

**EVENT: STS 2014 Meeting**

**DATE: 6<sup>th</sup> October 2014, Kyoto**

**THEME OF SESSION: Science and Technology for Developing Countries**

### **SUMMARY POINTS FOR SPEECH**

#### **Introduction**

- The 20<sup>th</sup> century ended with an impressive array of accomplishments in nearly every field of science and technology. During the course of the last century, life span of the average human increased dramatically, small pox was eliminated and polio infections have been reduced by 99%.
- In late 18<sup>th</sup> century at a time when the global population was short of 1 billion, Malthus had expressed apprehensions about the ability and capacity of human race to sustain food production for the human population. Today, the human population stands in excess of 6 billion and the challenge that confronts us is not so much the availability of food (we grow enough to feed all mouths) as is the economic access to it.
- According to world's leading public health expert Susan J. Blumenthal, we have thus witnessed more gains in human development than at any time in history. This is why science matters. By generating new knowledge and fuelling innovation, science provides solutions to challenges that confront humanity.<sup>1</sup>

#### **Inequity in the Contemporary World & the Role of S&T**

- *“If there is technological advance without social advance, there is, almost automatically, an increase in human misery, in impoverishment”*  
- Michael Harrington (one of the leading public intellectuals of the 20<sup>th</sup> century)
- Despite the tremendous accomplishments in science and technology during the last century, nearly one fourth of the world population continues to live in severe poverty and the gap between the rich and the poor is widening<sup>2</sup>. Developing nations continue to suffer from the devastation of illnesses such as HIV/AIDS that affects 33 million globally, malaria which causes 1 million deaths annually and tuberculosis that leads to 1.7 million deaths annually<sup>3</sup>. How can we alter this

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<sup>1</sup> “How Science is Crucial to Improving Health Worldwide” by Susan Blumenthal, Huffington Post, 2010

<sup>2</sup> “Science in Response to Basic Human Needs” by M.S. Swaminathan, Current Science, 1999

<sup>3</sup> “How Science is Crucial to Improving Health Worldwide” by Susan Blumenthal, Huffington Post, 2010

utterly indefensible situation? What changes in our development strategy can lead us to a more equitable society? The formidable power of science and technology must be harnessed to the benefit of the whole of humanity.

- *“Dante once said that the hottest places in hell are reserved for those who in a period of moral crises maintain their neutrality. Our problems are man-made, therefore they can be solved by man. No problem of human destiny is beyond human beings.”*
- John F. Kennedy (former President, United States of America)
- The lesson of contemporary history is that technology must be an ally in the movement of social, economic and gender equity. Modern information technology provides this opportunity. Knowledge and skill empowerment can now be achieved at a faster pace. Harnessing science and technology for fulfilling the basic minimum needs of every child, woman and man living on our planet will be possible only if this message becomes central to the ethos of human culture.

### **Developing countries and their societal challenges for the 21<sup>st</sup> Century**

- There are major challenges faced by the developing countries including India. Many of these challenges, also global in nature, among others pertain to food security, sustainable urbanization, affordable healthcare, water management, anticipating and mitigating the effects of climate change induced disasters.
- Developing countries, in Asia and Africa and Latin America –with a high density of low-income population- face the challenges of decrease in food productivity and lack of nutrition. 842 million people in the world do not have enough to eat. A vast majority of them are in the developing countries. In developing countries, 1 out of 6 children are underweight and 1 out of 3 children are stunted.<sup>4</sup> Many people, in millions, are being dragged below the poverty line and several developing nations are facing the risk of massive food shortages. Studies point out that by 2050, there will be 3 billion more people to feed.<sup>5</sup> These require solutions that lie in inter-sectorial and interdisciplinary approaches including research and development for sustainable agricultural development, food biotechnology research for drought/salinity stress resistant & high yielding crop varieties and efficient use of water and soil resources.

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<sup>4</sup> Hunger Statistics compiled by World Food Programme

<sup>5</sup> “Food Shortage to Reach Critical Phase in Asia and Africa” by Pankaj Kumar, Jakarta Post, 2012

- While health gains of the 20th century count as one of the biggest social transformations of our times, more than a billion fellow human beings have been left behind in the health revolution. Infectious diseases coupled with non-communicable diseases, life style diseases and health care for the old demand huge investment in health care and research and development.
- Global per capita water supplies are declining and are now 30% lower than they were 25 years ago. By 2050, as much as 42% of the world's population will live in countries with insufficient freshwater stocks to meet the combined needs of agriculture, industry and domestic use.<sup>6</sup>Challenges such as availability of potable water, hardness, contamination, waste water management are concerns in many developing countries requiring S&T inputs in the form of new materials and nanotechnology.
- Large population densities, varied geographies, and proximity to seas and long coastlines make many developing countries vulnerable to weather related natural disasters such as earthquakes, floods and tsunamis, making huge demands on mitigation of their effects and making it incumbent on governments to invest in R&D in areas including precursory studies, prediction, forewarning, flood modeling etc.Approximately 600,000 deaths occurred worldwide as a result of weather-related natural disasters in the 1990s, some 95% of which took place in developing countries. Rising sea levels – an outcome of global warming – increases the risk of coastal flooding, and could cause population displacement. More than half of the world's population now lives within 60 kilometres of shorelines. Floods can directly cause injury and death, and increase risks of infection from water and vector-borne diseases.<sup>7</sup>

### **The Way Forward - S&T co-operation between Developing Countries**

- It is impossible to address these challenges without intervention of science and technology.Although developing countries are expanding their S&T institutional infrastructure and building their human capacities, the potential of S&T in achieving their socio-economic development is not being fully realized. Developing countries need to strengthen cooperation; complement and supplement each other.

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<sup>6</sup> "Science in Response to Basic Human Needs" by M.S. Swaminathan, Current Science, 1999

<sup>7</sup> Fact Sheet on Climate Change and Health by WHO

- In this direction, there has been an institutional-level initiative by Research and Information Systems (RIS) - an advisory body/ think tank of Ministry of External Affairs, Government of India.
- In the case of BRICS, India has taken up agriculture, geospatial technologies.
- At IBSA, India will promote health R&D, particularly biomedical sciences. At IORA, it is the Iran based RCSTT (Regional Centre for Science and Technology Transfer), where India has contributed with monetary and technical support apart from three new areas identified by the respective agencies for water, access to medicine and biodiversity conservation.
- The emerging economies (BRICS nations) amongst developing countries have demonstrated better use of S&T for national gains especially by using soft tool of science diplomacy.
- India produces 60% of vaccines and accounts for 60-80 % of UN vaccine purchases. Malaria, dengue and rota viral vaccines have made remarkable progress through global alliances.
- It is among the world leaders in space science and technology (recent success of Mars Mission- a case in point) and remote sensing. It has also recently launched Megatropiques weather satellite to study water cycle, energy exchanges in tropics to understand climate better.
- In pursuit of affordable innovations Indian entrepreneurs have provided novel solutions in the form of products and services these include innovation in delivery models of mobile telephony services with cheapest call rates in the world; low cost, high quality eye surgeries, Hepatitis B vaccine at a fraction of cost of earlier products and indigenously manufactured peoples' car at less than US \$ 2500.
- India has launched a flagship initiative 'Open Source Drug Discovery' Program (OSDD) with global partnership for TB drugs discovery and development.
- It has attracted bi-national S&T Centres in India such as Indo-French Centre for the Promotion of Advanced Research (CEFIPRA); Indo-US Science and Technology Forum (IUSSTF); Indo-German Science & Technology Centre (IGSTC); Indo Russian Centre for Science and Technology (IRCST) and Dedicated bi-national S&T cooperation funds with selected developed countries.
- Realising that innovations are key to growth of the economy, India has also enunciated its Science Technology and Innovation Policy 2013 to bring fresh perspective on innovation. India's approach and perspectives on S&T are based on the 'principles of inclusivity' solution science for grand societal challenges by 'Including the Excluded' and by

nurturing excellence and relevance, implying access, availability and affordability of solutions to as large a population as possible.

- A number of developing countries look upto India in the promotion of their science, technology and education. There are several bilateral, regional and multilateral mechanisms for partnership of India with these countries including engagement with the NAM S&T Centre, ASEAN, SAARC, TWAS/ICTP, UN-CSTD, BRICS.
- India has also played a key role in expanding SSC to the areas like intellectual property right (IPR), which have become more contentious. Along with Brazil and South Africa, India provided important leadership role at the WTO, and at the WIPO. It recommended need for pragmatic indicators to measure Sustainable Developmental Goals (SDGs) at the UN Commission on Science, Technology and Development (UNCSTD). India has also joined other developing countries in major debates on the protection of traditional knowledge and biodiversity. The coalitions that came up during these negotiations placed an alternative narrative on role of IPR and access to technology. This assumes great importance in an age of accelerated technological change.
- The giant leap of successful completion of India's first ever Mars Mission places it in a unique niche and in the company of Europe and Russia and offers leadership to developing countries in space science, exploration and applications and in the future contribute to achieving "collective self-reliance" through alliances, linkages and partnerships with developing countries on research -technology-manufacturing-trade.

### **Promoting Inclusive Innovation in Developing Countries**

- *Concern for man himself and his fate must always form the chief interest of all technical endeavours"*
  - Albert Einstein (Nobel Prize winning scientist)
- Most contemporary discussions on innovation are focused on R&D efforts in the formal economy. However, an overwhelming majority of the working population in developing countries are engaged in the informal sector. These peoples who constitute the weaker sections of society are constrained by insufficiently developed skills, inadequate access to public services, to markets, to assets and their vulnerability in handling risks. Developing nations must harness, increase and redirect formal innovation efforts to better meet the needs of the economically weaker sections of society to help in the improvement of their productivity and capacity to generate sustainable livelihoods. Innovation can be geared towards improving the delivery of a wide range of public services.

- Sujala, a watershed development project in the southern Indian state of Karnataka, has created hope for over 1300 villages across five districts. The project relies on high level of community participation and scientific planning tools like satellite remote sensing, geographic information systems and information technology.<sup>8</sup>
- Indian Tobacco Company's (ITC) e-Choupal initiative is the largest internet based intervention in rural India. The company's agribusiness procurement network caters to 40,000 villages in India through 6,500 kiosks across 10 states, effectively linking over 4 million farmers with computers and internet. Farmers can use the computers to check prices for their products and sell online, freeing them from middlemen who take a big cut of farm earnings.<sup>9</sup>

### **Investing in Frugal Innovation in Developing Countries**

- *Why does this magnificent applied science which saves work and makes life easier bring us so little happiness? The simple answer runs: Because we have not yet learned to make sensible use of it.*
- Albert Einstein (Nobel Prize winning scientist)
- Developing countries should avoid the allure of costly but ineffective research projects and establish a system that rewards solving practical problems
- The developed world's model is unsustainable and if it were to be applied everywhere then we would require the equivalent of more than fourth Earths to supply raw materials, fossil fuels and waste sinks.<sup>10</sup> The developed world's model is unsustainable and if it were to be applied everywhere then we would require the equivalent of more than fourth Earths to supply raw materials, fossil fuels and waste sinks.<sup>11</sup> The concept of 'frugal innovation' premised on the pillars of sustainability and affordability is the way forward for developing nations.
- Aravind Eye Hospital in the South Indian city of Madurai has created global benchmarks by evolving an eye surgery technique that helps to increase a surgeon's productivity by a factor of 10.

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<sup>8</sup> "Promoting Inclusive Innovation" by AnujaUtz, Innovative India Rises (ed. by LK Sharma), 2009

<sup>9</sup> Embedding Sustainability In Business, ITC Portal

<sup>10</sup> "The Great Leap: Driving Innovation from the Base of the Pyramid" by Stuart L. Hart

<sup>11</sup> "The Great Leap: Driving Innovation from the Base of the Pyramid" by Stuart L. Hart

- Tata Motors gained global attention by conceiving the Nano with a vision of making it the world's most affordable city car whose initial launch price was under Rs 1 lac or \$1,700.
- In Mumbai city, more than a hundred thousand citizens in their offices sit down to eat lunch out of lunch boxes called *dabbas* delivered by the humble *dabbawallas*. Some 3,500 such *dabbawallas* deliver 1.6 lakh lunches each working day, without fail or error. The *dabbawallas* have been accorded an efficiency rating of 99.999999 by the Forbes Global
- The Kegg Farms are a remarkable story of business innovation in India that combine scientific innovation driven down to the grassroots level to derive social and economic benefits.<sup>12</sup> They are the topic of a case study at the Harvard Business School. Kegg farms now services over 7,00,000 village households in 11 states, supplying 17 million Kuroiler chickens.

### **Striving Towards Inter-Generational Equity and Intra-Generational Equity**

- *“We can say with some assurance that, although children may be the victims of fate, they will not be the victims of our neglect”*
- John F. Kennedy (former President, United States of America)

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<sup>12</sup> “Innovations for Inclusion” by ArunMaira, Innovative India Rises (ed. by LK Sharma), 2009