

INNOVATION EYE



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Are we really seeing the true picture about our ST&I space?

The fact that innovation is paramount for sustainable development, especially in developing countries is a foregone



COSTI Innovation Dashboard: This is how it would look like

conclusion today. In Sri Lanka, education seems to be a success story. We are well-known for our high literacy rate. It was reported that the net enrolment rate in schools reached 99% in 2010, for both males and females. Country-wide development programmes are being implemented aiming at increasing ICT literacy from 35% to 75% by 2016.

We hear about child innovators, many discoveries, unique health treatments, our unique natural resources, but still in the Global

Innovation Index, the world sees us differently. Where are we going wrong, or is it that we are really not going wrong but measured incorrectly.

There are many world indices measuring various aspects of national capabilities, economic growth etc. Are these indices really depicting the real picture? If not why? If you delve deeper into how these world indices are calculated the reason behind becomes very clear, incorrect data. For example, some values of the 2013 Global Index is calculated based on data collected in 2009. COSTI has met many challenges since its inception, one insurmountable challenge is access to data. So would have other international organisations trying to collect relevant data.

This is one area where COSTI aims to make a difference: one, attempt to portray a true picture of Sri Lanka's research and innovation space, two: to break the barrier of data inaccessibility and promote a culture of data sharing. To this effect COSTI is in the process of building a National ST&I (Science, Technology and Innovation) Dashboard which will give the users 'at a glance view' of the research and innovation space of Sri Lanka.

Dr Geetha Abeysinghe
Director IT @ COSTI

From the Editor



“The nation which does not create new things will not rise”

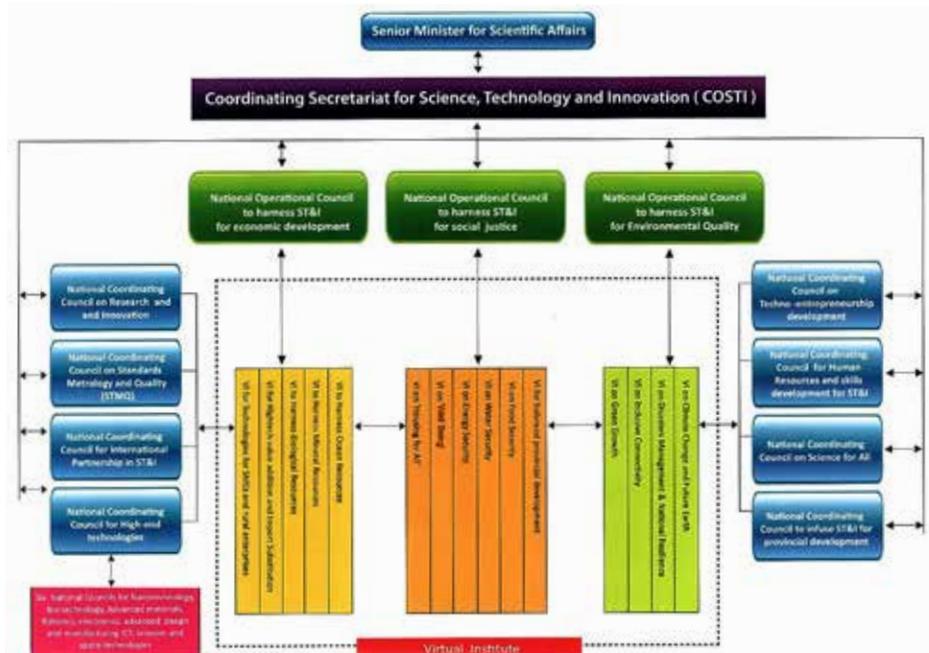
-Cumaratunga Munidasa (1887-1944)

This is the launching of COSTI's second newsletter. COSTI team is happy to note that the newsletter had been well received. The feedback received was positive and we will continue to work on the suggestions. COSTI was able to distribute the e-version of the newsletter to about 5000 in the STI space with the help of the database created by COSTI itself. We aim to communicate to the wider STI community. On February 01, 2014 COSTI completed its first year of its tenure. Its achievements up to now provide ample evidence as to its success brought in against many odds! So far, COSTI had progressed remarkably well with its mandated tasks and had always extended its guidance towards R & D and ST & I (Research and Development/Science Technology and Innovation) activities of the country. It also extended its support to everyone, who needed assistance with regard to R&D and ST & I ventures. It was possible to take necessary measures in keeping with its mandate to increase medium-high tech & high-tech value added exports through nanotechnology, etc. COSTI's objective is to identify ways and means to improve the country's high-tech exports from 1.5% to 10% by the year 2016. An interesting feature of COSTI is its staff although a smaller number it comprises of personnel with diverse experience and expertise and they have in turn proved their excellence in day to day activities by their teamwork. Teamwork is the criterion for success and COSTI expects collaboration to be the way forward in realizing its operational framework. This issue illustrates some of the COSTI's recent events together with innovative ideas of several members, which are listed at the member's corner. At the moment this newsletter may be a small step forward towards communicating science and related info to a wider stakeholder group.



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COSTI-Operational framework for Coordination and Monitoring



COSTI News and Activities

Roundtable Discussion Series II: Value Addition to Clay



Dr. Muditha Senerath Yapa (JKH) presenting at the event

The roundtable discussion was enriched by presentations from several resource personnel from universities, research organizations and the industry. The speakers shared their valuable research findings, their problems and their methodology of solving such problems. For those involved in this trade, this event provided a tremendous opportunity to express their findings and to find solutions to their problems.

Thereafter, a panel discussion took place under the chairmanship of Dr. Mubarak. The personnel of the



Dr. Bandula Perera (PUSCL) expressing his ideas during the discussion session

On the 9th of May 2014 COSTI conducted its second roundtable discussion on value addition to clay at Sri Lanka Institute of Development Administration (SLIDA), Colombo. The purpose of this roundtable discussion was to form an interaction among the people involved in the clay industry and the researchers scattered throughout the country by discussing its strengths, weaknesses, opportunities and threats, thereby, seeking ways and means to overcome the problems. People involved in research relating to clay varieties from universities and other research institutes along with people involved in clay industry and trade were the participants of this event. Prof. Ajith de Alwis, project director of COSTI, delivered the welcome address and described in detail the objectives of the program. Hon. Senior Minister for Scientific Affairs Prof. Tissa Vitharana was present at the event and delivered an inspiring speech.

industry as well as research institutes raised a number of important issues and suggestions. How far these suggestions are feasible has to be seen by applying them to present day situations, but to realize their success may take quite some time. Finding a solution to an industry problem of a considerable magnitude cannot be achieved overnight. Finally, COSTI assured the participants that it would endeavor to cooperate with the industry personnel to find solutions to their problems.

Roundtable discussion on concerning the issues related to import and export of biological samples

COSTI organized a roundtable meeting at the Sri Lanka Institute for Development Administration (SLIDA) on the 9th of April 2014, to discuss the issues relating to the imports/exports of biological samples, consumables and equipment. The event was intended to enlighten the relevant authorities about the difficulties faced by the importers and exporters of biological commodities and to enhance the participants' knowledge on the current procedures of imports and exports; besides formulating an efficient mechanism to expedite the clearance process. Participants representing various institutes (Public, private, university and research-institutes) had attended the event. During the discussion, key issues relating to delay in the import and export of biological commodities were

highlighted. Moreover, recommendations were scrutinized and development strategies were mapped out. The roundtable discussion was successfully concluded with the appointment of a working group to address the issues discussed during the meeting.



Prof. Tissa Vitharana, Hon. Senior minister for scientific affairs addressing the event attendees

An up-and-coming project titled “Made in Sri Lanka”: unveiling its graphite session



The parties involved in Project at the end of the Graphite session

Question arose as to the local people's degree of awareness about our country's industries. Are they truly proud of the country's products, which stabilize the economy by bringing in much needed foreign income?

COSTI and GIZ (Deutsche Gesellschaft für Internationale Zusammenarbeit) started a project called “Made in Sri Lanka”, which is aimed at capturing and visualizing the technical aspects involved in the value chains of Sri Lankan industries. In addition to enhance the competence in science, technology and innovation aspects of Sri Lankan industries among local as well as international entrepreneurs, local students and the general public.



Professional photographer Ralf Baker planning the session with Kahatagaha mines staff

Subsequent to the first session, (The first session was cinnamon) graphite industry was selected as the second photo session of the project and GIZ and COSTI personnel accompanied by Professional Photographer Mr. Ralf Baker visited Kahatagaha Graphite Mines at Dodamgaslanda in Kurunegala on the 19th of May , 2014 to inspect the value chain of graphite production. The team could experience how the miners work underground, up to a depth of 1310 feet; how the world's best and purest (99% purity) vein graphite is mined and processed for export.

We were welcomed and looked after by all the personnel including the Chairman Mr. D. Kalansooriya of Kahatagaha Graphite Lanka LTD.



Worker at Kahatagaha Mines posing at the photo session

A Dialogue between COSTI and SLRC on “Science for all Initiation”

Team COSTI met with officials of Sri Lanka Rupavahini Corporation for discussing and finding possible support for “Science for All Initiative”. The meeting took place on June 19, 2014 at Sri Lanka Rupavahini Corporation headquarters, Colombo. Mrs. Erin Wijekoon: Director, Educational Programmes lead the team of representatives from SLRC for this discussion.



Team COSTI and SLRC representatives during the discussion

“Science is not only a disciple of reason but, also, one of romance and passion.”

- Stephen Hawking

A Coordinated Dialogue on Science for All



Journalist Dhaneshi Yatawara (Lake House) speaking at the event

COSTI, in collaboration with SciDev.Net (<http://www.scidev.net/global>) organized a Coordinated dialogue on Science communication titled, "Mainstreaming science technology and innovation for public communication", at Hotel Galadari, Colombo, on 29th May 2014. The main objectives of this workshop were; To generate a discussion towards the development of an action plan/road map with effective mechanisms/programmes etc. for popularizing science, technology and innovation among different segments of the society. To facilitate linkages and networking of scientists and journalists working on science. To enhance public awareness and understanding of the importance of STI using print and electronic media (radio, TV, Internet, Newspapers and Social Media Networks such as Facebook and Twitter etc.) To develop mechanisms to encourage and facilitate cross-border exchange in field of science in society. Expected Outcomes of this workshop were to Identify linkages with existing science popularization activities in Sri Lanka and to develop and coordinate strategies for establishing and operationalizing a National Coordinating Council on Science for All in Sri Lanka to empower the people of Sri Lanka of all ages and walks of life with science knowledge to enable them to make informed decisions in everyday life.

Representatives from the State and Private Mass Media institution and the Press institutions, Scientists, Science teachers and students from selected schools, and Government sector including Hon senior minister for scientific affairs Prof. Tissa Vitarana, participated at this seminar.



Mr. Nalaka Gunawardene and Mr. Ranjit Devraj during the live discussion event

"To me there has never been a higher source of earthly honor or distinction than that connected with advances in science."

- Isaac Newton (1643-1727)

Meeting with Minister of Economic Development



Recently, several members of the COSTI had the opportunity to meet Hon. Basil Rajapaksa, Minister of Economic Development, at his ministry. The team had a fruitful discussion with the minister relating to the application of ST & I (Science, Technology and Innovation) for small and medium scale enterprises (SMEs). Hon. Minister Basil Rajapaksa is very much interested with the current activities of COSTI and requested its continuous support to upgrade country's SMEs.

Team COSTI visits Colombo Dockyard



Team COSTI during their Colombo Dockyard Visit

Team COSTI made a field visit to Colombo Dockyard on April 4, 2014. The main objective of this visit was to see the largest passenger vessels ever made in Sri Lanka. M.V. CORALS and M.V. LAGOON were made by Colombo Dockyard PLC for the Indian Government. It was revealed that these were built using Sri Lankan human resources and technical knowledge. Team COSTI also met with the senior management of Colombo Dockyard headed by Engineer Mr. Mangala Yapa.

COSTI knowledge sharing sessions

Friday knowledge sharing sessions have become a popular activity at COSTI where COSTI team members share their knowledge and experience among the colleagues. This gives the opportunity to every member to further their knowledge in diverse fields.



Team Member Vindhya sharing her research knowledge on "Traditional knowledge on snakebite treatments"



Team Member Pathmakumara Jayasinghe speaking on Speleology and Cave Science in Sri Lanka

"We live in a society exquisitely dependent on science and technology, in which hardly anyone knows anything about science and technology"

- Carl Sagan (1934-1996)



Members Corner

Sri Lankan SME sector and Future Challenges

-Ranjan Joseph (Statistician @ COSTI)

Small and medium-sized enterprises (SMEs) are important players in the national economic system of any country with its degree of influence toward the policy support by the government (Frietsch, 2013). The role of SMEs in poor economies is very crucial as SMEs has to deal with economically weak customers and employees. As in many other countries, Sri Lanka's SMEs employ a large number of people and contribute largely to the gross domestic product (GDP). According to Reddy (1991), 'SMEs have the capacity of achieving faster economic growth in view of their high employment potential, lower gestation period and relatively limited financial requirement. SMEs create more employment opportunities than that of large industries. These are labor-intensive industries (UN Information Agency, 1994) and they create lower innovation opportunities than that of large enterprises. On the other hand, they are less attractive in drawing the attention in the face of global competition. Further, their share of Research and Development (R&D) expenditure and R&D engagement is low on average.

It is important to understand the challenges and issues that SMEs are faced with; especially, in Sri Lanka. That understanding is critical to give them support in terms of monetary and fiscal policy and the regulations pertaining to an SME. It is not clear whether a proper definition is available in characterizing Sri Lankan SMEs in terms of their turnover/balance sheet and the number of employees. Due to this problem, regulations are not so effective for this

sector and SMEs find it difficult to obtain financial tax and technical support. The lack of a clear definition as to what constitutes an SME in Sri Lanka may be an advantage to the larger enterprises seeking tax concessions and other benefits, according to 'private research firm, Verite Research'.

Sri Lanka today is considered a 'lower middle level income country' (LMIC) (Per capita income from US \$ 4000 to US \$ 11000) and there should be an effective monetary and fiscal policy along with a framework for the nation to move to an 'upper middle level income country' (UMIC) (Per capita income from US \$ 11000). This is usually termed the "middle level economic trap". Some countries like South Korea and Singapore have already moved to the 'upper middle level income' category. The contribution



A Sri Lankan Spice Shop

Image by: McKay Savage

to their GDP from the hi-tech exports is significantly high as a result of heavy investment on R&D and ST & I (Research and Development/ Science, Technology and Innovation) sector. Countries such as Malaysia, Thailand remained LMICs for a long period. Therefore, they have realized the importance of further increase of investment on ST & I sector to uplift their economic structure.

A ruling on the development of the SME sector was stipulated in the 2014 budget; inclusive of the following commitments; namely, recognizing it as a much stronger financial services sector, developing Sri Lanka as a professional service hub, strengthening education and healthcare services, not promoting further subsidies, import substitution and encouraging R&D, innovation, technology expansion in domestic industries.



A Man involved in Brass works

Image by: Dinesh C.

SMEs should realize that they have the potential to engage in hi-tech activities, which could also bring about a paradigm shift from the normal SME mindset within Sri Lanka. To achieve it is a challenge that has to be faced by eliminating the obstacles that may crop up.

COSTI is developing as part of the coordinating framework for SMEs a 'virtual institute', which can perform the following tasks: identify clusters, challenges and competitiveness; ST & I interventions to improve the quality and productivity; thereby, to improve the potential of winning the foreign trade and businesses. COSTI pays more emphasis on the value chain of each product and cluster in terms of ST & I context and encourages achieving the goal of an increase in high-tech exports up to 15% of the total exports by 2020 and the production of a roadmap to achieve the targets.

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Can biogas be the next energy source to substitute conventional energy sources in Sri Lanka?

- B L Sanjaya (Project Scientist @ COSTI)

Energy is a vital factor for eradicating poverty, improving human welfare and raising the living standards of a country (UNDP, et al. 2000). However, most current patterns of energy supply and uses are considered unsustainable (UN, 2001).

The global energy map is changing, creating potentially far-reaching consequences for energy markets and trade. There was an interest for biogas during the resurgence in oil and gas production in the United States. The interest was further strengthened, when some countries retreat from nuclear power. There is a rapid growth in the use of wind and solar technologies and the unconventional gas production. If new policy initiatives are broadened and implemented in a concerted manner, it would be possible to improve the efficiency of global energy. If everything goes well, this would ultimately be the turning point of energy crisis.

Sri Lanka has a limited amount of hydropower resources and limited forest fuels. Its primary concern is the import of oil. Currently, oil imports consist of 30% of export earnings and about 6% of GDP. However, Sri Lanka's strategy for the energy security does not consider the importance of low cost green energy technology or the biogas based power generation. Furthermore, in the context of Sri Lanka's biogas, it could be called the 'Cinderella' among all renewable energy sources. Yet, the attention that it deserves due to its 'bountiful potential' has not materialized (de Alwis, 2012).

Biogas is a proven and established energy source in many parts of the globe, especially, in Asia. Several countries in Asia have embarked on large-scale domestic biogas programs: China (about 40 million household digesters by 2010), India (about 4.5 million units by March 2010) and Nepal (more than 225,000 plants by the end of 2010). Sri Lanka is relatively lagging behind with no more than 6,000 biogas units installed at present. But improved technological competitiveness and competence in Sri Lankan biogas systems could make Sri Lanka an energy hub in Asia. One of the interesting examples so far not revealed is to check the applicability of biogas as a vehicle fuel. Researchers at the University of Moratuwa with the help of the Ministry of Science and Technology have successfully completed a pilot scale demonstration of biogas as a transport fuel (de Alwis, 2012). This example clearly indicates the possibility of a successful implementation of biogas fuel stations in Sri Lanka to cut down the fossil fuel cost.

Further we can promote the number of associated benefits to the government and the respective markets. These include:

- Reduce the dependency on imported fossil fuels;
- Reduced the current account deficits

in relation to energy;

- Lower the national greenhouse gas emissions resulting from fossil fuels and reduction in methane emissions from waste treatment;

- Boost up Sri Lanka's green image by burning clean, locally grown fuel; this will give a concrete advantage over the export of products, reducing the environmental footprint;

- Local environment would be benefited from this by reducing pollution and improved soil fertility;

- Industries will develop, providing employment and economic growth to rural regions.

It is worthwhile to introduce low cost green energy technology (biogas units) for schools and government institutions especially for cooking purposes. As such, it is important to educate the students and employees about the use of biogas. In addition, the introduction of a government loan scheme having a low interest rate will enable the general public to purchase this biogas units and this would ultimately commercialize the green technology.

References:

<http://www.youtube.com/watch?v=y7x2CCP21AQ>



Boiling a kettle of water using the household biogas plant
Image courtesy of Sunday Times

"The science of today is the technology of tomorrow."

- Edward Teller (1908-2003)

Reuse of nitrate contaminated groundwater in Kalpitiya region, for its agriculture

- Pathmakumara Jayasingha (Deputy Project Manager @ COSTI)

Growing global population has led to an increasing trend in food production. As such, more agricultural activities are carried out throughout the country. Various developments have occurred while expanding the horizons of agriculture by the incorporation of higher technology. As a result, natural environment has been adversely affected. Expecting a higher yield, farmers used to apply a higher amount of inorganic fertilizers such as urea. This is a common practice causing the additional urea to ultimately end up in the aquifers leading to groundwater contamination. As a developing country, Sri Lanka is presently experiencing groundwater pollution due to intensive agricultural activities.

Kalpitiya peninsula is one of the highly productive agricultural areas in the country, specifically important as a coastal groundwater aquifer system where very good fresh water occurrences are in existence. Nearly for five decades, agricultural activities have been carried out in Kalpitiya. The intensive application of urea during the present agricultural activities carried out in the peninsula, had caused the groundwater to be contaminated with nitrate. This is mainly due to the haphazard fertilizer application practices, extensive groundwater utilization and the higher permeability of sandy soil. Out sourced agricultural practice had evolved mainly due to infertile sandy soil and semi-arid climate in the area. Farmers of the peninsula have been in the practice of using groundwater extensively installing dug wells as well as shallow tube wells in the sandy soil. This causes instant infiltration of added fertilizers to leach through the soil profile. It is recorded that groundwater in most of the agricultural lands have been polluted with nitrates. These nitrate concentrations have exceeded the guideline values of WHO. Nitrate contamination is a big issue in groundwater sector of the country. Recovery is the major problem which involves a lot of money to use high tech processes of ion exchange such as reverse osmosis and electro dialysis. Once urea is added to the permeable Kalpitiya sandy soil, quick infiltration and nitrification promptly takes place. At present nitrate concentrations in the groundwater aquifers of Kalpitiya seems

to be gradually increasing. Interestingly the community of the peninsula depends on this contaminated groundwater for their drinking and other day to day purposes. Health issues can arise due to long-term consumption of nitrate contaminated water and especially infants can suffer from "methamoglobinemia" (also called 'Blue Baby Syndrome'). However, at the moment no proper health survey has been carried out to distinguish any health problem in the area.

Anyhow increasing trend of nitrate pollution must be controlled in Kalpitiya peninsula; monitoring should continue as long as the farmers apply urea fertilizers without any control. Until then, groundwater of the Kalpitiya cannot be used as a source of freshwater in the future. Already some parts of the area are recorded as contaminated. Reusing of nitrate contaminated water as a nitrate source is an innovative idea because it will reduce both nitrate concentration in groundwater and use of urea by the farmers. Gradual decrease of nitrate due to absorbing the dissolved nitrate in contaminated water by the plants will eventually purify the aquifer water. Reduction of the application of urea fertilizers minimizes the fertilizer overheads of the farmers. Retention of water at the top most layer of soil is a difficult process due to highly permeable sandy material and hence there is no time or limited time for the plant to absorb the nutrients. Application of an impermeable layer such as a clay layer or polyethylene layer just under the plant/vegetable root system can hold water while creating an artificial micro environment within the uppermost part of the soil. Reuse of nitrate contaminated water as a source of nitrate has been tested in the Kalpitiya field by preparing special soil beds. Two soil beds were prepared with a polyethylene layer lining at a depth of 20 cm and filled with the same sandy soil of the Kalpitiya field. Red onion (*Allium cepa*), a short-term crop, was planted with the same manner as in the normal agricultural field there. One bed was supplied only with nitrate contaminated water. Its nitrate level was recorded as 100 mg/L. The other was added with nitrate contaminated water and crop specific fertilizers as done in the field. A plot at the normal field was managed with common fertilizer practices. Promising results were obtained from the bed that was applied with nitrate contaminated water as well as specific crop fertilizers and the leaves and bulbs of this bed were well grown than that of other beds. It is also noted

that enhancement in water retention by applying an impermeable layer has improved the absorption of nutrients. In practical situations the polyethylene layer can be replaced by a thin layer of clay, which can also enhance the quality of the sandy soil. By applying this method for a period of time, nitrate contaminated water can be purified without using additional urea. . Finally, extra cost for the urea can be minimized while farmers get additional benefits in several ways.

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Jayasingha, P., Pitawala, A. and Dharmagunawardhana. 2013. Fate of urea fertilizers in sandy aquifers of Kalpitiya; a laboratory simulation. *Journal of National Science Foundation, Sri Lanka*. 41(2); 121-129

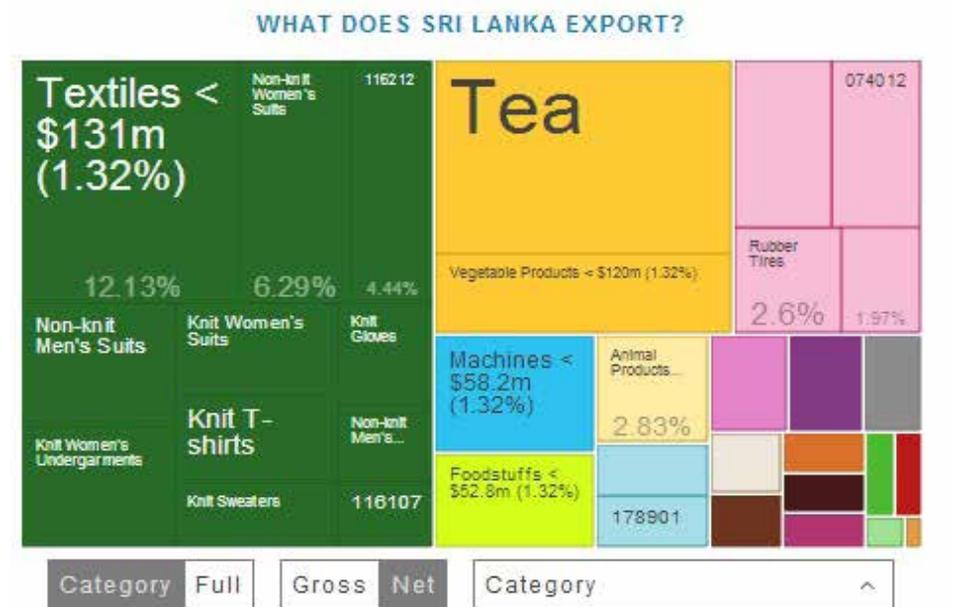
Heading towards wonder of Asia: Right time for Sri Lanka to bring in hi-tech process and product innovations to its traditional exports - Chandana Hewawasam (Project Scientist @ COSTI)

According to Sri Lanka's current complexity map (<http://atlas.media.mit.edu/profile/country/lka/>), almost 99 % of its products are simple products which can be copied by other competitors easily. Therefore, Sri Lanka is facing the problem of maintaining and retaining high economic growth. If the country wishes to move up and make that upward movement faster and sustainable, it has to convert its simple economy to a hi-tech based complex economy within the next couple of

decades – sooner the better! If Sri Lanka as a middle income country, can increase exports by creating conditions to allow producers to move into more (technologically) advanced processes and products based on strategic STI (science, technology and innovation) interventions, we can foster hope to achieve Country's goal of increasing its hi-tech exports from 1.5% to 10 % by 2016 as stated by Mahinda Chinthana vision for the future 2014-2016.

However, Sri Lanka is still banking heavily on primary products such as tea, garments and some minerals as raw materials (Figure 1).

At present, we have very few regular exports of hi-tech products - mainly parts and accessories of computers, Electronics, Electrical machinery, non-electrical machinery and Pharmaceuticals, which have been categorized under global hi-tech product classifications such as HS and SITC (Rathnasekera, S.2013). Further, with respect to high tech products, we cannot compete with high tech giants like South Korea or Germany because we are lagging behind in right STI prerequisites and infrastructure. Moving into 'economic complexity' is important for countries like Sri Lanka, Thailand and Malaysia. However, in this context, Malaysia and Thailand has more chances to forge ahead, due to their superior investments in R&D and human capital planning. Sri Lanka is still lagging behind because its R&D investment is still about 0.1% of GDP (Fig 2).



Sri Lankan Exports Image courtesy of Observatory of Economic Complexity
 Link: <http://atlas.media.mit.edu/profile/country/lka/>

Some changes to the prevailing mindsets are necessary. Both the private sector and the government of Sri Lanka should not be too content with the sources of profits mainly derived from trade, commerce, banking & finance, real estate, etc. According to Adam Smith, one of the world's first free-market capitalists, these are unproductive activities because they are not involved in producing value but are merely facilitating value creation (Smith A., 2005).

Further, the textile and garment industry was the starting point for many emerging nations when they had embarked on transforming their economies from agriculture-based to manufacture and services based economies. This was the pattern of economic development which one can witness in the case of

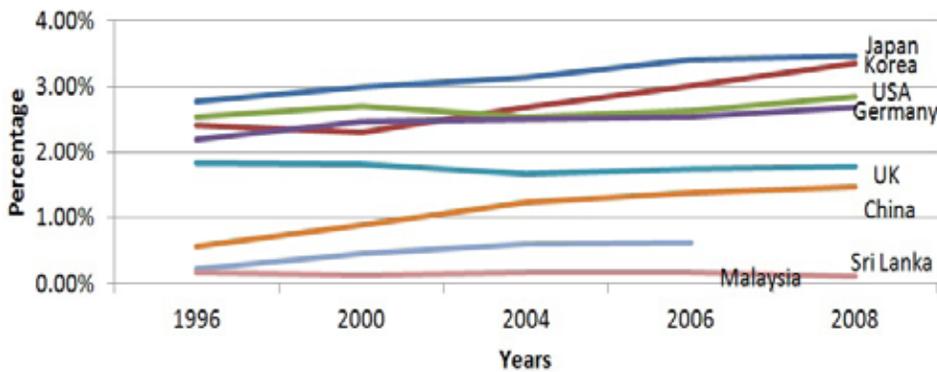
– tea, rubber and coconut – bringing nearly a three fourth of its total export earnings. When the unemployment rate was running at around 24 percent in the 1970's (Perera,B., 2001), it was the textile and the garment sector that came to the country's rescue by providing productive employment to a large number of job seekers in the country. Hence, the contribution of this sector to Sri Lanka's economy in the past should not be underestimated.

However, will such traditional industries continue to serve Sri Lanka in the same way in the future as well? A simple answer for that question has been given by Mr W.A Wijewardena, the Former Deputy Governor, Central Bank of Sri Lanka. As he pretty well pointed out in one of his paper article in the DailyFT in 2013, the threat to traditional industries

production processes to more complex production processes "largely driven by investments in research, technical education and an improvement in the work ethic, we would be able to secure our value added export markets, reduce competition from our current competitors, avoid the middle income trap and sustain growth and prosperity (Flaen et al, 2013). Further, there are prospects for the country to export high value "knowledge based" services also. For a sufficient expansion of such exports it is vital that the country's education should be improved qualitatively, especially in science, technology and information technology. The development of the knowledge base through appropriate educational reforms is a vital precondition to enhance such exports.

Coordinating Secretariat for Science, Technology and Innovation has already initiated a constructive dialogue and has made a collaboration platform for working together with EDB, Custom, DCS, IDB and other relevant stakeholders/Key players of the export sector in Sri Lanka. Our attempt is to develop a country specific definition for "Hi-tech exports and development of KPIs for measuring Hi-tech exports from Sri Lanka. This joint project will support Policy makers in increasing hi-tech exports from 1.5% to 10% by 2016 as mentioned in "Unstoppable Sri Lanka 2020".

Fig 2 Research and development expenditure (% of GDP)



South Korea, Hong Kong, Taiwan and Singapore in early 1960s and 1970s (Radelets S., et al, 1997).

However, the nature of the labor-intensive industry is such that its productivity improvement does not generate a sufficient output growth on a continuous and sustainable basis without the support of significant improvement in technology to elevate an economy to a high income level. Hence, a country has to adopt a strategy to drop the labor-intensive products and go for products that will generate a bigger output with lesser number of workers. At the same time country should encourage more Hi-tech product innovations for our traditional exports like tea, rubber, gems, graphite to increase the % contribution of manufactured Hi-tech exports from 1% to 10% as government planned to achieve by 2016.

During the last three decades, the textile and garment industry did serve Sri Lanka well. Before 1977, Sri Lanka did not have any export oriented production of clothing (readymade garments) and its exports were mainly composed of the main commercial agricultural products

may come from a totally unexpected source, namely, the advancements in disruptive technology. An example is 'doing away with the sewing machine and using the 3D printer' for stitching home-made dresses.

While increased value addition in exports is valuable, there are limitations and constraints to achieve this in Sri Lanka, A clear instance is that of tyre manufactures for which the import content is considered to be small as natural rubber is produced in the country. Yet even in such a commodity the import content is high as canvas, steel wire, chemicals and other inputs and machinery have to be imported. Garments exports also have high import content as the textiles and fabric and several other inputs such as thread have to be imported. While it is advantageous to export commodities with a high value addition, the prevailing limitations need to be recognized (The Sunday Times. Nov.11, 2012).

Even where the value addition is low if large markets are captured then the aggregate impact could be substantial. Such changes in the pattern of exports by moving away from simple

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STI (Science, Technology and Innovation) Contributions to Lanka; winning or losing opportunities

Most people think that it is a waste of money to invest on science and technology. They argue that science and technology had hardly contributed to the welfare of the country. Answer is sought as to whether the maximum potential of research and development had been achieved or else neglected. A study of the activities henceforth listed, can give an insight as to the value of STI and an identification of the most appropriate approach to achieve the best possible results.

1. STI contributions to Sri Lanka's economy

Research carried out relating to nation's staple food, rice (*Oryza sativa*), has achieved immense success due to STI activities. For example, during the last sixty years, sixty new varieties and fifteen hybrid varieties have been released by the relevant research organizations. Those varieties have contributed up to 70% of the country's rice harvest. Recently, they introduced some rice varieties able to produce higher yields of short duration and also to withstand inclement weather.

As far as the mineral industry of Sri Lanka is concerned, research carried out by Prof. Lal Fernando (University of Moratuwa) is instrumental in obtaining the maximum benefit out of mineral resources. It is to be noted that Froth Flotation plant developed by Prof. Lal Fernando has reorganized the graphite industry. It is presently installed at Bogala Graphite mine and is capable of upgrading graphite from low-grade to high-grade. As such, it was possible to achieve a considerable increase in export earning compared to that of unrefined material.

Research carried out by various sectors of the Department of Agriculture was instrumental in developing high yielding export crops, fruits and vegetables. At the same time, the Department of Animal Production and Health too promoted and breed animal varieties that are ideally suited to the country. Thus, the relevant STI activities have contributed immensely for the benefit of the country.

In the field of engineering too STI activities had contributed immensely. Research carried out by Dr. A. N. S. Kulasinghe, the world renowned engineer paved path to introduce the pre stressed concrete technology to Sri Lanka in 1949. Many years after the invention Dr. Kulasinghe successful in

obtaining the patent for his pre stressed concrete technology in 1956. This technology is now used throughout the world.

2. Lost opportunities

In 1955, Mr. Ray Wijewardhane invented a two wheel tractor to facilitate small scale farming in Sri Lanka. Sadly, the country has lost the opportunity to harness the maximum potential of this invention because a manufacturer based in the United Kingdom called 'Landmaster' acquired the technology from him for a smaller fee and in addition granting him a fellowship to study at Harvard University. This UK branded tractor captured the market, depriving Sri Lanka the opportunity to market its own invention. This is a classic example of local inventions losing their credibility to some outsider, thereby, hindering mass production and depriving the country of its apt economic benefit.

Sri Lanka is a country well versed in indigenous medicine. This traditional medicine has advanced quite a lot through research and development. Sometimes the country was subjected to a fair amount of losses due to negligence. One such incident is Sri Lanka's indigenous plant variety called 'Kotala Himbutu' being patented in Japan (Fuji Films Company - April 1,



The first landmaster in the world invented by Mr. Ray Wijewardene: A great opportunity lost
Image courtesy of: <http://www.raywijewardene.net/innovation.html>

2010). This type of incident is quite common with Sri Lanka's indigenous medicinal herbs. As such, this is an area where lost opportunities are prevalent even today.

COSTI's Initiation

We have set up a dedicated section in our official website for creating a database of local STI contributions and Lost opportunities. This will allow anybody who is interested in S, T and I to share their experiences. Visit our web

via <http://www.costi.gov.lk/index.php/en/lostopportunities> and contribute so we can learn through development and be better prepared next time to grab the best opportunities to drive our country towards prosperity.

-Team COSTI

Please note that the ideas and opinions expressed in the members corner are solely the authors personal views and not the COSTI institutional View.



Food for Brain

"Science must be open, accessible, and free – for its own fate, and for ours."

- Neil deGrasse Tyson
American astrophysicist, author, and science communicator

We need your feedback!
We welcome your ideas!

The Innovation Eye is published quarterly. We love to hear your ideas and suggestions on ways to improve our communication with you, write to us:

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The Coordinating Secretariat for Science, Technology and Innovation (COSTI) was established on February 1, 2013 as mandated by the cabinet decision of September 9, 2011 with the specific aim of coordination and monitoring of Science, Technology and Innovation activities in the country. It will also work towards promoting value addition and commercialisation in line with the National Science Technology and Innovation (STI) Strategy of Sri Lanka approved by the Cabinet in August 2010.

Like to know about COSTI's road map? Read the "Science, Technology and Innovation strategy for Sri Lanka: National Coordination and Monitoring Framework"

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