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Technopark Planning:

Investing in Nanotechnology in Sri Lanka

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1. INTRODUCTION

The Sri Lanka Institute of Nanotechnology (SLINTEC) was established in 2008 as a public-private partnership between the Government of Sri Lanka and five leading Private sector companies. Since its incorporation, SLINTEC has been able to achieve rapid results in both its directives of realizing success in Nanotechnology research and initiating the development of a Nanotechnology Park.

A team from UNESCO visited Sri Lanka in November 2010 to carry out an assessment of our aspirations and conduct workshops on the development of Science & Technology Parks. The UNESCO team produced a comprehensive report on a Concept Plan for the Development of a Nanotechnology Park in Sri Lanka. Many aspects of that report influenced our thinking and were adopted in the Strategic Plan for SLINTEC.

The Nanotechnology Park will adopt an Open Innovation framework based around a Nanotechnology Centre of Excellence (NCE). It aims to attract Multinational Companies (MNCs) as well as Small and Medium Enterprises (SMEs) to the Park, and take advantage of the research, development and innovation that is bound to flourish in an enterprising ecosystem. This paper describes the journey we have traveled so far, the framework we have adopted, the park we are developing and the advantages of investing in Nanotechnology in Sri Lanka.

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2. HISTORY

In 2006, Sri Lanka embarked on a new journey in science and technology development when the National Nanotechnology Initiative (NNI) was approved by the Cabinet of Ministers. The Government of Sri Lanka, through the Ministry of Technology and Research and the National Science Foundation (NSF), joined hands with the private sector to form a Public-Private-Partnership (PPP) to realize the vision of the NNI. The private sector partners are:

- 扶Brandix – One of the largest apparel manufacturers and exporters in Sri Lanka.
- 扶Dialog Axiata - The largest mobile telecommunications provider in Sri Lanka.
- 扶Hayleys – A multinational conglomerate with diverse business groups and ventures.
- 扶Loadstar – A joint venture between Camoplast of Canada and Solideal of Belgium.
- 扶MAS – One of the largest intimate apparel and sportswear manufacturers for leading global brands.

To fulfill the objectives of the NNI, two companies were incorporated in 2008, namely: the Sri Lanka Institute of Nanotechnology (SLINTEC) and Nanco. They were tasked to conduct research on Nanotechnology to make products and industries more competitive, add value to Sri Lanka's mineral resources and develop a Nanotechnology Park.

Research at SLINTEC commenced in August 2009, after the purchase of state-of-the art equipment for Nanotechnology research and the recruitment of top class scientists from Sri Lankan universities and institutes. Within 10 months of initiating research, the team successfully filed five international patents at the United States Patent and Trademark Office (USPTO). This was a great accomplishment for a small team of dedicated scientists and professors.

Nanco continued to explore the feasibility of establishing

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and developing a Nanotechnology Parke in the 50 acre land allocated by the Government in a suburb of Colombo named Homagama. Feasibility studies were done by a leading consultancy firm at the inception. But the most effective and useful support came from the UNESCO team that visited Sri Lanka in November 2010. The team comprised experts from the World Technopolis Association (WTA), University of Surrey and UNESCO. They conducted workshops on the development of Science and Technology Parks and understood our vision and our needs. The UNESCO team produced a comprehensive report on a Concept Plan for the Development of a Nanotechnology Park in Sri Lanka, which boosted our confidence and helped us formulate a sound Strategic Plan.

SLINTEC and Nanco were merged in March 2011 to strengthen efforts in fulfilling the objectives of the NNI. The amalgamated company SLINTEC continued its success in research by filing for two more patents in 2011, advancing many projects from research into development and commencing the design and planning of the Nanotechnology Park.

3. OPEN INNOVATION

Open innovation creates opportunities for all businesses to develop new products and solutions through a collaborative innovation process by taking them from research through development toward commercialization. Technology parks provide this enabling environment for building innovation systems and clusters. SLINTEC aims to provide this environment by developing an open innovation platform.

The SLINTEC innovation platform will have the following five components in our Nanotechnology Park:

1. Research & business development
2. Technology & business incubation
3. Capacity building through innovation
4. Technology commercialization centre
5. Funding mechanisms for business development

3.1 Focus Areas

In order for SLINTEC to continue to be successful, we must focus on areas that SLINTEC can be most effective and Sri Lanka could have a competitive advantage. Hence we have chosen the five focus areas illustrated in fig. 1.

In Smart Agriculture, we have chosen to focus on Nanotechnology based slow release fertilizer. We have plans to expand into sensors, next generation fertilizers and other advanced technologies in the area of Smart Agriculture.

In Rubber Nano-composites, our focus has thus far been on high-performance tires primarily for solid rubber tires with plans to advance into pneumatic tires.

Fig. 1.

In Apparel and Textile, we focus on high-end fabric, smart yarn and other technologies to boost Sri Lanka's robust apparel industry to the next level in global competition.

We have developed a Nanotechnology based external medical sensor with a view to enabling remote health monitoring under the Consumer Products area. In addition, we conduct research on detergents, cosmetics and other consumer products.

In the Nanomaterials area our efforts continue to be to add value to Sri Lanka's natural resources such as Ilmenite, Clay, Magnetite, Vein Quartz and Vein Graphite. We are developing processes to make Titanium Dioxide, Montmorillonite, Nano Magnetite, Nano Silica and Graphite Nano Platelets.

4. CONCEPTUAL FRAMEWORK

In developing our strategy for the Nanotechnology Park, we conceptualized a five-fold framework as illustrated in Fig. 01 and listed below:

1. Centre of Research & Innovation (R&I)
2. Cells of Incubation
3. Corporate Research & Business Development (R&BD)
4. Centralized Services
5. Community

The framework is a series of concentric circles developed around a Centre of Research & Innovation. This also draws parallels to a Hub and Spoke Model where the hub is the Centre of R&I and the spokes being the Cells of Incubation, Corporate R&BD, Centralized Services and the Community.

The Centre of R&I is the Nanotechnology Centre of Excellence (NCE) that will be developed in the first phase of the Nanotechnology Park. Its primary responsibility is to conduct research on Nanotechnology and facilitate Open Innovation. It will also be responsible for the management

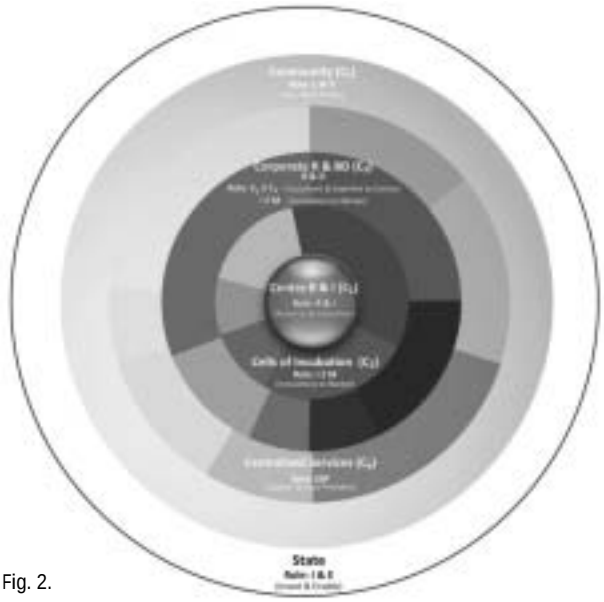

Fig. 2.

and promotion of the Park.

Cells of Incubation are intended to take innovations, from research conducted in the Centre, to the marketplace through development and commercialization. Startups that form as a result of research and innovations can begin in the Cells of Incubation taking their journey from pre-incubation through post-incubation to fully fledged companies. This is the facility enabling entrepreneurs to prosper.

Corporate Research & Business Development (R&BD) is meant for Private as well as Public enterprises. It is the aspect of the Park aimed at attracting Multinational Companies (MNCs) as well as Small and Medium Enterprises (SMEs) to establish facilities in the park and take advantage of the research, development and open innovation.

MNCs as well as SMEs will be provided attractive terms and conditions to invest in setting up their research and development facilities in the Park. They will also be able to invest in Nanotechnology research to make their products more competitive or to develop new products. Corporate R&BD will take innovations to market through commercialization of research. They will also provide market intelligence and product expertise to the Centre of R&I. This will be the bi-directional interaction between these two entities.

Centralized Services are those of accounting, marketing, legal, procurement, etc. that the Park would provide to the corporations, enterprises and startups in the park. This is a key enabling factor in the Park ecosystem. The Park would attract and establish satellite offices - for example, a legal and account firm to provide support services to the Nanotechnology Centre of Excellence and other tenants of the Park.

The Community will live in a united environment, work in a multidisciplinary setting, socialize and share knowledge. SLINTEC will provide housing and recreation for the Community and an education facility related to the Nanotechnology Centre of Excellence (NCE). The Community will also network with other institutions, universities, companies, etc. worldwide and collaborate on research, development and commercialization.

Encompassing this framework is the Government of Sri Lanka, which will invest in infrastructure and resources, and enable the creation of a Nanotechnology Park though appropriate policies, laws and incentives.

5. MASTER PLAN

The Master Plan of the Nanotechnology Park is illustrated in fig. 3.

The Nanotechnology Centre of Excellence (2) will occupy about ten percent of the land, leaving most of the land for Tenant Development Areas (9) dedicated for Corporate Research & Business Development (R&BD) facilities, Startups, Pilot Plants, etc.

Incubation (7), Administration and Centralized Services (3) will begin at the Centre of Excellence and move out into dedicated buildings and spaces with the expansion of the Park. We have dedicated an area in the Master Plan for Advance Agriculture Research and Green Houses to reinforce our focus on Smart Agriculture.

6. PHASED DEVELOPMENT

The Nanotechnology Park will be developed in a phased approach as shown in fig. 4. through pragmatic investments by the Government as well as private investors and companies keen on establishing themselves in the park. A phased approach in developing a Nanotechnology Park is a rational way of planning for the future and expanding the scope based on market demand and research success. SLINTEC is currently focused on developing Phase 1 which will be the Nanotechnology Centreof Excellence (NCE). Phase 1 will contain the following elements:

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Fig. 3.

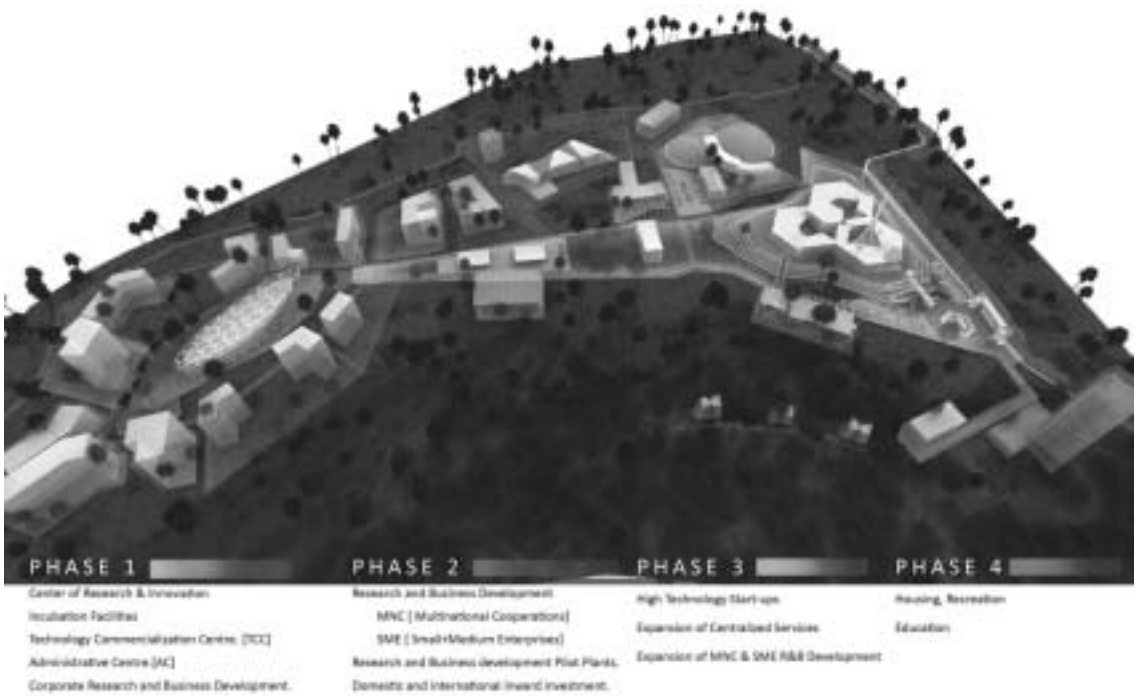

Fig. 4.

1. Centre of Research & Innovation (R&I)
2. Incubation for taking Research into Commercialization
3. Corporate Research & Business Development (R&BD)
4. Technology Commercialization Centre (TCC)
5. Administrative Centre & essential Centralized Services

6.1 Phase 1

The first phase is envisaged to be a state-of the art building for the Nanotechnology Centre of Excellence (NCE) that will accommodate the following in a sub-phase development approach.

Phase 1a

1. Centre of R&I
2. Cells of Incubation - Pre & Full incubation for start-ups

Phase 1b

3. Corporate R&BD - Private & Public
4. Nanotechnology focused departments of other Research Institutes
5. Technology Commercialization Centre (TCC)
6. Administrative Centre (AC) and essential Centralized Services

Phase 1c

7. Library
8. Auditorium
9. Accommodation

While SLINTEC develops Phase 1, we will be promoting and attracting investment in the Tenant Development Areas to MNCs and SMEs to establish their research and development facilities, pilot plants, etc. in the Park.

6.2 Phase 2

The second phase will focus on expansion of *Large-scale Corporate Research & Business Development* for both the Private and the Public Sectors. We hope to draw Foreign Direct Investment (FDI) from MNCs as well as SMEs through attractive incentives, terms and conditions.

6.3 Phase 3

The third phase will focus on expansion of *High Technology Industries* and expansion of *Centralized Services.*

6.4 Phase 4

The fourth phase will provide *Housing and Recreation for the Community and an Education Facility related to the Nanotechnology Centre of Excellence (NCE).* The plan is to integrate with the surrounding area and connect with the larger Knowledge Hub master plan for Homagama.

7. INVESTMENT ADVANTAGE

Sri Lanka is enjoying a "Peace Dividend" after the civil war that lasted more than 25 years, which ended in 2009. It has since had an annual GDP growth rate of more than 8 per cent, with a current (2010) per capita GDP of approximately USD 2,400. The Government has maintained an undivided focus on growth and development and has great ambitions of making Sri Lanka a dynamic global hub in Aviation, Energy, Knowledge, Logistics and Commerce. The Knowledge Hub initiative is focused on attracting investments in higher education with a view to making Sri Lanka a regional hub for learning and innovation.

Sri Lanka is benefiting from political stability and rapid infrastructure development such as new highways, sea ports, airports and power plants. The Government is increasing its emphasis on education. Sri Lanka has achieved near universal literacy (91%); English is spoken and understood widely. These factors make Sri Lanka very attractive to any foreign investor or company seeking a highly educated, qualified and talented workforce. For many companies and institutes based in North America or Europe, the cost arbitrage of doing research and development work in Sri Lanka is a significant advantage.

The Nanotechnology Park, as illustrated in the Master Plan (fig. 3.), will be subdivided into zones for tenants to invest and develop their research centres, incubation facilities, pilot plants, etc. in an enabling and supportive environment of a Science and Technology Park. These tenants, whether they be MNCs or SMEs will be provided attractive incentives to set up their facilities in the Park. These along with the environment of Open Innovation and the access to the Nanotechnology Center of Excellence will give any company or institute a considerable advantage.

The Government of Sri Lanka is visionary and innovation friendly. It is focused on rapid development through advanced technology. In its Budget for 2012, the Government has made noteworthy provisions and financial incentives in the furtherance of research and development (R&D) in Sri Lanka. These include a significant reduction in corporate tax on profits derived from R&D related income, a reduction in personal income tax for individuals engaged in research and technology, and a triple deduction to companies that under-

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take R&D through research institutes.

The Board of Investment (BOI) in Sri Lanka offers many incentives and tax holidays to companies, both local and foreign, that invest in all aspects of economic development. As such, the BOI will play a major role in the development of the Nanotechnology Park in Homagama, Sri Lanka. We intend to work with the BOI to obtain the maximum tax holiday for all corporations that invest in the Nanotechnology Park. We also plan to secure from the Government other incentives such as tax free import of material & equipment for research, development & commercialization of Nanotechnology.

Our aim is to provide the maximum tax benefits for individuals, specialists and experts working in Nanotechnology research and the maximum incentives for companies to invest in the Nanotechnology Park and in Nanotechnology R&D in Sri Lanka.

8. CONCLUSION

The Government of Sri Lanka together with the Private Sector has taken a leap of faith in Nanotechnology. This faith and vision have produced positive results in the formation of SLINTEC and its noteworthy accomplishments in a short period of time.

Guided by a Board of Directors comprising some of the highest ranking officials in technology and research from the public sector and some the most influential CEOs from the private sector, SLINTEC is now poised to advance to its next stage by developing a world-class Nanotechnology Park in Sri Lanka. A technology park ensures maximum sharing of both human and physical resources for multidisciplinary R&D. A technology park is the most effective means to bring research, industries, entrepreneurs and academia together to achieve a collective greatness.

Sri Lanka has flourishing industries in apparel and textile, rubber, tea, activated carbon and rich mineral resources ready to move into higher value categories. Sri Lanka has prominent universities in science and technology ready to provide a steady stream of highly-skilled talent. The Government has invested in supporting research, provided land for a Nanotechnology Park and continues to create an enabling environment for local as well as foreign companies and institutes. Now is the time for all to take advantage of this prospect by investing in Nanotechnology in Sri Lanka.

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