking, marketing, managing and learning abilities.

One of the most important steps in reaching these goals is the acquisition of a more complete understanding of our physical and social environments. Steps are being taken to establish a wider and more detailed array of vital statistics of the island, and the installation of systems to follow the dynamics of change brought on by scientific and technological progress, as well as, the evolution of new and growing patterns of expectations by the Jamaican people. Foresighting and modeling are being used to help in these initiatives.

More socially responsible scientists are being trained and encouraged to operate in Centers of Excellence, where skills are honed to allow facility with emerging scientific technologies, such as bioengineering to improve agriculture, nano-technology to increase industrial variety and efficiencies,

geological mapping to improve water supplies and reduce losses from earthquakes and flooding, and micro element identification and measurement, to better understand and reduce sources of pollution.

Closing the S&T Gap - An Urgent Imperative

Recent analysis has clearly shown that Jamaica must substantially increase its investments in S&T, and that a mere holding position with regard to these factors do great damage to the prospects of the island's future. It is clear that ignoring S&T is not a benign choice, and that irrespective of this; the poor and frustrated will continue to transfer and use technologies in ways unhelpful to maintaining an orderly society and reaching higher qualities of life. In a sense, innovations are being deployed for nefarious ends much faster than the rest of society deploys these tools for constructive purposes.

Jamaica has no choice but to close the S&T gap between itself and the island's trading partners, especially those in the dominant economies, as it ensures that intra-island S&T divisions are also curtailed. Gaps in and between sectors and regions are also kept in focus as they are symptoms of disturbing and chronic inequalities.

The message that S&T are crucial to domestic socio-economic development has been rigorously stressed in various fora and in the local media for over three decades. Although there has been much political and private sector rhetoric about the economic centrality of S&T, this has not been matched with commensurate execution. This is also true of the environmental threat from unexpected human actions made possible by improved technologies.

Accordingly, it is clear that creative collective social initiatives are necessary to make the alterations to support and use S&T effectively. How to alter the extant value system and the accompanying ethical motives of individuals, to allow this to happen, will be the subject of scientific studies. One such study is the calculation of the true cost of poverty to encourage placing this scourge at the apex of development and provide an empirical basis for S&T interventions for its reduction.

Actions Taken to Close the S&T Divide

(a) Creation of a National Commission on Science and Technology for better S&T Management

Jamaica is working on many fronts to increase its S&T effectiveness.

One of the main initiatives is the systematic management of these tools

on the island. The National Commission on Science and Technology (NCST) is the instrument created to undertake this task.

Jamaica has had a long history with S&T. Significant steps were taken in the 1960's to use knowledge to make better use of our natural resources. As a consequence, many S&T institutions were established and today there are over 40 of them. Many of these have reached very advanced standards, but nevertheless, their overall impact on the island's socio-economic development remain sub-optimal.

In the early 1990's, it was therefore decided to create the NCST to better manage, coordinate, monitor and integrate the activities of these institutions. This is a broad-based cross-sectoral assembly of leaders from the private and public sectors, academia and other national bodies, such as unions and professional associations, chaired by the Prime Minister.

The management scheme of Jamaica's S&T infrastructure is represented on the Next Slide (Slide 2 – Jamaica's S&T Infrastructure). The major aim of this body is to provide a forum for collaborative priority setting among business, government and S&T institutions. I shall not go into the

detailed ramifications of our infrastructure, instead it should be noted that the intent is to cover all the major domestic S&T units, to ensure that coordination takes place which will lead to relationships that foster innovations and better use of scarce resources.

At the beginning, there was much opposition to this institution because of its mandate to coordinate formerly highly independent bodies (See Slide 3 – The Role and Functions of the NCST). However, after ten years of existence, the Commission has proven its worth and is now seen as an essential pivot of the island's S&T infrastructure. The Commission has set about to draft a new S&T law and new policy along with action plans. Also, a national strategy has been designed to reduce the decline in S&T capability, occasioned by an unbalanced national emphasis on business and management education and training.

Additionally, the Commission has launched a programme to ensure that the productive sector and the social ambitions of ordinary Jamaicans include more problem solving procedures, verifiable knowledge and modern technological evaluation and application, thereby allowing domestic technological needs and aspirations to be better known and

expressed. Close interactions between the universities, private sector and government are also being fostered to increase economic performance and identify necessary social interventions.

(b) **Additional S&T Actions to reduce the Knowledge and Action Gaps**

Other actions to help curtail the S&T Divide are depicted on the Next Slide (Slide 4 – Actions to Close the Domestic and International S&T Divide)

(i) **New Policy and Legal Arrangements**

Since its independence, Jamaica has promulgated two S&T policies, one in 1960 when the Scientific Research Council (SRC) was formed by law, and another in 1990, when the decision was taken to establish the NCST on a Prime Ministerial Order. Now that the NCST has demonstrated its usefulness and has instigated better cohesion in the local S&T community, it has been decided to amend the SRC law to make the former institution an R&D and Transfer of Technology Center, and repose the functions of coordination and management in the NCST. The ultimate idea is to have budgeting of S&T by objectives and performance, instead of by Ministerial fiat. The NCST is positioning

itself to become the main repository of S&T learning, anticipation and advice on the island.

This will allow a clearer separation of functions and more interagency collaboration and coordination and less unnecessary overlap of functions, as well as, ensure a more dedicated and innovative focus on national priority issues.

(ii) Indicators

To be able to make sounder S&T decisions, the NCST has begun to collect information on input and output, as well as, demand indicators. This is done by re-examining the mandates and activities of all the island's S&T institutions, including contributions from the private sector, to S&T for development.

The NCST, using information gathered in the indicator studies, has elaborated a national strategic plan with targets to be met and ways to measure success in the spread and utilization of S&T competence for balanced development.

(iii) Young Scientists Forum

One of the great failings of the recent past is the decline in the attractiveness of S&T professions, and the consequent loss of the island's recently trained young scientists, either to jobs outside S&T, or to foreign concerns, outside the island.

This has led to a fall in science and engineering enrollments at our three Universities, especially among the males. To counter this, a Young Scientist Forum, where matters of national concerns are debated and solutions proffered, has been established to boost the entry and retention of more young people in the S&T professions, especially in technologically led entrepreneurial activities. The idea is to bring both young businessmen and young scientists together to bridge the technological divide between science and the private sector.

Efforts to identify gifted students and correct their present underdevelopment, have begun. The goal here is to encourage them to take up research and engineering careers.

Also, S&T parks are being established at our three universities, to allow science graduate students to engage in commercial spin-off activities using the results of their research work. Commercial testing and contract work have already begun at the parks. Feasibility studies will be conducted to expand these operations at the unit at the University of the West Indies. This will be used as a model for further development of the others.

(iv) Reduction of Poverty

Jamaica sees poverty as the greatest obstacle to socio-economic stability and will be using the best of local and foreign S&T to eradicate this bane from the island. The strategy being used is to link rural production with the large demand for food and services in the thriving tourism sector, as well as, with the urgency to satisfy the island's needs for food security.

This effort has already begun to force local S&T institutions to think and act innovatively to bring local S&T initiatives closer to the deprived rural and urban communities. Such undertakings will allow unfolding economic opportunities to be more systematically seized.

Jamaica subscribes to the attainment of the Millennium Development Goals (MDGs) and has devised ways to meet these targets. These goals are considered instrumental in focusing the capability of the S&T system to worthwhile domestic ends. The S&T community is being challenged to seek ways to ensure the reaching and surpassing of these objectives.

(v) Work with the Jamaican Diaspora

Jamaica alone cannot fulfill all the S&T needs of its population. The S&T fraternity is too small and the demands too great. So, partnerships with outside bodies are crucial.

To begin this partnership process, Jamaica has decided to work closely with Jamaican professionals abroad to transfer knowledge and encourage investments in S&T- led operations and businesses.

At the same time, partnerships with developing countries are being intensified and terms of trade reexamined to allow these relationships to be accelerated.

(vi) Education and Training

The best way to ensure a strong and sustainable flow of S&T professionals on the island, is to promote S&T education at the primary and secondary school levels. Books, papers, radio and electronic means are therefore being used to deliver the exciting message of the power of science to individual advancement and national progress. We have begun with the teachers in this national endeavour.

(vii) Financing of R&D and S&T Activities

A major gap in the island's S&T system is the absence of sizable risk and venture capital funds for S&T and innovative activities. The NCST presently administrates a small Technology Investment Fund for such projects, but the demand has been so overwhelming that serious consideration is being given to remodeling and expansion of this facility.

Also, a thrust is being made to have the National Development Bank, as well as, other financial institutions, dealing with technological investments and small-scale operations, acquire staff that understands S&T and can reasonably assess the risks involved in innovative-type projects.

Additionally, better use of technology transfers, that are made possible through Foreign Direct Investments, are being encouraged, within both the public and private sectors.

(vii) Small and Medium Enterprise Focus

Nurturing and upgrading small enterprises with up to date knowledge is vital to creating jobs and improving the wealth of those at the base of the society. Locally these enterprises need better production technologies and more competitive products and services. To facilitate these initiatives repair and maintenance skills must be provided, as well as, more effective communication and management systems. Technology and business parks are being supported to provide these and other complementary type services, while branches of the island's main R&D institutions are being established near the loci of small businesses and rural operations.

Additionally, emerging enterprises are encouraged to connect with information and trading networks, so that they can become more integrated with larger, more established commercial interests and outlets.

Special funding for these enterprises exists, but ways to ensure continual S&T upgrading for improved efficiencies, are not as advanced. To help in this regard, annual prizes for innovations in different sectors are being provided to encourage the creative use of knowledge.

(viii) A National Think Tank

The rate of scientific developments and technological changes are so rapid that it will take a special facility to follow and evaluate them in the context of Jamaica's socio-economic development. Occasionally, these activities take place, but this is not enough to provide continual guidance and direction for the nation. The Prime Minister's Adviser's Office is working with the local arm of the Caribbean Academy of Sciences and experts at the island's Universities and professional societies to assemble a group to undertake these types of operations. Independent reports on S&T for development issues and directions, in areas of crucial

importance, are being considered to improve decision-making, and social introspection on the island.

Monitoring, Evaluation and Adaptation

All S&T initiatives will be subjected to close monitoring and evaluation and subsequent adjustments will be made where necessary. This will become a routine for all S&T-led projects and for the funds made available to R&D and S&T institutions. These efforts will form the crux of the learning process.

This means that policy research and technological analysis and fashioning of performance matrices, to foster and direct implementation, together with the monitoring and study of causative behavioural changes, along with economic impact determination, will be pursued on an on-going basis, through the auspices of the NCST. Results here will help to ensure that the island's S&T infrastructure and skills are adequate and functioning properly.

Conclusion

Jamaica has taken seriously the persistence of S&T inequalities at both the local and international levels, and has set about to correct them. The island, however, appreciates that these attempts are medium to long-term propositions, and has worked to gain the long-term commitment and necessary support from the public and private sectors to make these changes realities.

The most important required modifications that have been identified are those to be found in the values, attitudes and motives of the ordinary Jamaican. A crucial understanding to be made is how these are reflected in the island's leadership. Although the "divide" problems are manifested in the physical sciences, we are aware that the solutions to these problems may lie in the better comprehension of the interface between science and society, made possible by social and behavioral scientific work.

Jamaica wants to instill in all citizens a culture of critical thinking, scientific appreciation and technological harnessing, to propel its social and economic development forward. This will require a deeper probing of the reciprocity between S&T and society.

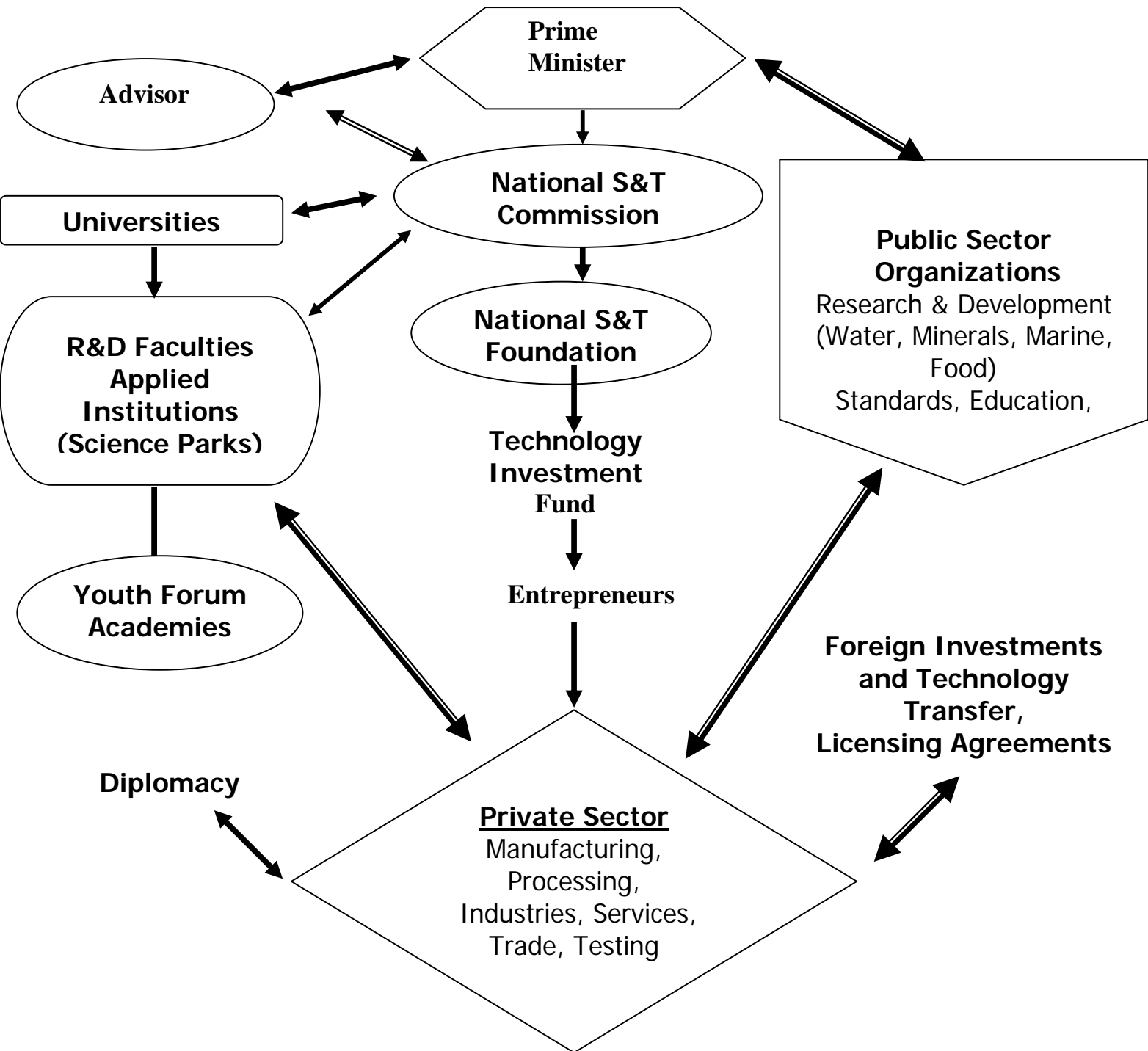
We further realize that we have to generate and undertake these imperatives largely by ourselves, and that we must build a strong S&T capacity to solve our problems to reach our ambitions. In this way, the S&T gap can be narrowed without Jamaica losing its focus on achieving an environmentally conscientious, economically balanced, and ethical attuned society.

SLIDE 1

Major Science and Technology Strategies for Closing Gaps

- Improved R&D for Increased Production, Productivity and Marketing
- Use of Global S&T and Analyses of Impacts
- Improve S&T Skills and S&T Literacy in Civil Society
- Constructive Learning and Dissemination of Findings (ICTs)
- Studies on the Reasons for Domestic Response to S&T and Knowledge
- Use of Foresighting and Modeling
- Upgrading of Infrastructure – Centers of Excellence
- Stimulation of S&T for Entrepreneurship
- International Partnerships
- New Energy Forms

SLIDE 2 - Jamaica's S&T Infrastructure



SLIDE 3
The Role of the NCST

- Provides Advisories to the Government on Issues Relating to S&T
- Undertakes Policy Analyses and Monitors Implementation
- Identifies, Catalyses and Galvanizes Action in Areas of Importance to National Development
- Promotes the Development of Local S&T Capability, Innovativeness and Competitiveness

SLIDE 4

Role of the NCST Cont'd...

- Informs and Educates the Public to Ensure a Better Understanding of S&T Issues and More Importantly, How to Use S&T
- Identifies and Develops Mechanisms for Funding S&T Activities
- Follows and Reports on Global S&T Developments of National Importance
- Fosters Local and International R&D Partnerships

SLIDE 5
**Actions to Close the Domestic and International
S&T Divide**

- Creation of a Coordinating Body
- New Policy and Legal S&T Arrangements
- Development of Indicators of Progress
- Hosts a Young Scientists Forum
- Accent on S&T for Social Advancement
 Reduction of Poverty (MDGs)
- Collaboration with the Jamaican Diaspora
- S&T Education and Technical Training
- Financing of R&D and S&T Activities
- Small and Medium Enterprise Focus
- Creation of a National Think Tank
- Monitoring and Evaluation