



Biotechnology Advanced Sector Foresight Project:

Best Bet Investment Opportunity Cases

Laura Superville
& Ian Ivey

NEXT

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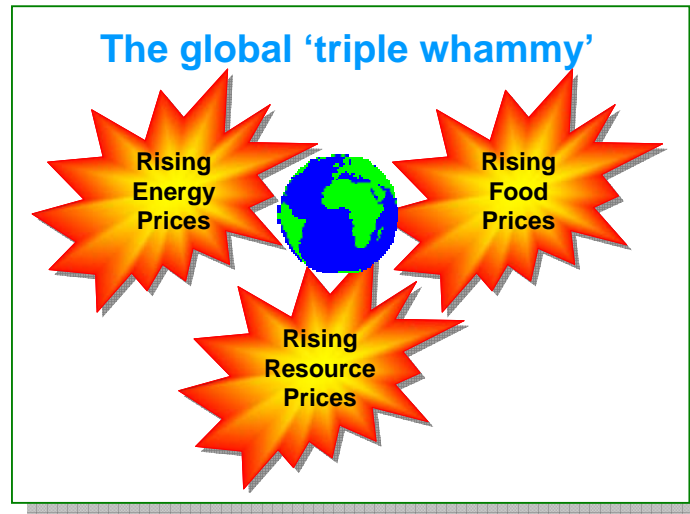
Ian Ivey and Laura Superville

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2 Introduction

The world is suffering from a 'triple whammy' effect that will drive many changes if the human race is to have a long-term sustainable future. The three big drivers behind this 'triple whammy' effect are shown in Figure 1.

Figure 1: The main drivers behind the global 'triple whammy'



In addition to these three drivers, increasing and aging populations, escalating health care costs, and a realisation that the global supply of natural resources is struggling to keep up with rapidly growing demands, are combining to open up a range of opportunity windows to develop smart new businesses in the biotechnology sector.

As part of Trinidad and Tobago's drive to become a fully developed nation by the year 2020, it is vital that new globally competitive businesses evolve in the country to not only compensate for the inevitable decline in the country's oil and gas resources but also to provide higher quality and more stimulating future knowledge-based employment opportunities for the increasing numbers of students graduating from universities both at home and offshore.

At a workshop held in October 2007, nine best bet opportunity areas were identified that could provide the basis for developing such new businesses in the biotechnology sector. At the end of the workshop the participants were asked to vote for which best bets they thought offered the greatest practical potential for T&T. The outcome of that voting process is shown in Table 1.

Table 1: Rankings of the 9 'best bets' from the October 3rd workshop

Rank	'Best Bet'	No. Votes
1	SuperCane Inc.	11
2	Customised Bio-Indicators Inc.	10
3	Value Miners Inc. (Factor X based solutions)	9
4	Fever Grass Natural Solutions	8
5	Converting Waste to Value	8
6	Turning Tyres and Metal Into Infrastructure	7
7	Age Defiance – a Holistic Offer	6
8	Waste to Energy	5
9	Novel Proteins From Bugs	5

The basis for the selection of the three best bets highlighted in blue to develop into more comprehensive business investment opportunity cases can be justified in terms of global market potential, the availability of resources, the capability and enablers status, and their appropriateness for a small country like T&T as shown in Table 2.

Table 2: Best bet selection criteria

Rank	'Best Bet'	Market Potential	Resource Availability	Capability & Enablers	Appropriate
1	SuperCane Inc	✓✓✓	✓✓✓	✓✓	✓✓✓
2	Customised Bio-Indicators Inc.	✓✓✓	✓✓✓	✓✓	✓✓✓
3	Value Miners Inc.	✓✓✓	✓✓✓	✓✓	✓✓✓

- ✓✓✓ High rating
- ✓✓ Good rating
- ✓ Low rating

The three Advanced Biotechnology Best Bet Business Investment Opportunity Cases described in this report have been developed after consultation with specialist sector persons in T&T as well as through additional desktop research work.

3 Biotechnology Best Bets

3.1 Best Bet 1 Title: 'SuperCane Inc.'

3.1.1 The Investment Opportunity

- There are many emerging rapid growth opportunities that offer significant increases in value and which are associated with large-scale natural resource crops such as sugarcane.
- Currently the potential value adding associated with this crop has been minimal internationally and there is also a poor efficiency of utilisation of the raw material.
- There are many opportunity areas identified that are associated with every component of the sugarcane plant that could be developed into new and innovative businesses.
- This best bet investment opportunity is to initiate a business which develops both the technology and processes required to extract the value associated with a selected range of derivatives from sugarcane and facilitate commercialisation.
- This business would be built upon using knowledge assets that already exist in T&T, the region, and through international networks.
- It may be that the business itself is based on a model not too dissimilar to the innovative collaborative models used by Innocentive ⁽¹⁾ or Goldcorp ⁽²⁾.
- The priority will be to focus on developing 'low hanging fruit' opportunity areas in the short-term in order to develop revenue streams.
- A proportion of time and resources will also be allocated towards developing medium to longer term (5 years plus) opportunity areas.
- The creation of innovative IP and its licensing will be a key part of this new business.

3.1.2 Rationale

- Sugarcane is the fastest biomass accumulating crop in the world.
- However, only 17 – 20% of the total biomass bulk is used as the raw material to produce sugar and the balance of 80 – 83% ends up as waste with little value.
- One of the fastest growth areas worldwide is deriving value from such waste streams and, in some instances, the potential value adding that can be leveraged can be substantial ⁽³⁾.
- There is considerable potential to leverage far more value from sugarcane than has traditionally been the case.
- The rapidly rising prices of fossil fuels are driving a switch in focus to renewable resource sources for a range of industrial applications including biofuels, bioenergy production from biomass, bioplastics, natural components in composite materials used for construction, natural batteries, and timber substitutes ⁽⁴⁾.
- There are also potential health and wellness applications for biochemical components derived from sugarcane.
- In addition there are potential application areas for converting the waste stream known as bagasse into a natural soil conditioning agent and animal feed.

¹ <http://www.innocentive.com>

² <http://www.fastcompany.com/magazine/59/mcewen.html>

³ Making 'money out of muck' http://www.tffi.net/article_view/101

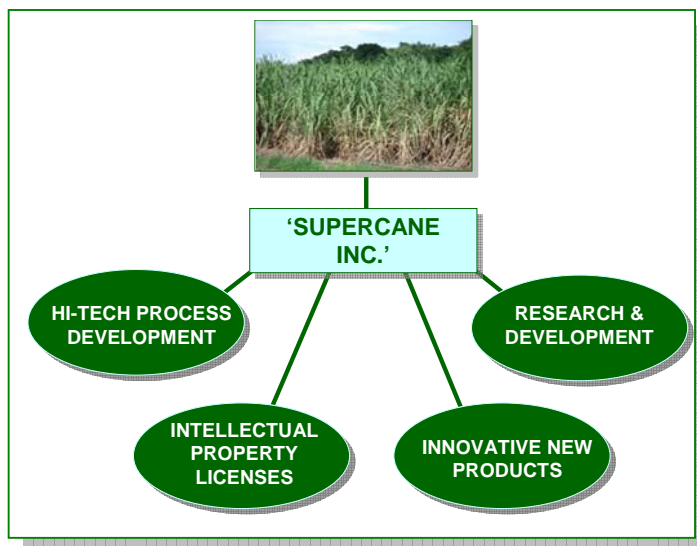
⁴ <http://www.nytimes.com/2008/06/08/business/08oil.html?scp=1&sq=june+08+2008&st=nyt#>

- Agro-tourism is another area that can be developed to extract greater value from the sugarcane growing sector and initial moves in this direction are being made in Barbados and The Bahamas.

3.1.3 Customer Offer

- A technology development company that develops new and innovative practical solutions for extracting greater value from all the components of sugarcane and which also, in specialised cases, creates intellectual property (IP) that can be licensed and which generates revenue from licensing fees and royalty payments.
- These practical solutions will largely focus on commercialising a great deal of the research work that has already been done in international, regional, and national institutions by using smart groups of persons connected through collaborative models to develop the most effective and highest value generating solutions.
- Such solutions can be produced by 'SuperCane Inc.' on a contractual basis (with or without an IP creation component), as a joint venture with a commercial entity seeking to develop new lines of business, or on a stand-alone basis. In the latter case the licensing rights for any IP-based solutions developed would be put up for international tender to the highest bidder.

Figure 2: An overview of the 'SuperCane Inc.' customer offer (5)



3.1.4 Foresight Context

- The rapidly accelerating trend to shift towards using natural renewable resources in areas that have traditionally used finite resources such as fossil fuels.
- The trend towards natural health and wellness solutions.
- The trend towards using virtual collaborative models to develop and deliver innovative customer solutions.
- The trend towards extracting significant value (sometimes at high levels) from waste streams that have historically been considered as having little or no value.
- The trend towards directing development assistance into research and development activities that develop non-traditional uses for commodity crops to assist in the transition away from traditional market access for basic commodities that are no longer wanted such as sugar e.g. through EU agencies and the IDB.

⁵ NEXT Archives

3.1.5 Target Markets

- Established business groups which may have a strong interest in sustainable natural resource derived products and solutions because their current business models may be in jeopardy due to the rapid rise in costs for traditional non-renewable commodities.
- Innovative new 'green' companies that are investing in sustainable products and services in the energy, health and wellness, building and industrial components, and electronics sectors.
- Angel and venture capital investment groups, such as those in California associated with the ICT sector, that are moving rapidly into areas strongly related to this best bet.
- Other angel and venture capital investment groups that have a strong interest in backing knowledge based new businesses.
- Major sugar producing countries such as Guyana, Jamaica, India, Brazil, Barbados and others to offer them value adding opportunities

3.1.6 What We Have

- A soaring demand for natural resources, changing value propositions, and a growing urgency to develop more sustainable solutions.
- A major commodity crop with a wide range of potential higher value added applications and derivatives which are poorly exploited to date.
- A huge waste stream that has considerable value adding potential in numerous areas.
- The oldest cane breeding programme in the world.
- A regional sugarcane breeding station in Barbados.
- A gene pool that includes a wide range of characteristics that can be used to produce optimised added value derivative mixes. Most of Trinidad's varieties come from lines developed out of the gene pool situated in Barbados.
- An ideal climate for growing sugarcane.
- Considerable expertise that has been developed over centuries in the region.
- Greater levels of privatisation in the sector which is leading to a desire to be more innovative.
- Moves to use innovative packaging and branding in Barbados to extract greater value for derived products.
- Expertise at the Sugarcane Feeds Centre in T&T with regard to the use of sugarcane for feeding small and large ruminants.
- A national regulatory framework to support the protection of IP.
- Some smaller farmers are engaging in value-adding opportunities such as selling fresh sugarcane juice, syrups and candies.
- A growing global interest in nutraceuticals and natural health and wellness products that has a quite different associated value paradigm from the consumer perspective (e.g.^{6 7}).
- A desire to explore new opportunities for sugar e.g. the Sugarcane Feeds Centre.
- Expertise in the growing, technical and research areas. However, this has diminished somewhat since the closure of Caroni 1974 Ltd. and the location of such expertise is not well known. There were 15,000 cane farmers and 10,000 sugar sector employees in T&T prior to the closure of Caroni.

⁶ http://www.tffi.net/article_view/77

⁷ http://www.tffi.net/article_view/107

- M Phil and PhD postgraduate students who can undertake specific research projects related to themes that provide potential opportunity areas for 'SuperCane Inc.'
- A degree of collaboration already exists in the private sector with groups such as Angostura and Hennessey and this could be leveraged.
- Specially targeted funding for developing new business streams based on sugarcane from the EU, Inter-America Development Bank (IADB), and possibly also from the Caribbean Development Bank (CDB).
- Angel and venture capital investors, particularly in the USA, who are investing in and developing 'green energy' and sustainable resource based businesses around the world.
- The St. Madeleine Sugar Factory still exists but it would need upgrading and the installation of leading edge technology to support this best bet.
- Production of bio-plastics from sugar is expected to become a significant growth area ⁽⁸⁾.
- Ethanol production from sugarcane is already a major growth area in a number of countries.
- Bagasse is already being used in Brazil for electricity generation.
- A Brazilian company is also producing a product called the ECO FIRE IGNITER which is made 100% from sugarcane biomass ⁽⁹⁾.
- There are a number of value added derivatives that have already been developed from sugarcane e.g. Lesstanol ⁽¹⁰⁾, Policosanol for cholesterol reduction ⁽¹¹⁾, and Octacosanol ⁽¹²⁾.
- There are a number of even more radical technologies being developed around sugar e.g. Sony's sugar battery ⁽¹³⁾.

3.1.7 What We Need

From the R & D Sector

- The re-establishment of a sugar research programme in T&T.
- Application for plant variety right protection for any unique new cultivars of sugar developed in T&T and the region.
- Linkages with centres involved in sugar research not only within the region but also in Cuba, India and Brazil i.e. improved research institution collaboration locally, regionally and internationally.
- Vertical integration of research and development.
- A need to form public private partnerships for mutual benefit, in particular with highly entrepreneurial individuals and/or groups.
- The development of innovative new technologies.
- A focus on optimising production methods and planning as well as the development of multi-purpose strains of sugarcane.
- There is a need to search for current IP rights that exist with regard to sugarcane and associated process technologies and value derivation.

⁸ http://news.dow.com/dow_news/prodpub/2007/20070719a.htm

⁹ http://www.importers.com/agri-equipment-supplies/agri-processing-products/Exporter/Spheres_LLC_Corporation/ID.182346.TP.349944/Eco-Fire_Igniter.html

¹⁰ http://www.garudaint.com/product.php?id=2&prod_code=OCTA-60&rb=policosanol

¹¹ http://findarticles.com/p/articles/mi_hb223/is_200703/ai_n18907765

¹² http://www.pharmj.com/Editorial/20000729/articles/nutraceuticals3_octacosanol.html

¹³ <http://www.inhabitat.com/2007/09/04/sony-bio-battery-runs-entirely-on-sugar/>

- There is also a need to ensure that the approach taken with regard to areas that may have the potential for securing IP rights are clearly defined to avoid any premature disclosure that might jeopardise the securing of such rights.
- There is a need for more expertise in the new and innovative product development area.
- There is a need to become more proactive in accessing research funding from international agencies such as the EU Sustainable Project Group – which has a particular focus on the sugar sector.

From the Private Sector

- Investment from venture capitalists and angel investors.
- A need to form public private partnerships for mutual benefit.
- A stronger focus on branding and marketing – including organic.
- The identification and exploitation of new market opportunities in offshore markets.
- A much stronger focus on value added products such as nutraceuticals.
- Developing a brand and logo for the new business.
- Investment in modern processing and storage facilities.
- Greater mechanisation and more modern production and processing technologies.
- An integrated national sugar purchasing and marketing group that can leverage the best value for all parties.
- The formation of alliances with key offshore stakeholders as and when required.
- Developing a viable commercial proposition in conjunction with both the R&D and Public Sectors that would attract investment and promise an attractive rate of return on invested capital.
- There is a need to develop much higher quality employment opportunities for the increasing numbers of tertiary trained graduates in T&T.

From the Public Sector

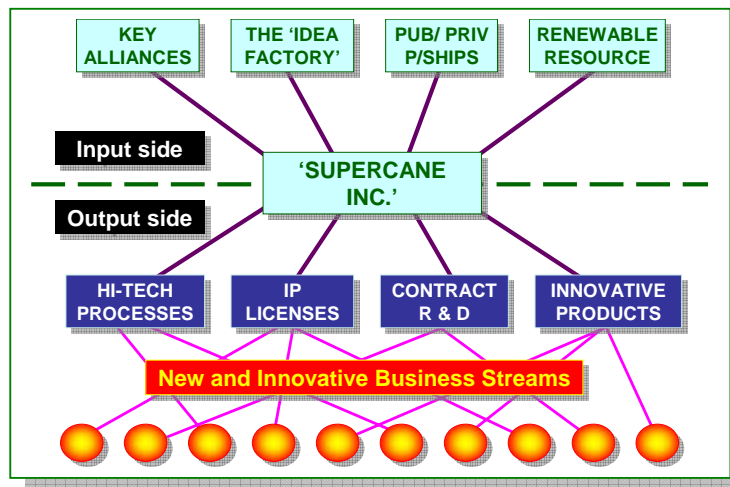
- Recognition that there is a need to aggregate land titles into larger areas to facilitate large-scale high-tech production of the base materials if a best bet like this is to lead to a local value adding industry component.
- Reinstatement of sugar research activities – but within a highly defined value adding focus and linked into an overall regional research strategy and approach.
- An organic certification scheme that is internationally recognised.
- An upgrade of educational programmes that would support the skills sets needed for this best bet. Currently the offer is very limited both at the university level and through the Eastern Caribbean Institute for Agriculture and Forestry (ECIAF).
- More interdisciplinary programmes that include collaboration between groups with interests in the Life Sciences, Chemistry, Engineering, Agriculture, etc.
- Funding for research projects that may lead to the development of IP.
- A need to form public private partnerships for mutual benefit.
- Monitoring of adherence to the international standards required under The Codex Alimentarius.
- Standards setting for the raw material supply and derived products and monitoring of those standards to ensure they meet international and specific customer country requirements.
- A new approach to funding to support research and development of new and innovative uses of sugarcane and potential derivatives.
- Financial incentives that facilitate the development of new and innovative businesses built around sugarcane.

- Integration of the CEPEP workers into the national labour pool to help address a chronic shortage of labour in T&T.
- In this regard the training of more people with skills in processing methods, optimising raw material usage, production techniques, branding and marketing, research and development, and highly efficient value chain development.
- The provision of quarantine facilities.
- The improvement of national infrastructure in areas such as access roads, research facilities, and cross border trade.
- To provide a comprehensive national growth and innovation framework that would facilitate the development of a high-technology business built around sugarcane.

3.1.8 A Possible Business Model

In order to develop a business that is capable of delivering internationally recognised and competitive solutions, the model for a business built around this best bet opportunity area may look something like that shown in Figure 3.

Figure 3: A possible business model for the ‘SuperCane Inc.’ best bet ⁽¹⁴⁾



The most important aspects of this proposed model are as follows:

- On the input side:
 - Mutually beneficial alliances would be developed with leading edge research institutions to ensure that a sharing of the latest R&D findings and technology development is facilitated. Alliances would also be formed with the appropriate commercial entities (this may include rapid growth emerging companies) to assist with commercialisation of products and services developed by ‘SugarCane Inc.’.
 - The ‘Idea Factory’ is a global virtual network of persons with an interest and expertise relevant to ‘SuperCane Inc.’ who are invited to develop answers to specific commercial challenges or a need for innovative new solutions. This may operate along a similar line to the ‘Innocentive’ model ⁽¹⁵⁾.
 - The ‘Public Private Partnership’ component includes consortia that put together public and private sector funding to pursue the development of solutions in specific opportunity areas.

¹⁴ NEXT Archives

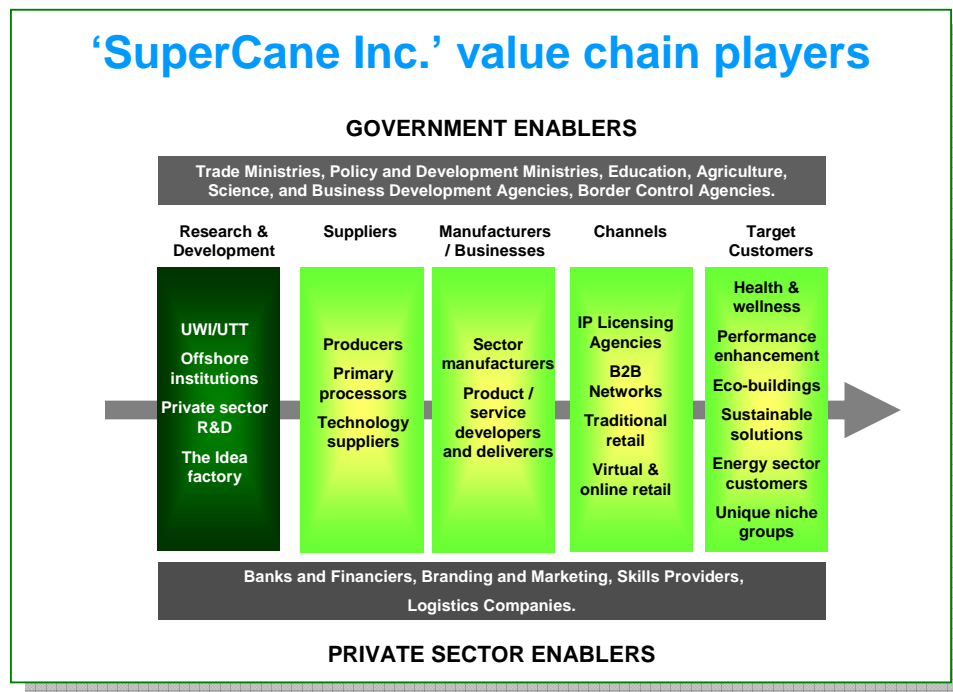
¹⁵ <http://www.innocentive.com>

- The 'Renewable Resource' component includes growers of the raw material and first stage processors (and these may not be in T&T).
- On the output side:
 - Innovative new hi-tech processes.
 - In-house developed IP that can be licensed and generate long-term revenue streams.
 - Contract R&D to develop solutions for specific client needs.
 - An innovative product development capability built around areas that generate a minimum of 400% value adding over current base values - preferably more than 1000%. It is extremely important to differentiate the 'SuperCane Inc.' business model to those evolving in places like Brazil. These tend to be strongly commodity focused – high volume / low value.
- All of the above would combine to generate new and innovative business streams within T&T, the region and internationally with T&T becoming the centre of excellence in deriving high value derivatives from sugarcane.

3.1.9 Best Bet Value Chain

The main player groups in the value chain model that would be needed to leverage the value developed by 'SuperCane Inc.' are shown in Figure 4.

Figure 4: Key stakeholders in the 'SuperCane Inc.' value chain model (16)



The challenge is to develop the right combination of value chain links to maximise the revenue generation for T&T as a country. This will require a strong virtual networking capability to underpin the global connectedness required to make 'SuperCane Inc.' a truly global entity.

¹⁶ NEXT Archives

3.1.10 Key Players

Key Local Players

In terms of organisations and agencies, the following organisations are suggested as being key players:

- The Food and Agricultural Organisation (FAO).
- Ministry of Agriculture, Land and Marine Resources (Chemistry, Food & Drug Division).
- Ministry of Trade and Industry (sector development and international trade connections).
- Caribbean Industrial Research Institute (CARIRI).
- Caribbean Agricultural Research and Development Institute (CARDI).
- The Sugarcane Feeds Centre.
- Universities such as the University of the West Indies (UWI) and the University of Trinidad and Tobago (UTT).
- Regional research institutions.

In terms of specific persons, the following have been suggested as being able to make a valuable contribution:

- Dr. Puran Brigdemooan (Centre for Biosciences Agriculture and Food Technology, University of Trinidad and Tobago, Waterloo Road, Carapichaima, Trinidad).
- Dr. Majeed Mohammed, (Senior Lecturer, Department of Food Production, Faculty of Science and Agriculture, UWI).
- Dr. Musa Mohammed, (Centre for Biosciences Agriculture and Food Technology, University of Trinidad and Tobago, Waterloo Road, Carapichaima, Trinidad).
- Dr. George Mason, (Centre for Biosciences Agriculture and Food Technology, University of Trinidad and Tobago, Waterloo Road, Carapichaima, Trinidad).
- Professor Laurence Wilson, (Professor Emeritus, Department of Food Production, Faculty of Science and Agriculture, UWI).
- Mr Floyd Neckles, (Project Director, Sugarcane Feeds Centre, Pokhor Road, Longdenville).
- Dr. P. Seshagiri Rao and Dr. Anthony Kennedy (West Indies Central Sugar Cane Breeding Station, WICSCBS - Groves, St. George, Barbados).
- Dr. Winston Elibox, (Postdoctoral Research Fellow, Biotechnology, Faculty of Science and Agriculture, UWI).
- Dr. Audia Barnett, (Executive Director, Scientific Research Council, Jamaica).
- Mr Surenarine Persaud, (Project Deputy Director, Ministry of Agriculture).

In terms of potential Investors the following locally based, individuals, businesses and groups already have an interest in sugar related activities:

- Mr Ramdeo Ramcharan (President, Sugarcane Farmers Co-operative Society Limited).
- Angostura.
- CARIB.
- Nestlé.
- The Sugar Estate Company of Trinidad and Tobago.

Examples of Offshore Players

The following are a few selected examples of organisations and channels that are taking a highly innovative approach towards deriving greater value from the sugarcane sector. They indicate the potential that exists for this sector, particularly as the world demand for sustainable renewable resources accelerates.

The Audubon Sugar Institute at the LSU Ag. Center in the USA ⁽¹⁷⁾



This research institution is based at the Louisiana State University and has already identified one biocide derived from sugar that has been patented and registered. There are a number of other derivatives being developed.

The Institute is funded by a public private partnership.

El Instituto Cubano de Investigaciones de los Derivados de la Caña de Azúcar (ICIDCA) ^(18, 19)

The Cuban Institute for Research on Sugarcane Derivatives is also a key international institution that has done a considerable amount of research on identifying specific components and compounds within sugarcane which can be used to add more value from the sugarcane production and processing sector.



The Dow Chemical Company and Crystalsev ⁽²⁰⁾



The giant Dow Chemical Company and Brazilian ethanol producer, Crystalsev, are building a new plant due to come on line in 2011 that will produce polyethylene from sugarcane.

Styrophobia ⁽²¹⁾



One of the biggest environmental problems the world faces is non-biodegradable plastics and their impact on the environment. Bio-plastics that degrade in 60 – 120

17

<http://www.lsuagcenter.com/en/communications/leads/Fueling+with+Cane+Audubon+Sugar+Institute+finds+new+uses.htm>

18 http://www.nti.org/e_research/profiles/Cuba/Biological/3487_3517.html

19 <http://www.icidca.cu/>

20 http://news.dow.com/dow_news/prodbus/2007/20070719a.htm

21 <http://stores.styrophobia.com/Page.bok?template=sugarproducts>

days are now being made from sugarcane. This online retailer based in Hawaii provides a useful example of an innovative approach to offering a practical solution.

Bajaj Eco-Tec Products Ltd (²²)



This company in India is reputed to be just one of two in the world which manufacture wood-free medium density fibre board from sugarcane bagasse waste streams. The company is also developing high density fibre board and laminated flooring from bagasse.

Reports suggest there is a company that will soon be doing something similar in Guyana (²³).

Other groups suggested that could play a useful role include:

- Canadian International Development Agency (CIDA).
- McGill University, Canada.
- Pharmaceutical companies.
- 2B AG – a Swiss company that is already investing in Brazil.
- Sony – who are developing the sugar / enzyme powered battery.

3.1.11 Implementation Roadmap

An indicative roadmap of the targets set to establish 'SuperCane Inc.', what will be needed to ensure that they are achieved, and who is involved in order to achieve the desired outcomes for this investment opportunity, is shown in Table 3.

Table 3: Indicative road map for implementing the 'SuperCane Inc.' best bet investment opportunity

By when?	What?	Who?
Initial	<ul style="list-style-type: none"> • Form a consortium to establish the business and identify major opportunity areas. • Finalise the business model and strategy to set up and run the business. • Define the parameters upon which projects will be selected – i.e. at least 400% value adding in areas outside client contracted projects. • Establish key alliances locally and offshore. • Access and appoint key personnel. • Finalise a commercialisation strategy and roadmap. • Develop a branding and marketing strategy. • Identify funding needs and sourcing. 	<ul style="list-style-type: none"> • R&D sector / Private sector / Public sector. • Consortium leaders PPP. • Consortium leaders PPP. • Consortium leaders PPP. • Consortium leaders PPP. • Consortium leaders PPP. • Branding/marketing group. • Consortium leaders PPP.
1 st 6 months	<ul style="list-style-type: none"> • Set up the 'real' and 'virtual' components of the business. 	<ul style="list-style-type: none"> • Consortium team.

²² <http://www.bajajecotec.com/bajajecotech-introduction.html>

²³ Pers. comm. Mr Bali Singh, a Canadian accountant and investment group representative

	<ul style="list-style-type: none"> • Select 3 'low hanging fruit' opportunity areas to focus activities on for IP generation and innovative product development. • Negotiate 3 R&D contracts. • Pursue potential hi-tech solution clients and confirm at least 1 contract. 	<ul style="list-style-type: none"> • Market researchers / R&D / Private sector. • R&D sector / Consortium team. • Consortium team.
2nd 6 months	<ul style="list-style-type: none"> • Build up the 'Idea Factory' global network and put up 3 challenges for solution development. Award at least 1 prize for an innovative solution developed for the initial projects. • Complete 3 R&D contracts and negotiate 4 for the following year. • Advance work on the first hi-tech solution project. • Advance work on developing first IP-based products. • Secure funding needs and resources for Year 2. 	<ul style="list-style-type: none"> • Networking specialist / Consortium team. • R&D sector / Consortium team. • R&D sector / Consortium team. • R&D sector / Consortium team. • Consortium leaders PPP.
Year 2	<ul style="list-style-type: none"> • Continue to build up the 'Idea Factory' global network and put up at least 10 challenges for solution development. Award at least 3 prizes for innovative solutions developed for projects. • Complete 4 R&D contracts and negotiate 5 more for the following year. • Complete work on the first hi-tech solution project and initiate 2 more. • Sell 1 IP license and initiate negotiations for selling 3 more. • Collect royalties from 100,000 units of IP related products produced by license holders. • Secure funding needs and resources for Year 3. 	<ul style="list-style-type: none"> • Networking specialist / Consortium team. • R&D sector / Consortium team. • R&D sector / Consortium team. • IP sales specialist. • Consortium team. • Consortium leaders PPP.
Year 3	<ul style="list-style-type: none"> • Continue to build up the 'Idea Factory' global network and put up at least 15 challenges for solution development. Award at least 7 prizes for innovative solutions developed for projects. • Complete 5 R&D projects and negotiate 7 more for the following year. • Complete work on 2 hi-tech solution projects and initiate 3 more. • Sell 3 IP licenses and initiate negotiations for selling 6 more. • Collect royalties from 1,000,000 units of IP related products produced by license holders. • Secure funding needs and resources for Year 4. 	<ul style="list-style-type: none"> • Networking specialist / Consortium team. • R&D sector / Consortium team. • R&D sector / Consortium team. • IP sales specialist. • Consortium team. • Consortium leaders PPP.
Year 4	<ul style="list-style-type: none"> • Continue to build up the 'Idea Factory' global network and put up at least 20 challenges for solution development. Award at least 10 prizes for innovative solutions developed for projects. • Complete 7 R&D projects and negotiate 9 more for the following year. • Complete work on 3 hi-tech solution projects and initiate 4 more. • Sell 6 IP licenses and initiate negotiations for selling 10 more. • Collect royalties from 2,000,000 units of IP related products produced by license holders. • Secure funding needs and resources for Year 5. 	<ul style="list-style-type: none"> • Networking specialist / Consortium team. • R&D sector / Consortium team. • R&D sector / Consortium team. • IP sales specialist. • Consortium team. • Consortium leaders PPP.
Year 5	<ul style="list-style-type: none"> • Continue to build the Idea factory global network up and put up at least 25 challenges for solution 	<ul style="list-style-type: none"> • Networking specialist / Consortium team.

	<p>development. Award at least 15 prizes for innovative solutions developed for projects.</p> <ul style="list-style-type: none"> • Complete 9 R&D projects and negotiate 11 more for the following year. • Complete work on 4 hi-tech solution projects and initiate 5 more. • Sell 10 IP licenses and initiate negotiations for selling 15 more. • Collect royalties from 5,000,000 units of IP related products produced by license holders • Secure funding needs and resources for Year 6. 	<ul style="list-style-type: none"> • R&D sector / Consortium team. • R&D sector / Consortium team. • IP sales specialist. • Consortium team. • Consortium leaders PPP.
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3.1.12 Financial Scenario

- This financial scenario combines both short-term and long-term elements of investment needs and revenue generation. The short-term component includes contract research to third parties to develop specific solutions or undertake research projects for national, regional or international agencies or private sector groups. The longer term components include the development of IP that can be licensed and innovative product solutions from which ongoing royalties can be derived, also with an IP protection basis.
- The summary in Table 4 provides a ‘best-guess’ estimate of the potential revenues, expenses, and EBIT figures that could be achieved over a ten-year period based upon the combination of short- and long-term business areas described above.
- In terms of value adding, all solutions developed by ‘SuperCane Inc.’ will be based upon achieving a minimum of a 400% increase in basic value for sugarcane and its derivatives with an ideal of 1000% value adding or more being the overall goal.
- This financial scenario also assumes that not all the intellectual capital resides in-house but includes an international ‘brains trust’ which contributes to solution development through the ‘Idea Factory’ component that is part of the model for deriving the maximum amount of value from this best bet.
- This pool of intellectual capital is rewarded by means of prizes for the person who comes up with the best solution. In the international market such prizes have been up to US\$ 100,000 for innovative solution developments.

This financial scenario has not been subjected to detailed scrutiny. It is intended to be an example of what could be achieved in the top 20% of the range of potential scenario outcomes. Before making an investment commitment, it would need further development and to be subjected to due diligence.

Full details can be found in the Appendix at the end of this report.

Table 4: Indicative financial projections for the ‘SuperCane Inc.’ investment opportunity

	By year 3	By year 6	By year 10
Gross revenue from all activities	US \$ 2,050,000	US\$ 9,820,000	US\$ 52,390,000
Basis of the revenue figure	<ul style="list-style-type: none"> • 2 hi tech solutions @ US\$ 250,000 each • 3 IP licenses @ US\$ 150,000 each • 5 R&D contracts @ US\$ 120,000 each. • 1,000,000 units of innovative products with a US\$ 0.50 royalty 	<ul style="list-style-type: none"> • 5 hi tech solutions @ US\$ 250,000 each • 15 IP licenses @ US\$ 150,000 each • 11 R&D contracts @ US\$ 120,000 each. • 10,000,000 units of innovative products with a US\$ 0.50 royalty 	<ul style="list-style-type: none"> • 9 hi tech solutions @ US\$ 250,000 each • 50 IP licenses @ US\$ 150,000 each • 22 R&D contracts @ US\$ 120,000 each. • 80,000,000 units of innovative products with a US\$ 0.50 royalty
Capital expenditure*	US\$ 2,350,000	US\$ 1,650,000	US\$ 2,200,000
Operating expenditure	US\$ 1,486,250	US\$ 7,119,500	US\$ 37,982,750
Earnings before interest and tax (EBIT)	US\$ 563,750	US\$ 2,700,500	US\$ 14,407,250

* Does not include government investment.

3.1.13 NEXT Star Rating



- Because T&T has considerable expertise associated with the sugarcane growing sector, a key location central to a number of major sugarcane producing countries, and a big investment in tertiary education which is increasing the number of highly qualified graduates, this best bet has a great deal of potential to form the basis of a whole new business sector in T&T.
- The most critical factor associated with pursuing such a best bet is to focus on developing solutions that have considerable potential for adding value to basic sugarcane (at least 400% and probably a 1000% increase in value as a minimum target).
- The reason this is critical is that other countries such as Brazil are investing heavily in low-value high-volume commodity based developments built around the sugarcane sector. It makes no sense to be competing with research and development agencies and businesses that have already established an advanced position in those fields – such as ethanol production.
- This means that T&T would be operating in a higher risk area when it comes to solution development but the rewards for successful solutions are likely to be substantially greater than for those groups working in the low value commodity field.

3.2 Best Bet 2 Title: 'Customised Bio-Indicators Inc.'

3.2.1 The Investment Opportunity

- The investment opportunity is built around a business that uses science and technology and combines that with research and development to develop unique client solutions based on customised biological indicators.
- It is envisaged that such biological indicators are derived from natural populations of microbial organisms and they are not necessarily altered through the use of genetic engineering.
- These indicators enable the determination of the presence or absence of beneficial or harmful organisms or substances in specific environments.
- Such indicators can be used in a wide range of application areas such as occupational safety and health, national security, drug and food safety, bio-safety, in agricultural production systems, and many other areas that have not yet been specifically identified.
- Two big growth areas are in bio-security (and bio-terrorism) and food safety.

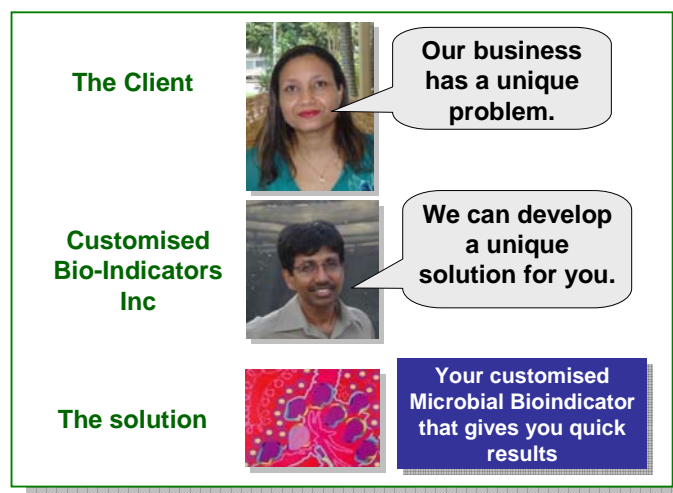
3.2.2 Rationale

- Personal and national security and safety is a huge growth area internationally and embraces a whole range of opportunity areas.
- There is increasing recognition that nature has the potential to offer a solution to almost all of mankind's challenges.
- There is an opportunity to look for more specific indicators to test environments by searching through natural microbial populations.
- There is a potential to use such indicator systems as the basis of continuous 'live' monitoring systems e.g. of food condition, rather than only for testing suspect samples once a problem arises.
- This best bet is essentially the microbial equivalent of the 'canary in the coalmine' used historically to determine if toxic gases such as methane were present in work environments.

3.2.3 Customer Offer

- Customised biological indicator systems based on naturally occurring microbial organisms that can be used in a wide range of application areas.
- Such systems can be specifically designed to satisfy individual client needs.
- They can also be used to monitor the status of products and environments to prevent problems developing rather than just for diagnosing problems once they have already occurred.
- These systems will be designed to provide more rapid monitoring and diagnostic processes than currently is the case with tests such as Polymerase Chain Reaction testing (which can take days to complete) and enzyme linked immuno-sorbent assays (which take hours to complete).
- They are also designed to be easily understood, not only by technical people but also the general public. This means they can make their own assessments of safety and risk through the use of these indicators.

Figure 5: The 'Customised Bio-Indicators Inc.' customer offer (²⁴)



3.2.4 Foresight Context

- The trend towards increasing investment in global security systems and bio-security.
- A growing demand for more innovative indicator and detection systems to preclude health and safety issues.
- Increasing legislative requirements that are focusing on traceability and product safety issues.
- Increasingly stringent standards for water and environmental factors and rapidly increasing penalties for non-compliance or environmental damage.
- The increasingly higher standards being demanded for occupational safety and health and the preservation of human life.
- The growing demand for sustainable naturally derived solutions.

3.2.5 Target Markets

- The target markets are those sectors that have an increasing requirement for safety and security monitoring and maintenance, as well as environmental improvement, and include clients in the following sectors:
 - The food and beverage sector.
 - The pharmaceutical sector.
 - The health and wellness products sector, which includes supplements, personal care products, and natural derivatives.
 - The mining sector.
 - The transport and logistics sector, with a special focus on airports, sea ports, ships, and containers.
 - The petrochemical sector.
 - The chemical industries sector.
 - The public utilities sector, with a particular focus on water and wastewater.
 - The hospitality sector, with a particular focus on food handling and storage.
 - The agricultural sector.
 - Biological pest and disease management.
 - Testing laboratories and the diagnostic sector.

²⁴ NEXT Archives

- There would be a strong focus on providing solutions for large players in major markets in those sectors, particularly those with safety, security and environmental issues e.g. in China, Germany, the USA, Switzerland, India, Brazil, the UK, Japan, Taiwan, and South Korea.

3.2.6 What We Have

- There is a well-established local and regional academic base to support this best bet.
- There is also a well-established applied research and development base in T&T in both the public and private sectors, although the focus tends to be somewhat restricted.
- There is a large industrial sector and associated infrastructure in T&T which would help in the process of identifying opportunity areas and the development of customised solutions.
- There are well-established regional and international trade links.
- Reliable telecommunications networks.
- A good pool of human resources who have some skills and experience in fields relevant to this best bet.
- The establishment of ISO frameworks that comply with internationally recognised standards and requirements.
- Considerable microbial and genetic biodiversity in T&T, which has the potential to provide quite unique globally applicable customised solutions.
- The potential to discover some novel species in T&T that could be patented for applications in regional and international markets.
- Whilst there is no current regulatory framework relevant to this best bet, there is a Biosafety Committee at the University of the West Indies (UWI) that addresses research and research procedure issues.
- T&T ratified the Cartagena Biosafety Protocol in 2000 – but the resources to back such ratification are lacking
- A National Biosafety Policy was developed in 2003 to deal with national bio-safety issues such as GM foods and live modified organisms.
- Many importing countries have quite specific quarantine restrictions and guidelines and access to the USA is quite difficult when it comes to live cultures.
- Others have strict regulations with regard to GMOs and applications.
- Trade with living organisms has always been a more challenging area but has been happening in some areas for many decades e.g. with the export of yeast and yoghurt.
- An IP framework in place that facilitates the registration of unique biotypes and protection of the knowledge component associated with them locally and internationally.
- An opportunity to use technology that is patent protected in certain markets but not others in those latter markets.
- Considerable experience with microbial fermentation technology which is present in T&T and could be scaled up.
- There are numerous laboratory facilities available in T&T.
- There is a pool of people who have basic skills sets relevant to this area but who would need additional more specialised training.
- There is a technical and research capacity available to isolate microbes for producing bio-pesticides and therefore develop novel techniques to screen for bio-pesticides. A student at UWI recently identified a probiotic compound (a protein) that controls certain bacterial diseases in fish.
- Microbial indicator technology is currently being developed in T&T from a soil health and environmental health perspective. Other areas currently being

researched include the application of microbial indicators to determine the level of decay associated with historical artefacts.

- There is a great deal of research going on in this field at UWI and, at present, the number of students working in the pure microbial field is at 'saturation level'.
- Well developed English language skills, which is the main language used in this field.
- Groups in Cuba, Latin America and South America that are working in this field.
- Commercially successful and emerging biotechnology companies offshore which may be valuable alliance partners.
- A considerable pool of accumulated knowledge regarding potential microbial bio-indicators and their applications in a diverse range of areas such as food safety, the mining industry, environmental areas, and detecting explosives.
- The first commercial entities offering products and services in this emerging field.

3.2.7 What We Need

From the R & D Sector

- A critical mass of persons working in this field nationally, regionally, and internationally, and their interconnection.
- A check of the existing T&T laws as they relate to the import and export of micro-organisms, bioengineering, and biodiversity (with a particular focus on intellectual property rights and bio-prospecting).
- A check on the legal situation regarding these same areas in potential target market countries.
- There needs to be training to develop skills in formulation technology. Much of this training may only need to be in addition to skills sets that already exist.
- Better knowledge and utilisation of assistance being provided in this field by international development agencies.
- Strategic alliances with other research institutions internationally that are working in this field and greater collaboration.
- Greater knowledge of Spanish as many relevant conferences in the region are in this language.
- A search of which IPRs currently exist in this field internationally to identify potential opportunity areas.
- The expansion of current laboratory facilities with a focus on greater specialisation as currently most laboratories are used on a shared purpose basis.
- A focus on specific opportunity areas including:
 - Microbial screening.
 - Microbial immobilisation.
 - Lifespan testing and definition of environmental tolerances.
- The alignment of business, regulatory and research interests towards a common goal.
- A detailed analysis of the materials and resources requirements to support the development of successful outcomes associated with this best bet.

From the Private Sector

- Investment in formulation technology.
- The forming of alliances and joint ventures with offshore biotechnology companies that have an interest in this area. However, such relationships need to take into account the capability, enabler, and resource situation that exists in T&T – both currently and potentially.
- Identification of key local players who may be active, or interested in being active, commercially in this field.

- A need to develop branding and marketing strategies for a new business developed in this field.
- Funding for R&D work – perhaps in conjunction with the private sector as a public private partnership.
- Market research and promotion.
- The alignment of business, regulatory, and research interests towards a common goal.

From the Public Sector

- Some clarity with regard to the current regulatory status as it relates to this field.
- There needs to be a clear policy and structure in place – it currently does not exist in T&T.
- The empowerment of persons working in this field to use such microbial indicators as a preferred tool in a wider range of application areas.
- The provision of human resources and institutional capacity to implement international obligations associated with international agreements such as the Cartagena Biosafety Protocol.
- Clarification of what incentives and financial assistance may be available to fund R&R to develop commercial applications associated with this best bet.
- Funding for R&D work – perhaps in conjunction with the private sector as a public private partnership.
- Human resources development that is relevant to this field.
- An improvement in the cross-border processes to shorten transition times and ensure that live organisms are not endangered because of poor handling.
- Monitoring of research and workplace environments to ensure employees are not exposed to potentially life threatening situations.
- The alignment of business, regulatory and research interests towards a common goal.

3.2.8 A Possible Business Model

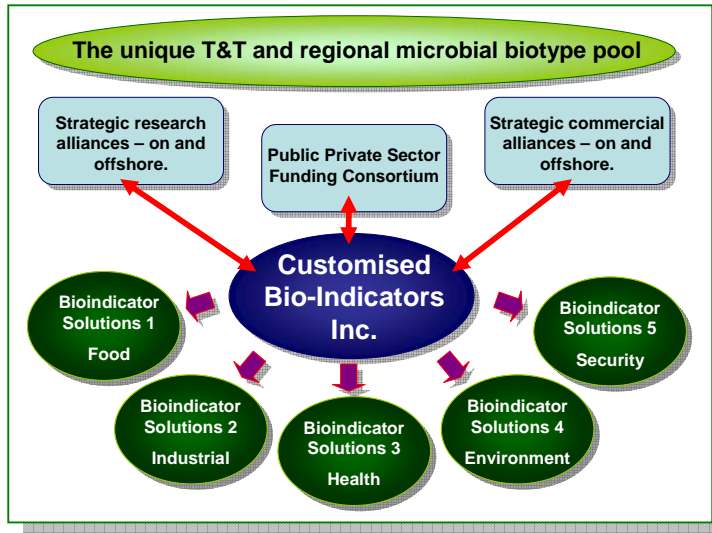
In order to develop a business that is capable of delivering internationally recognised and competitive solutions, the model for a business built around this best bet opportunity area may look something like that shown in Figure 6.

The most important aspects of this proposed model are as follows:

- On the input side:
 - Alliances and partnerships with key research agencies and institutions active in this field internationally need to be finalised to ensure synergies rather than duplication of effort result.
 - Alliances and partnerships with key commercial partners (these may include major agencies such as the EPA in the USA or national security agencies) need to be finalised to secure marketing alliances and product delivery channels.
 - A public private sector funding component needs to be finalised to provide the financial resources necessary to develop the first commercial products and underpin the long-term sustainability of 'Customised Bio-Indicators Inc'.
- On the output side the delivery options could include:
 - Innovative new hi-tech processes for identifying unique micro-organism based bio-indicators.
 - The generation of biological IP that can be licensed and generate long-term revenue streams.
 - R&D contracts to develop customised solutions for specific client needs.
 - Unique innovative products developed from T&T's microbial biotype pool that can be marketed internationally.

- All of the above would combine to generate new and innovative business streams both within T&T, the region, and internationally with T&T becoming the centre of excellence in deriving unique customised microbial bio-indicator solutions from the local and regional biotype pool(s).

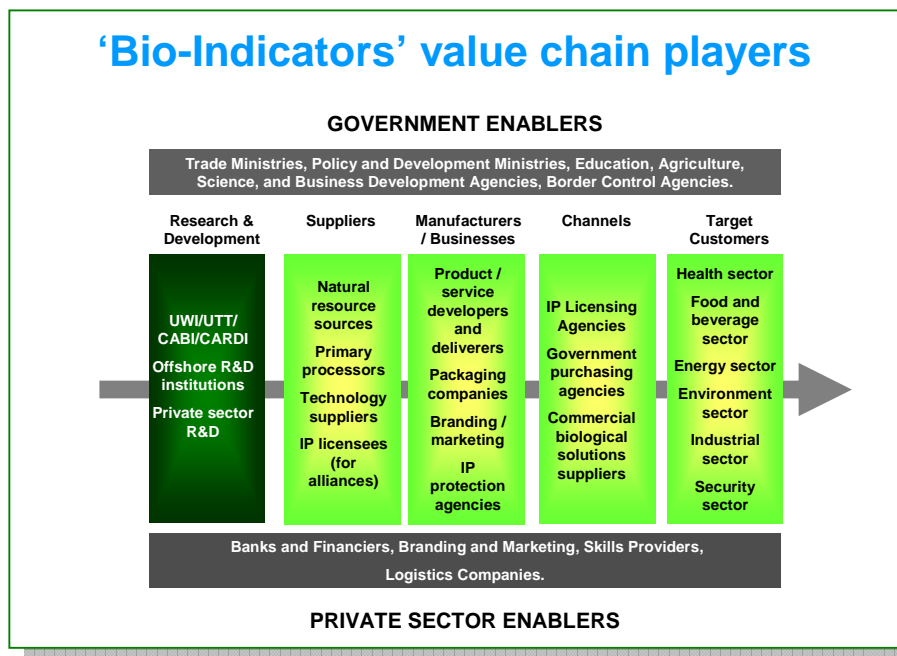
Figure 6: A possible business model for the ‘Customised Bio-Indicators Inc.’ best bet ⁽²⁵⁾



3.2.9 Best Bet Value Chain

The main player groups in the value chain model that would be needed to leverage the value developed by ‘Customised Bio-Indicators Inc’ are shown in Figure 7.

Figure 7: Key stakeholders in the ‘Customised Bio-indicator Inc.’ value chain model ⁽²⁶⁾



²⁵ NEXT Archives

²⁶ NEXT Archives

The challenge is to develop the right combination of value chain links to maximise the revenue generation for T&T as a country. This will require a strong networking capability to develop and manage the global research and commercial alliances and partnerships required to make 'Customised Bio-Indicators Inc.' an internationally competitive and successful business.

3.2.10 Key Players

Key Local Players

From the organisational perspective these may include:

- Government agencies including the Ministry of Agriculture, Land & Marine Resources; Ministry of Finance; Ministry of Health; Ministry of Planning, Housing and the Environment; Ministry of Science, Technology, and Tertiary Education; Ministry of Trade and Industry; Ministry of National Security.
- University and Research Institutions including UWI, UTT, CABI, CARDI, and CARIRI.
- Health groups such as the Caribbean Epidemiology Center (CAREC) which operates locally and regionally.
- Private sector groups that have an interest in biosecurity, biosafety and bio-remediation. There are indications that Neal and Massy and CLICO could have an interest in this field.
- They could include major food processing and personal product manufacturing groups such as Bermudez, National Cannery, Carib, Nestlé, Lever Brothers and Angostura.
- It could also include private security services companies such as Imjim Security.

From the individual perspective these may include:

Dr Pathmanathan Umaharan, Deputy Dean, Faculty of Life Sciences

- Dr Umaharan has developed a patented screening process for genetic material that identifies the presence or absence of certain microbial resistance characteristics in plants. He has a great deal of experience in fields that are highly relevant to achieving successful outcomes associated with this best bet.

Figure 8: Dr Pathmanathan Umaharan (²⁷)



Dr Ulrike Krauss, Co-Director and Regional Representative of CABI

- Dr Krauss has had a great deal of experience and knowledge relating to potential 'microbial assets' that are present in T&T and other parts of the Caribbean region

²⁷ NEXT Archives

and Latin America. She also has considerable knowledge relating to potential applications for micro-organisms to be used as bio-indicators.

Figure 9: Dr Ulrike Krauss (left) and her team searching for unique microbial organisms ⁽²⁸⁾



Other T&T based persons who have been mentioned as being able to offer considerable value towards realising this best bet include:

- Dr Ramsubhag (Life Sciences Department, UWI).
- Dr Badrie (Food Production, UWI).
- Graduate students who are doing related research projects.

Examples of Offshore Players

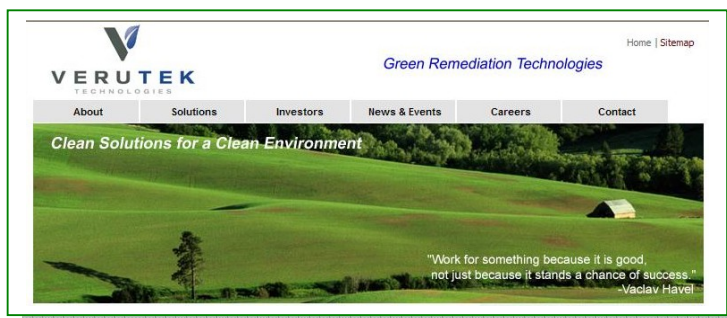
There are numerous research and commercial groups expanding into the bio-indicator field. Following are a few selected examples of some of the more specialised commercial groups and research organisations that have such an involvement.

VeruTEK Technologies, USA ⁽²⁹⁾

This US company recently formed an alliance with the Environmental Protection Agency and together they plan to 'become highly active in the enviroceuticals market'.

This will be built around green chemistry and nano-technology solutions with applications in the soil remediation, water, and wastewater sectors. Whilst they are not focusing specifically on micro-organism derived bio-indicators per se, they are potentially positioned to be interested in such developments.

The EPA itself is involved in the development of practical applications for microbial bio-indicators.



²⁸ Courtesy of Dr Ulrike Krauss

²⁹ <http://www.verutek.com/>

The Agricultural Research Service, USDA, USA ⁽³⁰⁾



This large research organisation is investigating the use of microbial bio-indicators to detect microbial processed food products such as pureed sweet potato. Food biosafety is becoming a big issue in the USA with serious recent cases that have caused illness and deaths associated with E.coli infections on spinach ⁽³¹⁾, salmonella contamination on tomatoes ⁽³²⁾, and the highly toxic E. coli O157:H7 strain that has contaminated meat products ⁽³³⁾.

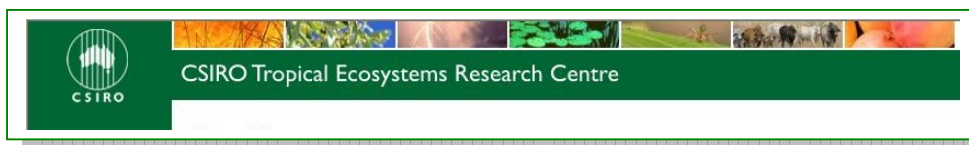
Dr Brill + Partner GmbH ⁽³⁴⁾



This German private laboratory is involved in testing sites, products and water supplies for microbial contamination and providing solutions to such contamination if it arises. Involvement with a group that has strong R&D experience combined with commercial experience would provide a potentially valuable access channel to markets for T&T developed microbial bio-indicator solutions.

CSIRO Tropical Eco-systems Research Centre, Australia ⁽³⁵⁾

This major research organisation has considerable experience with using bio-indicators for applications in Australia's huge mining sector.



³⁰ <http://www.ars.usda.gov/main/main.htm>

³¹ <http://www.cdc.gov/ecoli/2006/september/>

³² <http://www.cdc.gov/Salmonella/saintpaul/>

³³ <http://healthlink.mcw.edu/article/1031002172.html>

³⁴ <http://www.brillhygiene.com/>

³⁵ <http://www.terc.csiro.au/>

SGM Biotech Inc, USA (36)

This is a commercial business that provides microbial bio-indicator based monitoring services to the health and industrial sectors.



Lockheed Martin Energy Research Organisation, USA (37)

This unit within the giant Lockheed Martin Corporation has registered a patent for bacterial strains that can detect the presence of explosive materials such as trinitrotoluene (38).

CABI, UK and international (39)

This organization has a strong R&D focus in the agricultural sector and has considerable resources relating to the development and uses of microbial bio-indicators. CABI is also present in the Caribbean and Latin America with its regional base being located at St. Augustine in T&T.



3.2.11 Implementation Roadmap

An indicative roadmap of targets set to establish 'Customised Bio-indicators Inc' as a business, what will be needed to ensure the targets are achieved, and who is involved in order to achieve the desired outcomes associated with this investment opportunity, is shown in Table 5.

Table 5: Indicative road map for implementing the 'Customised Bio-indicators Inc.' best bet investment opportunity

By when?	What?	Who?
Initial	<ul style="list-style-type: none">• Form a consortium to establish the business and identify major opportunity areas.• Finalise the business model and strategy to set up and run the business.• Define the parameters upon which projects will be selected – e.g. what will offer T&T a unique competitive advantage.• Identify the 'low hanging fruit' opportunities that have the potential to generate short-term revenue.• Establish key R&D and commercial alliances locally and offshore.	<ul style="list-style-type: none">• R&D sector / Private sector / Public sector.• Consortium leaders PPP.• Consortium leaders PPP.• Consortium leaders PPP.• Consortium leaders PPP.

36 <http://www.sgmbiotech.com/>

37 <http://www.lockheedmartin.com>

38 <http://www.patentlens.net/daisy/Bioindicators/q6/1637.html>

39 <http://www.cabi.org>

	<ul style="list-style-type: none"> • Access and appoint key personnel. • Finalise a commercialisation strategy and roadmap. • Develop a branding and marketing strategy. • Identify funding needs and sourcing. 	<ul style="list-style-type: none"> • Consortium leaders PPP. • Consortium leaders PPP. • Branding/marketing group. • Consortium leaders PPP.
1st 6 months	<ul style="list-style-type: none"> • Set up the business – staff and premises. • Select 3 'low hanging fruit' opportunity areas to focus initial efforts on. • Select 3 other medium to longer term areas that offer the potential for IP generation and innovative product development. • Negotiate 3 R&D contracts. • Pursue potential microbial solution clients and confirm at least 1 contract. 	<ul style="list-style-type: none"> • Consortium team. • Market researchers / R&D / Private sector. • Market researchers / R&D / Private sector. • R&D sector / Consortium team. • Consortium team.
2nd 6 months	<ul style="list-style-type: none"> • Build up the global R&D and commercial network and develop a mechanism for identifying and developing mutually beneficial solutions. • Complete 3 R&D contracts and negotiate 4 for the following year. • Develop at least one saleable solution from the 3 initial 'low hanging fruit' opportunity areas and pursue 3 more additional areas. • Advance work on developing the first IP-based products from the 3 medium to long-term opportunity areas and start work in another 3 areas. • Secure funding needs and resources for Year 2. 	<ul style="list-style-type: none"> • Networking specialist / Consortium team. • R&D sector / Consortium team. • R&D sector / Consortium team. • R&D sector / Consortium team. • Consortium leaders PPP.
Year 2	<ul style="list-style-type: none"> • Continue to build up the global R&D and commercial network for mutual benefit. • Complete 4 R&D contracts and negotiate 5 more for the following year. • Develop at least one more saleable solution from the 3 initial 'low hanging fruit' opportunity areas and pursue 3 more additional areas. • Finalise development of the first IP-based product from the 3 medium to long-term opportunity areas and start work in another 3 areas. • Achieve gross revenue of US\$ 2,450,000. • Secure funding needs and resources for Year 3. 	<ul style="list-style-type: none"> • Networking specialist / Consortium team. • R&D sector / Consortium team. • R&D sector / Consortium team. • IP sales specialist / R&D sector / Consortium team. • Consortium team. • Consortium leaders PPP.
Year 3	<ul style="list-style-type: none"> • Continue to build up the global R&D and commercial network for mutual benefit. • Complete 5 R&D contracts and negotiate 6 more for the following year. • Develop at least one more saleable solution from the 6 initial 'low hanging fruit' opportunity areas and pursue 3 more additional areas. • Finalise development of the second IP-based product from the 6 medium to long-term opportunity areas and start work in another 3 areas. • Achieve gross revenue of US\$ 5,850,000. • Secure funding needs and resources for Year 4. 	<ul style="list-style-type: none"> • Networking specialist / Consortium team. • R&D sector / Consortium team. • R&D sector / Consortium team. • IP sales specialist / R&D sector / Consortium team. • Consortium team. • Consortium leaders PPP.
Year 4	<ul style="list-style-type: none"> • Continue to build up the global R&D and commercial network for mutual benefit. • Complete 6 R&D contracts and negotiate 7 more for the following year. • Develop at least two more saleable solutions from the 9 initial 'low hanging fruit' opportunity areas and pursue 3 more additional areas. 	<ul style="list-style-type: none"> • Networking specialist / Consortium team. • R&D sector / Consortium team. • R&D sector / Consortium team.

	<ul style="list-style-type: none"> Finalise development of the third and fourth IP-based products from the 9 medium to long-term opportunity areas and start work in another 3 areas. Achieve gross revenue of US\$ 10,200,000. Secure funding needs and resources for Year 5. 	<ul style="list-style-type: none"> IP sales specialist/ R&D sector / Consortium team. Consortium team. Consortium leaders PPP.
Year 5	<ul style="list-style-type: none"> Continue to build up the global R&D and commercial network for mutual benefit. Complete 7 R&D contracts and negotiate 8 more for the following year. Develop at least 3 more saleable solutions from the 12 initial 'low hanging fruit' opportunity areas and pursue 3 more additional areas. Finalise development of the fifth and sixth IP-based products from the 12 medium to long-term opportunity areas and start work in another 3 areas. Achieve gross revenue of US\$ 13,590,000. Secure funding needs and resources for Year 6. 	<ul style="list-style-type: none"> Networking specialist / Consortium team. R&D sector / Consortium team. R&D sector / Consortium team. IP sales specialist / R&D sector / Consortium team. Consortium team. Consortium leaders PPP.

3.2.12 Financial Scenario

- This financial scenario combines both short-term and long-term elements of investment needs and revenue generation. The short-term component includes contract research to third parties to develop specific solutions or undertake research projects for national, regional or international agencies or private sector groups. The longer term components include the development of IP-based microbial product solutions that can be licensed and innovative product solutions from which ongoing royalties can be derived.
- The summary in Table 6 provides a 'best-guess' estimate of the potential revenues, expenses, and EBIT figures that could be achieved over a ten-year period based upon the combination of short and long-term business areas described above.
- This financial scenario also assumes that 'Customised Bio-Indicators Inc.' becomes a leading edge international developer of IP and customised solutions both in its own right and through collaboration with clients and highly competent public and private research institutions.

Table 6: Indicative financial projections for the 'Customised Bio-indicators Inc' investment opportunity

	By year 3	By year 6	By year 10
Gross revenue from all activities	US \$ 5,850,000	US\$ 19,680,000	US\$ 61,040,000
Basis of the revenue figure	<ul style="list-style-type: none"> 5 R&D contracts @ US\$ 250,000 each. 2 customised solutions @ US\$ 200,000 each 2 IP licenses @ US\$ 100,000 each 40,000 units of products with a US\$ 100 royalty 	<ul style="list-style-type: none"> 8 R&D contracts @ US\$ 250,000 each. 8 customised solutions @ US\$ 200,000 each 8 IP licenses @ US\$ 120,000 each 150,000 units of products with a US\$ 100 royalty 	<ul style="list-style-type: none"> 12 R&D contracts @ US\$ 250,000 each. 30 customised solutions @ US\$ 200,000 each 17 IP licenses @ US\$ 120,000 each 500,000 units of products with a US\$ 100 royalty
Capital expenditure*	US\$ 2,500,000	US\$ 1,700,000	US\$ 2,000,000
Operating expenditure	US\$ 4,387,500	US\$ 14,760,000	US\$ 45,780,000
Earnings before interest and tax (EBIT)	US\$ 1,462,500	US\$ 4,920,000	US\$ 15,260,000

* Does not include government investment.

This financial scenario has not been subjected to detailed scrutiny. It is intended to be an example of what could be achieved in the top 20% of the range of potential scenario outcomes. Before making an investment commitment, it would need further development and to be subjected to due diligence.

Full details can be found in the Appendix at the end of this report.

3.2.13 **NEXT Star Rating**



- T&T has considerable biodiversity which has been little developed.
- There is a growing pool of young talent emerging from universities trained in the biosciences field.
- There is also a small pool of experienced researchers in the country who have expertise relevant to the realisation of this best bet.
- The most critical factor in pursuing such a best bet is to be aligned with key international R&D and commercial organisations that will be essential for leveraging the value that exists in T&T's biodiversity.
- It is clear that this is an emerging field and commercial applications have only come on to the market in recent years in any significant way.
- There is a considerable amount of research that has already been done internationally that provides valuable insights into sources of potential applications and provides a good indication of the types of end-users who would be interested in purchasing them.
- There is no question that any business established in T&T would be operating in a relatively high-risk area when it comes to solution development but the rewards generated from successful solutions have the potential to add significantly to the country's economic and social development – particularly in the provision of high quality job opportunities for university qualified graduates.
- The only realistic model would appear to be a public private partnership because of the risk. And, in this regard, it would have to be managed on a strict commercial basis to ensure revenue generation targets are achieved and the business does not become a loss-creating entity.

3.3 Best Bet 3 Title: 'Value Miners Inc.'

3.3.1 The Investment Opportunity

- The investment opportunity is a commercially oriented research and development (R&D) based business that identifies various bioactive compounds (Factor X) in local flora and fauna that can be used to derive added value for T&T and the region.
- Revenue generation will arise through a combination of research contract work for commercial clients and the development of Intellectual Property (IP) that can be licensed. Such IP may be developed in conjunction with private clients, through public private partnerships, or through public or donor country research funding.
- The business development will be staged to ensure that short-term opportunity areas are the initial priority in order to establish a cash flow that will underpin longer term R&D work.

3.3.2 Rationale

- There are a number of businesses emerging around the world that have achieved high levels of value adding to traditional natural products through the application of science and technology and research and development.
- There are existing commercial examples where value adding levels of 2500% and more have been achieved (⁴⁰).
- There is also a considerable existing pool of knowledge about potential 'Factor X' components that can be found in local flora and fauna. Some of this knowledge has been generated within T&T and the region. Some has been generated offshore. A great deal of it already exists in the public domain.
- There are currently a number of bioactive compounds that have been identified which could be used to derive a high level of value adding if a market oriented approach was taken.
- Three excellent examples of such compounds are those found in cocoa – phenylethylamine (creates a 'feel-good' sensation in humans), theobromine (a powerful anti-oxidant), and methylglyoxal (a powerful anti-bacterial compound).
- There are others that can be found in a range of food crops, herbs, wild plants, animals, seaweed, and invertebrates such as conch, centipedes, and scorpions.
- The challenge is to develop a means by which the presence of such compounds can be empirically measured and such measurements converted into a consumer-linked value proposition which generates a big lift in the price that can be derived from product lines. Such a lift depends upon developing a means by which consumers can easily recognise the product's inherent value and can be assured of the fact that what they are purchasing is authentic and verifiable.
- There is increasing investment being made into this area and there are already some high profile success stories emerging internationally.

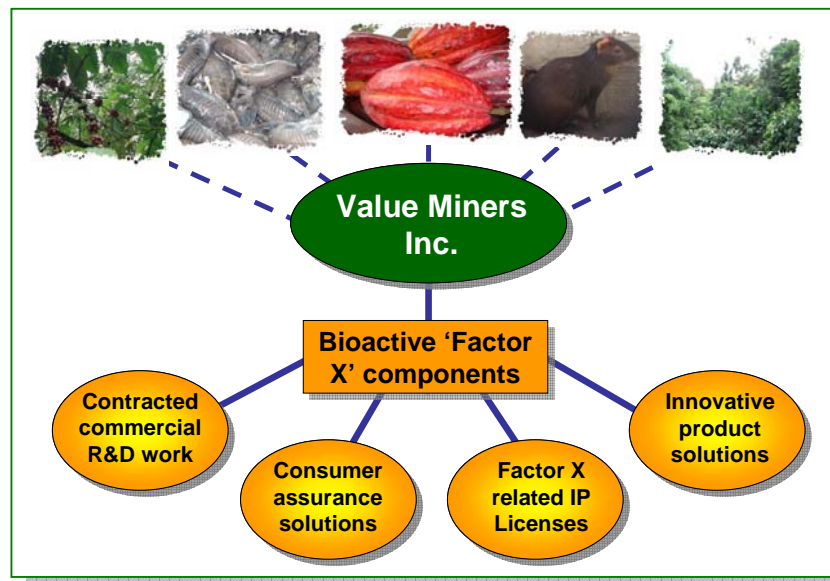
3.3.3 Customer Offer

- A laboratory and knowledge based business that provides contractual and project specific services to identify and quantify bioactive components ('Factor X') in local and regional flora and fauna and converts the research into propositions which can be used to derive far higher value added revenue streams.

⁴⁰ http://www.tffi.net/article_view/77

- Access to high-tech research and development capabilities that may also include a specialised genetic engineering component if there is a market slot with growth potential and a high level of acceptance for such derivatives
- A range of client options for developing such value adding 'Factor X' based propositions including:
 - Contract based R&D work.
 - Public private partnerships.
 - The development of IP-based opportunities through research projects funded by the public sector or regional donor organisations.
- The development of empirically based systems and associated activity / 'potency' related scales that provide customers with a valid basis for choosing to purchase a particular value added product.
- The development of IP that can be licensed internationally and generate revenues from royalties on a long-term basis.
- Such IP might include highly innovative ways of delivering a 'Factor X' to the end user e.g. a fashion item that has contact with the body and could slowly release such a bioactive compound.

Figure 10: The 'Value Miners Inc.' customer offer (⁴¹)



3.3.4 Foresight Context

- The growth in personal spending on health and wellness products.
- A shift in emphasis by international pharmaceutical companies towards deriving more solutions from natural sources.
- The trend towards 'Age Defiance' (spending greater amounts of money on anything that will slow or reverse the ageing process).
- The growth in customised solutions.
- The shift in the value proposition when it comes to purchasing food versus a product or service which provides a health or wellness benefit.
- The increasing prevalence of lifestyle related diseases and disorders.
- The growing global trend towards more sustainable solutions.
- Increasingly individualistic societies with more egotistical attitudes.

⁴¹ NEXT Archives

- The trend towards a shift of innovation from the developed world to the developing world.

3.3.5 Target Markets

- In general terms the target market sectors would include pharmaceuticals, health and wellness, food and beverage, cosmetics and body care products, lifestyle related, and sports and leisure.
- The main target customers would largely be companies that have a specific focus on manufacturing, distributing, and marketing products which provide a high value added solution to end consumers.
- The market focus such companies would have is likely to include providing solutions for lifestyle needs, to persons with lifestyle diseases, to persons who wish to look and feel younger, to persons who want heightened pleasure experiences, and to persons who want to improve their personal performance levels.
- They are likely to be across all generational groups but be related to niche groups with more emphasis on 'age defiance' and health and wellness in the more mature cohorts and perhaps more emphasis on personal performance and pleasure amongst the younger cohorts.
- They are likely to come from the upper and middle socio-economic groups in mature economies such as Canada, the USA, the UK and Europe, Australia, Japan, Taiwan, and Singapore as well as in the rapidly growing higher wealth population groups in India and China – particularly in large urban environments such as Bangalore, New Delhi, Shanghai, and Beijing.
- The Diaspora and ethnic groups which have a natural affinity for 'Factor X' products derived from local and regional sources.
- Communities of interest and specialist marketing channels on the Internet with a strong link to 'Factor X' based products.

3.3.6 What We Have

- A diverse and large biological base to work with in T&T.
- Known specific areas of interest, some of which have already been researched extensively, including sugarcane, cocoa, seamoss, bois bande, coconut, mangoes, coffee, shadon beni, scorpions, centipedes, aniseed, plus a wide range of medicinal herbs and plants.
- Significant human resources with expertise that could be leveraged in association with this best bet e.g. herbalists, researchers, and product developers and manufacturers.
- Over thirty years of experience in the field of natural product research in T&T.
- The Caribbean Herbal Medicine Research Institute associated with UTT.
- The proposed 'Natural Products Institute' that is being developed in association with UTT.
- Biotechnology study and research capabilities as well as the Natural Products unit in the Department of Chemistry at UWI.
- The Cocoa Research Unit at UWI.
- A wide range of unique natural resources to which little value adding has been achieved to date but which has good potential for such value adding.
- Companies that produce health and wellness products with some degree of value adding e.g. Angostura.
- The Food & Drug division of the Ministry of Health and the Bureau of Standards.
- Skills in the production of crops and the farming of animals.

- Extensive laboratory facilities in a range of institutions along with chemistry engineering and chemistry departments at universities.
- The national Herbarium at UWI St. Augustine.
- National gene pool collections in fields such as cocoa and sugarcane.
- Access to some government funding.
- Current research with crops such as hot peppers which has some relevance to this best bet.
- There is a good availability of technical people in a range of different fields relevant to this best bet.
- A good pool of graduate and post-graduate students in relevant fields.
- On the job training opportunities at CARIRI.
- Branding and marketing companies such as Label House, Caribbean Marketing, and the Ross Advertising Agency.

3.3.7 What We Need

- There is an urgent need for a 'Champion', strong leadership, and a desire to get things done now.
- The country has plenty of resources available right now but little progress has been made towards generating a return on the investments already made.
- There needs to be a change in attitude and drive to achieve real results that benefit the country socially and economically.

From the R & D Sector

- A Gap Analysis to determine precisely what is needed.
- A strong focus on 'Factor X' opportunity areas that are derived from local biological resource sources so that there is a strong element of uniqueness associated with what 'Value Miners Inc.' develops.
- Market research to identify key alliance partners and specialised consumer target groups.
- Identification of existing technology that might be available to help develop value added derivatives and processes.
- The acquisition and import of such technology where applicable.
- A broadening of the role that CARIRI plays in developing such commercial solutions. Currently it is highly client specific.
- Greater leadership in the R&D field.
- The involvement of the Pharmacy and Medical Sciences Departments at the universities.
- Taking a holistic approach to the business because there is a need to incorporate statistical, marketing and IT specialists alongside the science focussed members of the team.
- Taking a multidisciplinary approach towards commercialisation.
- Improved access to the vast amounts of research data at institutions such as UWI and in government and regional agencies.

From the Private Sector

- A major contribution towards prioritising the work of 'Value Miners Inc.' to ensure that a highly commercial focus is pursued. This will include targets to achieve certain levels of success and revenue generation by certain time points.
- The development of a trademark and logo.
- The development of new business streams and businesses that can create new value added product ranges derived from the work done by 'Value Miners Inc.'

- The creation of a highly efficient value chain that facilitates the extraction of the greatest amount of value from markets targeted by this best bet opportunity.
- Venture capital, strategic alliances, and key partnerships.
- Developmental centres to facilitate commercialisation.
- Production of specific natural resource raw materials if current supplies are insufficient.

From the Public Sector

- There is an urgent need to align all the existing resources and initiatives towards priority areas and to overcome the fragmentation that exists in T&T and which is inhibiting progress towards economic diversification.
- Strong support from the relevant government agencies.
- Legislation and border control initiatives that protect against the loss of the potentially valuable flora and fauna heritage which exists in T&T and the region.
- Strong backing, both legislative and in terms of implementation, to protect IP developed in association with this best bet and realising the associated value internationally. This includes any new technologies and processes developed.
- Intellectual Property Office support for protecting IP and registering patents.
- Clarification of how traditional knowledge associated with the use of plant genetic sources could be protected. This includes areas such as traditional knowledge, folklore, and genetic resources.
- The facilitation of approval of work permits and visas for specialist staff.
- The protection and preservation of sensitive areas that contain valuable sources of natural flora and fauna.
- A strengthening of the awareness of the value inherent in the country's reserves of biological material.
- 'Buy-in' at the top level in Government and the Public Service so that this area becomes part of the national economic development and diversification agenda.
- A lead role to be taken by either the Ministry of Agriculture or the Ministry of Science, Technology, and Tertiary Education so that they become a 'Champion' of the cause in order to mobilise and galvanise action.
- The creation of higher quality job opportunities for the increasing numbers of graduates coming out of T&T's tertiary institutions to ensure that as many as possible stay here and continue to contribute positively towards the country's future.

3.3.8 A Possible Business Model

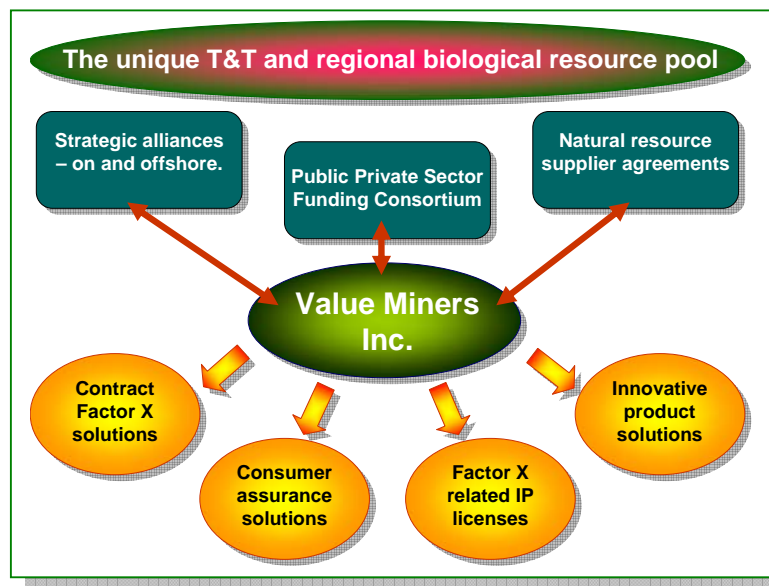
In order to develop a highly specialised business that is capable of delivering outputs that become internationally recognised, the model for a business built around this best bet opportunity area may look something like that shown in Figure 11.

The most important aspects of this proposed model are as follows:

- On the input side:
 - Alliances and partnerships with key stakeholders internationally in both the research and commercial fields need to be finalised in order to identify the priority opportunity areas and the approaches that Value Miners Inc. should focus on.
 - A public private sector funding component needs to be finalised to provide the financial resources necessary to establish and underpin the long-term sustainability of 'Value Miners Inc.'
 - Alliances and partnerships with key suppliers of the natural resources required to ensure end-client needs can be satisfied.

- On the output side the delivery options would include:
 - Projects undertaken on a contract basis to identify and commercialise 'Factor X' related opportunity areas.
 - The generation of measures of 'Factor X' components that can provide a viable commercial basis for end-customer purchase decision-making and provide them with an assurance of the authenticity and quality of the products that they are buying.
 - The creation of IP that can be licensed and generate long-term revenue streams.
 - Unique and innovative products built around derivatives from T&T's biological pool and developed in conjunction with inter-sectoral cooperative approaches that can be marketed internationally as highly unique 'must-have' items.
- All of the above would combine to generate new and innovative business streams both within T&T, the region, and internationally with T&T becoming the centre of excellence in generating value associated with the specific 'Factor X' components that are inherent in the local biological resource pool.

Figure 11: A possible business model for the 'Value Miners Inc.' best bet (⁴²)

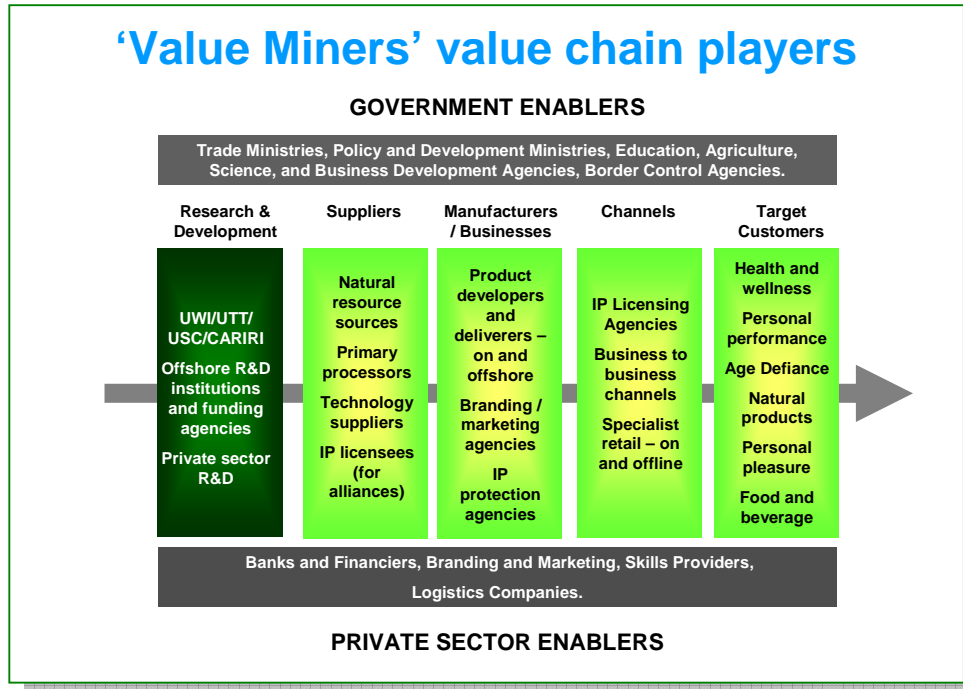


3.3.9 Best Bet Value Chain

- The main player groups in the value chain model that would be needed to leverage the value developed by 'Value Miners Inc' are shown in Figure 12.
- There are two challenges associated with developing this value chain:
 - The first is to bring together a whole range of currently isolated pieces of the jigsaw that already exist to provide the central core of people, funding, and assets required to realise this best bet.
 - The second is to develop the right combination of value chain links to maximise the revenue generation for T&T as a country. This will require a strong networking capability to develop and manage the key global research and commercial alliances and partnerships required to ensure that 'Value Miners Inc.' becomes an internationally successful business in the field of 'Factor X' value adding.

⁴² NEXT Archives

Figure 12: Key stakeholders in the 'Value Miners Inc.' value chain model (⁴³)



3.3.10 Key Players

Key Local Players

There are no obvious local commercial players who are operating in the space envisaged for this best bet. However, there are some companies operating in areas that have some relevance. Here are three examples.

Genta Inc. (⁴⁴)

Genta Inc. is a US based medical products development and marketing company with a particular focus on cures for cancer that are built around RNA and DNA. The company has a local branch in Trinidad and Tobago.

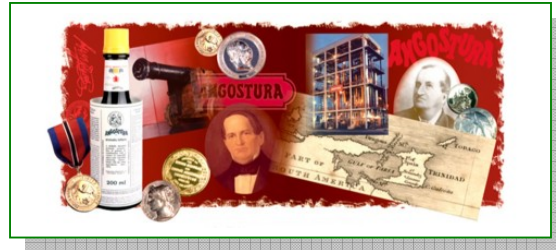


⁴³ NEXT Archives

⁴⁴ <http://www.genta.com/>

Angostura Holdings Limited ⁽⁴⁵⁾

This is one of T&T's largest and most successful food and beverage production and marketing companies. It has been highly innovative in the way it has set up global marketing and distribution alliances and their product range includes the company's internationally known Angostura Bitters – originally developed as a natural health product in the 19th century.



Cher Mere ⁽⁴⁶⁾

Cher Mere is included because of the entrepreneurial person who has developed this innovative and entrepreneurial chain of outlets in T&T and Barbados. The person is Ms Cheryl Bowles who trained as an industrial chemist. She has also developed a range of wellness and body care products that is marketed internationally and which includes key local ingredients.



In addition to these three commercial examples, the persons consulted in association with this best bet also felt that the following organisations could contribute towards realising this best bet:

- The National Herbarium at UWI, St. Augustine.
- The Food Science & Technology Unit Chemistry Engineering Department at UWI, St. Augustine.
- The University of the Caribbean with its strong emphasis on health and wellness.
- The Caribbean Industrial Research Institute (CARIRI).
- The College of Science, Technology and Applied Arts of Trinidad and Tobago (COSTAATT).
- The John Donaldson Technical Institute.
- The Cocoa Research Unit at UWI.
- The Caribbean Agricultural Research & Development Institute (CARDI).
- The National Agricultural Marketing and Development Corporation (NAMDEVCO).
- The Trinidad and Tobago Agri-business Association (TABA).
- The Food and Beverage Industry Development Committee (FBIDC).

⁴⁵ http://www.angostura.com/06_index_retry.htm

⁴⁶ <http://www.chermerecaribbean.com/>

Individual persons with skills relevant to this best bet that reviewers suggested include:

- Dr. Maxwell - Organic Chemistry Lecturer, Department of Chemistry, UWI.
- Dr. Cockburn - Biochemistry Lecturer, Head of Department, Department of Life Science, UWI.
- Dr. Umaharan - Senior Lecturer Genetics and Molecular Biology Department of Life Science, UWI.
- Dr. Baccus - Senior Lecturer/Researcher Chemical Engineering, Department of Food Science & Technology Unit, UWI.
- Dr Kumar Mahabir - who has recently published a new edition of 'Medicinal and Edible Plants used by East Indians of Trinidad and Tobago'.
- The Principals of the universities as they will direct and aid in focusing on the necessary departments via the respective deans.
- Professor David McGraw – Provost, UTT.
- Professor Clement Sankat – Principal, UWI.
- Shirley Christian Maharaj - Agricultural Director, Central Statistical Office.
- Peter Pariaj - Past Director, Central Statistical Office, and Lecturer, UWI.
- Professor Denis Pantin, Department of Economics, UWI.
- Surendra Arjoon, Department of Management Studies, UWI.

In terms of local funding sources that could be of some relevance to this best bet, the following organisations have been suggested:

- The Ministry of Trade and Industry has targeted seven industries for development and expansion and one of those is the food and beverage sector. There may be some funding available through this avenue.
- The state Research Development Facility is targeted towards businesses that need to acquire specialised technologies or introduce new concepts which improve competitiveness and profitability.
- The Business Development Corporation.
- UTT is getting government funding support to set up its Institute of Natural Products.
- The Agricultural Development Bank.

Potential private sector investors active in areas relevant to this best bet in T&T include:

- The Buccoo Reef Trust – currently funding research in conjunction with the Herbarium.
- Stuart Brothers – manufacturers and exporters of concentrated flavouring extracts and essences for beverages, ice cream, etc.
- Ms. Daphne Bartlett – President of the San Fernando Business Association. She also manufactures her own cosmetic line.
- Genta Pharmaceuticals – a local pharmaceutical company.
- Angostura – already manufacturing and exporting a range of food and beverage products including Angostura Bitters.

Other potential investors might include:

- The Buccoo Reef Foundation.
- Clico (which has already invested heavily in the cocoa production sector).
- S. M. Jaleel.
- Solo (a beverage manufacturer).
- Taste Maker Manufacturing Co. Ltd.
- Unilever Limited.
- Sasha Cosmetics.
- Nestlé.

Examples of Offshore Players

The following are examples of groups and business that are focussing on the value adding that can be achieved through connecting with growing consumer concerns about personal health and wellness. Whilst not all the commercial examples are specifically about a 'Factor X', they have all become highly successful businesses because they have applied science and technology and research and development to basic biological material sources and added substantial value.

The TRAMIL Regional Applied Research Program (⁴⁷)

This programme has a mission, 'to validate scientifically the traditional uses of medicinal plants for primary health care', and a vision, 'to be the reference interdisciplinary program in the detection, validation and diffusion of the uses of medicinal plants that impact in public health'. The group recently released a CD titled 'Caribbean Herbal Pharmacopoeia' which details the health and wellness characteristics of a range of Caribbean herbs.



POM Wonderful, USA (^{48, 49})

This is an excellent example of the value adding that can be achieved by focusing of 'Factor X' health and wellness benefits of a product. Los Angeles entrepreneurs, Stewart & Sylvia Resnick - ex-Nike marketing executives, bought a farm in 1987 and on that farm were 40 hectares of pomegranates.



⁴⁷ <http://www.funredes.org/endacaribe/traduccion/tramil.html>

⁴⁸ <http://www.pomwonderful.com/>

⁴⁹ http://www.tffi.net/article_view/107

Ignoring advice to cut them out, they instead invested US\$ 10 million into documenting the potential health benefits of pomegranate juice. It is very high in anti-oxidants. They also developed a fantastic brand, smart packaging, and adopted innovative 'in your face' promotional activities.

They started making and selling the juice in 2002. By 2003 they were turning over US\$ 12 million. By 2006 the turnover had soared to US\$ 91 million. They have funded 21 research projects to demonstrate the positive benefits of consuming pomegranate juice and another 44 are being planned. They have actually spent more of R&D than on marketing and advertising.

Comvita, New Zealand (⁵⁰)



Comvita is a globally successful New Zealand based public company that develops and markets a wide range of honey based products, in particular health and wellness derived products based on the powerful anti-bacterial effects associated with 'high active' manuka honey. This honey is derived from the nectar in flowers on one of New Zealand's native plants, manuka (*Leptospermum scoparium*).

Professor Peter Mowlan at the Waikato Honey Research Unit (⁵¹) found that the lines of honey coming from different locations where specific biotypes of manuka had evolved had quite different levels of activity against bacteria. He found that this was due to a factor in the honey initially called UMF (the unique manuka factor). Some biotypes produced nectar with a naturally higher level of this factor. Recently, German researchers found that a major active component in the UMF is a compound called methylglyoxal (⁵²) – which is also found in cocoa and coffee.

Mowlan developed a simple 0 - 20 numerical scale to indicate the activity levels in different lines of manuka honey so that consumers could be assured of the benefits of the product. As a consequence, lines that have 15+ levels now receive a 2500% premium over standard commodity honey.

'The Coal Pot', Grand Bay, Dominica (^{53 54})

This is a small innovative company that began business just five years ago. The owner, Ms Avriel James, is an entrepreneurial person who has overcome many hurdles on the pathway to success by being smart and having a natural instinct for picking the winning ways. All the soap and personal care products the company has developed are derived from natural products with a strong emphasis on raw materials sourced within Dominica or from neighbouring islands.



⁵⁰ <http://www.comvita.com/index.html>

⁵¹ <http://bio.waikato.ac.nz/honey/special.shtml>

⁵² <http://www.scoop.co.nz/stories/SC0707/S00002.htm>

⁵³ <http://www.coalpot-soaps.com>

⁵⁴ Photo NEXT archives

The company has developed its own unique manufacturing process which preserves the inherent qualities of the fresh herbs used in many of their products. It is still a small company, but growing rapidly. Their products are currently exported to North America, the UK, France, Germany and a number of the Caribbean islands.

The company's products command a 400% premium over commodity soaps and body care products because of the special characteristics they have.

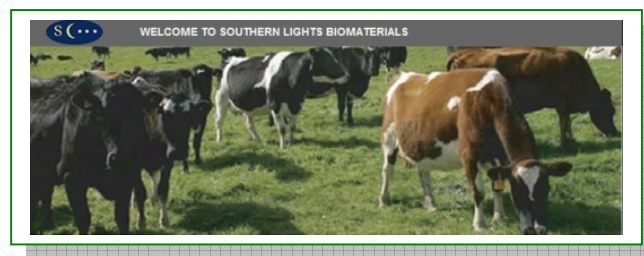
Southern Lights Biomaterials, New Zealand ⁽⁵⁵⁾

This company is another example of how huge value can be added by being aware of growth opportunities and taking advantage of a unique opportunity situation to build a highly innovative and entrepreneurial business.

The founder, Mr Peter Meyer, is an American born investment banker who was the joint owner of a successful bank in London for many years. He sold out his interest in the bank and moved to New Zealand in the 1990's. He looked at a number of possible investment opportunities and then found one which had huge value adding potential.

New Zealand cattle are certified free of both foot and mouth disease and bovine spongiform encephalopathy (BSE). For over a century all the waste components that arose during the abattoir processing operations for cattle were simply rendered down into low value tallow and blood and bone fertiliser. The latter had a value of about US\$ 0.20 / kg.

Southern Lights Biomaterials have built a business around extracting specific pieces of bovine tendon tissue from the abattoir waste streams and cleaning them up so that they meet stringent medical standards. The resulting product has an end value of as much as US\$ 2,000 / kg. The value paid to the processors for the tendon pieces is around US\$ 20 / kg – 100 times more than the value processors had received previously. SLB generates a further 100 times increase in value through its smart marketing initiatives.



Other offshore players who those interviewed considered might add value to this best bet include:

- The Canadian government, which provides funding and support assistance for collaborative projects. A key focus is on sustainability but, historically, some of the funding has been terminated due to poor local practices.
- The Food and Agricultural Organisation (FAO).
- The Inter-America Development Bank.

⁵⁵ http://www.slv.co.nz/who_we_are.php

- The Caribbean Development Bank.
- Specialist development funding agencies associated with the EU.
- CARICOM is endeavouring to set up a regional R&D fund.
- UWI is examining ways of securing external funding sources.
- The Inter-American Institute for Cooperation on Agriculture (IICA).
- The Organisation of American States (OAS).
- The Pan-American Health Organisation (PAO).
- The Caribbean Export Development Agency (CEDA).
- Caribbean Export.

3.3.11 Implementation Roadmap

An indicative roadmap of the steps needed to establish 'Value Miners Inc' as a business, the targets set, what will be needed to ensure those targets are achieved, and who is involved in order to achieve the desired outcomes associated with this investment opportunity is presented in Table 7.

Table 7: Indicative road map for implementing the 'Value Miners Inc.' best bet investment opportunity

By when?	What?	Who?
Initial	<ul style="list-style-type: none"> • Form a public private partnership consortium to establish the business and identify major opportunity areas. • Finalise the business model and strategy to set up and run the business. • Define the parameters upon which projects will be selected – e.g. which will offer T&T a unique competitive advantage. • Identify the 'low hanging fruit' opportunities that have the potential to generate short-term revenue. • Establish key R&D and commercial alliances locally and offshore. • Access and appoint key personnel. • Finalise a commercialisation strategy and roadmap. • Develop a branding and marketing strategy. • Identify funding needs and sourcing. 	<ul style="list-style-type: none"> • R&D sector / Private sector / Public sector. • Consortium leaders. • Consortium leaders. • Consortium leaders. • Consortium leaders. • Consortium leaders. • Consortium leaders. • Consortium leaders. • Branding/marketing group. • Consortium leaders.
1st 6 months	<ul style="list-style-type: none"> • Set up the business – staff and premises. • Undertake market research and select 3 'low hanging fruit' opportunity areas to focus initial efforts on. • Select 3 other medium to longer term areas that offer the potential for IP generation and innovative product development. • Negotiate 3 R&D contracts. • Pursue potential end user clients and establish a relationship 	<ul style="list-style-type: none"> • Consortium team. • Market researchers / R&D / Private sector. • Market researchers / R&D / Private sector. • R&D sector / Consortium team. • Consortium team.
2nd 6 months	<ul style="list-style-type: none"> • Build up the R&D capability and commercial network to support the identification and development of potentially marketable solutions. • Complete 3 R&D contracts and negotiate 4 for the following year. • Develop at least one saleable solution from the 3 initial 'low hanging fruit' opportunity areas and pursue 3 more additional areas. 	<ul style="list-style-type: none"> • Networking specialist / Consortium team. • R&D sector / Consortium team. • R&D sector / Consortium team.

	<ul style="list-style-type: none"> • Advance work on developing the first IP-based products from the 3 medium to long-term opportunity areas. • Secure funding needs and resources for Year 2. 	<ul style="list-style-type: none"> • R&D sector / Consortium team. • Consortium leaders PPP.
Year 2	<ul style="list-style-type: none"> • Continue to build up the R&D capability and commercial network to support the identification and development of potentially marketable solutions. • Complete 4 R&D contracts and negotiate 5 more for the following year. • Develop at least one more saleable solution from the 3 initial 'low hanging fruit' opportunity areas and pursue 3 more additional areas. • Finalise development of the first IP-based product from the 3 medium to long-term opportunity areas and start work in another 3 areas. • Achieve gross revenue of US\$ 515,000. • Secure funding needs and resources for Year 3. 	<ul style="list-style-type: none"> • Networking specialist / Consortium team. • R&D sector / Consortium team. • R&D sector / Consortium team. • IP sales specialist/R&D sector / Consortium team. • Consortium team. • Consortium leaders PPP.
Year 3	<ul style="list-style-type: none"> • Continue to build up the R&D capability and commercial network to support the identification and development of potentially marketable solutions. • Complete 5 R&D contracts and negotiate 7 more for the following year. • Develop at least one more saleable solution from the 6 initial 'low hanging fruit' opportunity areas and pursue 3 more additional areas. • Finalise development of the second IP-based product from the 6 medium to long-term opportunity areas and start work in another 3 areas. • Achieve gross revenue of US\$ 1,070,000. • Secure funding needs and resources for Year 4. 	<ul style="list-style-type: none"> • Networking specialist / Consortium team. • R&D sector / Consortium team. • R&D sector / Consortium team. • IP sales specialist/R&D sector / Consortium team. • Consortium team. • Consortium leaders PPP.
Year 4	<ul style="list-style-type: none"> • Continue to build up the R&D capability and commercial network to support the identification and development of potentially marketable solutions. • Complete 7 R&D contracts and negotiate 9 more for the following year. • Develop at least two more saleable solutions from the 9 initial 'low hanging fruit' opportunity areas and pursue 3 more additional areas. • Finalise development of the third and fourth IP-based products from the 9 medium to long-term opportunity areas and start work in another 3 areas. • Achieve gross revenue of US\$ 2,000,000. • Secure funding needs and resources for Year 5. 	<ul style="list-style-type: none"> • Networking specialist / Consortium team. • R&D sector / Consortium team. • R&D sector / Consortium team. • IP sales specialist/R&D sector / Consortium team. • Consortium team. • Consortium leaders PPP.
Year 5	<ul style="list-style-type: none"> • Continue to build up the R&D capability and commercial network to support the identification and development of potentially marketable solutions. • Complete 9 R&D contracts and negotiate 11 more for the following year. • Develop at least 3 more saleable solutions from the 12 initial 'low hanging fruit' opportunity areas and pursue 3 more additional areas. • Finalise development of the fifth and sixth IP-based products from the 12 medium to long-term opportunity areas and start work in another 3 areas. • Achieve gross revenue of US\$ 3,870,000. • Secure funding needs and resources for Year 6. 	<ul style="list-style-type: none"> • Networking specialist / Consortium team. • R&D sector / Consortium team. • R&D sector / Consortium team. • IP sales specialist/R&D sector / Consortium team. • Consortium team. • Consortium leaders PPP.

3.3.12 Financial Scenario

- This financial scenario combines both short-term and long-term elements of investment needs and revenue generation. The short-term component includes contract research to develop specific ‘Factor X’ solutions for clients on a national, regional or international basis. The long-term components include the development of solutions that involve developing IP license-based solutions that provide license fees as well as ongoing royalties from ongoing product sales. It is a quite conservative model.
- The summary in Table 8 provides a ‘best-guess’ estimate of the potential revenues, expenses, and EBIT figures that could be achieved over a ten-year period based upon the combination of short and long-term business areas described above.

This financial scenario has not been subjected to detailed scrutiny. It is intended to be an example of what could be achieved in the top 20% of the range of potential scenario outcomes. Before making an investment commitment, it would need further development and to be subjected to due diligence.

Full details can be found in the Appendix at the end of this report.

Table 8: Indicative financial projections for the ‘Value Miners Inc.’ investment opportunity

	By year 3	By year 6	By year 10
Gross revenue from all activities	US \$ 1,070,000	US\$ 6,220,000	US\$ 28,920,000
Basis of the revenue figure	<ul style="list-style-type: none"> • 5 R&D contracts @ US\$ 120,000 each. • 100,000 customer solutions @ a US\$ 1.00 royalty/unit. • 1 IP license @ US\$ 120,000 each. • 100,000 units of innovative products with a US\$ 2.5 royalty/unit. 	<ul style="list-style-type: none"> • 11 R&D contracts @ US\$ 120,000 each. • 1,200,000 customer solutions @ a US\$ 1.00 royalty/unit. • 10 IP licenses @ US\$ 120,000 each. • 1,000,000 units of innovative products with a US\$ 2.5 royalty/unit. 	<ul style="list-style-type: none"> • 19 R&D contracts @ US\$ 120,000 each. • 4,000,000 customer solutions @ a US\$ 1.00 royalty/unit. • 22 IP licenses @ US\$ 120,000 each. • 8,000,000 units of innovative products with a US\$ 2.5 royalty/unit.
Capital expenditure*	US\$ 2,500,000	US\$ 1,700,000	US\$ 2,000,000
Operating expenditure	US\$ 4,387,500	US\$ 14,760,000	US\$ 45,780,000
Earnings before interest and tax (EBIT)	US\$ 1,462,500	US\$ 4,920,000	US\$ 15,260,000

* Does not include government investment.

3.3.13 NEXT Star Rating



- T&T has a considerable pool of flora and fauna, some commercial and some natural, to which little value adding has been created.
- There is already a considerable research resource that will enable the business to identify ‘low hanging fruit’ opportunities, such as the bio-actives in cocoa, that can be rapidly commercialised through the application of R&D and innovation.

- There is also a considerable amount of research that has been done internationally that provides valuable insights into sources of potential value adding that can be practically commercialised.
- There is a growing pool of young talent emerging from universities who have been trained in the biosciences field.
- There is also a significant pool of experienced researchers in the country who have a wide range of expertise relevant to the realisation of this best bet.
- Becoming aligned with key international R&D and commercial organisations will be essential for leveraging the potential value associated with T&T's pool of biological diversity.
- Whilst this is still an emerging field, there have been significant commercial successes achieved in recent years which demonstrate the value adding potential that consumers create in association with products which have a scientifically proven inherent 'Factor X'.
- There is a real opportunity for such a T&T based business to achieve a high degree of success.
- The revenues generated from successful 'Factor X' commercial applications have the potential to add significantly to the country's economic and social development – particularly in the provision of high quality job opportunities for university qualified graduates.
- It would also add a new potentially higher value dimension to the country's agricultural sector.
- The only realistic model for this best bet appears to be a public private partnership because of the R&D investment levels required.
- It is critical that 'Value Miners Inc.' is managed on a strict commercial basis to ensure that revenue generation targets are achieved and the future contributions made to T&T are maximised.

4 What Comes Next?

There has been a group of very enthusiastic persons involved in developing the best bets in this sector foresight project over the past nine months. The group included persons from the public, private, and institutional sectors with a strong R&D contingent. The level of enthusiasm and the quality of input from participants has been outstanding.

Undertaking this project has resulted in the following:

- Building up a network of people who have a passion for applying foresight and innovation in both the public and private sectors to the biotechnology sector with the purpose of identifying future opportunities that will advance T&T economically and socially.
- Identifying a wide range of capabilities and enablers that exist but also demonstrating that there is a high degree of fragmentation and disconnection between various stakeholder groups.
- Identifying the need for a high level 'Champion' who can 'sell' the benefits of investing in these high growth opportunity areas.
- Demonstrating that there is a great deal of potential locked up in the country's natural biological resource pool that has considerable inherent value if a combination of science and technology, alongside entrepreneurship and innovation, could be encouraged and facilitated.
- Indicating that all three best bets can only really become a commercial success if they are backed by some form of a public private partnership arrangement, particularly because of the initial R&D investment inputs required.
- Demonstrating that old industries can be given a new lease of life if R&D and S&T are applied.

The challenge now is not only to see how many of these Advanced Biotechnology Sector Best Bet Investment Opportunity Cases can become a commercial reality but also for Trinidad and Tobago to develop a National Growth and Innovation Framework and Strategy to prioritise the allocation of limited resources into areas which have the potential to generate the best future returns for the country.

The development of such a framework will be essential if the foresighting approach is to take a hold and help stimulate the development of new entrepreneurial businesses that have medium to long-term high growth prospects and can deliver the outcomes the country desires.

Such a framework and strategy would align all the country's key agencies, stakeholders, and resources in one go-forward direction. Once this is achieved, then the country will make real progress towards achieving its goal of becoming a fully developed nation by the year 2020. The latest indications are that such an approach is closer to becoming a reality.

These best bets are ambitious - but being ambitious is critical for the future success of a small nation with big aspirations - such as T&T.

5 Appendix – Best Bet Financial Scenarios

BEST BET SECTOR: Advanced Biotechnology		BEST BET 1: 'SuperCane Inc.'											
		File date:		12/06/08									
		Last review:		02/07/08									
10 Year Financial Projection Model (US\$)													
		YEAR											
		1	2	3	4	5	6	7	8	9	10		
GOVT INVESTMENT	Description												
S&T research	Tech. & processes	300000	300000	300000	300000	300000	300000	300000	300000	300000	300000		
Education	Training	250000	250000	250000	250000	250000	250000	250000	250000	250000	250000		
Trade development	Market development	250000	250000	250000	250000	250000	250000	250000	250000	250000	250000		
Total Govt investment		800000	800000	800000	800000	800000	800000	800000	800000	800000	800000		
COMMERCIAL INVESTMENT													
		YEAR											
		1	2	3	4	5	6	7	8	9	10		
REVENUE	Description												
Product/Service Line 1	HI-tech process solns												
Volume	No	0	1	2	3	4	5	6	7	8	9		
Value/Unit	Value per solution	250000	250000	250000	250000	250000	250000	250000	250000	250000	250000		
Gross line revenue		0	250000	500000	750000	1000000	1250000	1500000	1750000	2000000	2250000		
Product/Service Line 2	IP licences												
Volume	No of licences	0	1	3	6	10	15	20	30	40	50		
Value/Unit	Value of licences	150000	150000	150000	150000	150000	150000	150000	150000	150000	150000		
Gross line revenue		0	150000	450000	900000	1500000	2250000	3000000	4500000	6000000	7500000		
Product/Service Line 3	R&D Contracts												
Volume	No of contracts	3	4	5	7	9	11	13	15	18	22		
Value/Unit	Value per contract	120000	120000	120000	120000	120000	120000	120000	120000	120000	120000		
Gross line revenue		360000	480000	600000	840000	1080000	1320000	1560000	1800000	2160000	2640000		
Product/Service Line 4	Innovative products												
Volume	No of units	0	100000	1000000	2000000	5000000	10000000	20000000	40000000	60000000	80000000		
Value/Unit	Royalty per unit US\$	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5		
Gross line revenue		0	50000	500000	1000000	2500000	5000000	10000000	20000000	30000000	40000000		
Total Revenue		360000	930000	2050000	3490000	6080000	9820000	16060000	28050000	40160000	52390000		
EXPENSES													
Capex	Description												
Item 1	Facilities & equipment	1000000	500000	500000	500000	500000	500000	500000	500000	500000	500000		
Item 2	Network set up costs	250000	50000	50000	50000	50000	50000	50000	50000	50000	50000		
Total Capex		1250000	550000	550000	550000	550000	550000	550000	550000	550000	550000		
Opex	Description												
Packaging	Not applicable	0	0	0	0	0	0	0	0	0	0		
Salary and wages	40% gross rev (1)	750000	850000	820000	1396000	2432000	3928000	6424000	11220000	16064000	20956000		
Freight	Not applicable	0	0	0	0	0	0	0	0	0	0		
Marketing	5% of gross rev. (2)	50000	75000	102500	174500	304000	491000	803000	1402500	2008000	2619500		
Distribution	Not applicable	0	0	0	0	0	0	0	0	0	0		
Travel	7.5% of gross rev. (3)	50000	75000	153750	261750	456000	736500	1204500	2103750	3012000	3929250		
Communications	5% of gross rev	18000	46500	102500	174500	304000	491000	803000	1402500	2008000	2619500		
E-commerce	Not applicable	0	0	0	0	0	0	0	0	0	0		
Rental	5% of gross revenue	18000	46500	102500	174500	304000	491000	803000	1402500	2008000	2619500		
Consumables	5% of gross rev (4)	50000	75000	102500	174500	304000	491000	803000	1402500	2008000	2619500		
Administration	5% of gross rev (5)	30000	46500	102500	174500	304000	491000	803000	1402500	2008000	2619500		
Total Opex		966000	1214500	1486250	2530250	4408000	7119500	11643500	20336250	29116000	37982750		
EBIT		-606000	-284500	563750	959750	1672000	2700500	4416500	7713750	11044000	14407250		
EBIT - CAPEX		-1856000	-834500	13750	409750	1122000	2150500	3866500	7163750	10494000	13857250		
EBIT - (Capex+Govt)		-2656000	-1634500	-786250	-390250	322000	1350500	3066500	6363750	9694000	13057250		
NOTES:													
CAPEX and OPEX CAPEX is capital expenditure. OPEX is operational expenditure													
1 Salary and wages are a fixed sum in years 1 and 2. This figure also includes rewards paid to solution developers who are part of the 'Idea factory'.													
2 Marketing costs are adjusted upwards in years 1 and 2 and these are complemented by state agency promotional activities (allocation under Government Investment).													
3 Travel costs adjusted upwards in years 1 and 2. It is assumed considerable travel will be needed to ensure that the knowledge base is leading edge internationally.													
4 Consumables costs adjusted upwards in years 1 and 2.													
5 Administration costs adjusted upwards in years 1 and 2.													

BEST BET SECTOR: Advanced Biotechnology		BEST BET 2: 'Customised Bio-Indicators Inc'									
		File date:		19/06/08							
		Last review:		02/07/08							
10 Year Financial Projection Model (US\$)											
		YEAR									
		1	2	3	4	5	6	7	8	9	10
GOVT INVESTMENT	Description										
S&T research	Identifying sources	500000	500000	500000	500000	500000	500000	500000	500000	500000	500000
Education	Training	250000	250000	250000	250000	250000	250000	250000	250000	250000	250000
Trade development	Marketing support	250000	250000	250000	250000	250000	250000	250000	250000	250000	250000
Total Govt investment		1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000
COMMERCIAL INVESTMENT											
		YEAR									
		1	2	3	4	5	6	7	8	9	10
REVENUE	Description										
Product/Service Line 1	R&D contracts										
Volume	No	3	4	5	6	7	8	9	10	11	12
Value/Unit	Value per solution	250000	250000	250000	250000	250000	250000	250000	250000	250000	250000
Gross line revenue		750000	1000000	1250000	1500000	1750000	2000000	2250000	2500000	2750000	3000000
Product/Service Line 2	Customised solutions										
Volume	No of solutions	0	1	2	3	5	8	12	18	24	30
Value/Unit	Value per solution	200000	200000	200000	200000	200000	200000	200000	200000	200000	200000
Gross line revenue		0	200000	400000	600000	1000000	1600000	2400000	3600000	4800000	6000000
Product/Service Line 3	IP licenced solutions										
Volume	No of licenses	0	1	2	5	7	9	11	13	15	17
Value/Unit	Value per license	50000	750000	100000	120000	120000	120000	120000	120000	120000	120000
Licensed units sold	No.		5000	40000	75000	100000	150000	200000	300000	400000	500000
Value/Unit	Royalty US\$		100	100	100	100	100	100	100	100	100
Gross line revenue		0	1250000	4200000	8100000	10840000	16080000	21320000	31560000	41800000	52040000
Total Revenue		750000	2450000	5850000	10200000	13590000	19680000	25970000	37660000	49350000	61040000
EXPENSES											
Capex	Description										
Item 1	Facilities & equipment	1000000	750000	750000	600000	600000	500000	500000	500000	500000	500000
Item 2											
Total Capex		1000000	750000	750000	600000	600000	500000	500000	500000	500000	500000
Opex	Description										
Packaging	Not applicable	0	0	0	0	0	0	0	0	0	0
Salary and wages	45% gross rev (1)	750000	1000000	2632500	4590000	6115500	8856000	11686500	16947000	22207500	27468000
Freight	Not applicable	0	0	0	0	0	0	0	0	0	0
Marketing	5% of gross rev. (2)	50000	75000	292500	510000	679500	984000	1298500	1883000	2467500	3052000
Distribution	Not applicable	0	0	0	0	0	0	0	0	0	0
Travel	5% of gross rev. (3)	50000	75000	292500	510000	679500	984000	1298500	1883000	2467500	3052000
Communications	5% of gross rev	37500	122500	292500	510000	679500	984000	1298500	1883000	2467500	3052000
E-commerce	Not applicable	0	0	0	0	0	0	0	0	0	0
Rental	5% of gross revenue	37500	122500	292500	510000	679500	984000	1298500	1883000	2467500	3052000
Consumables	5% of gross rev (4)	50000	75000	292500	510000	679500	984000	1298500	1883000	2467500	3052000
Administration	5% of gross rev (5)	30000	122500	292500	510000	679500	984000	1298500	1883000	2467500	3052000
Total Opex		1005000	1592500	4387500	7650000	10192500	14760000	19477500	28245000	37012500	45780000
EBIT		-255000	857500	1462500	2550000	3397500	4920000	6492500	9415000	12337500	15260000
EBIT - CAPEX		-1255000	107500	712500	1950000	2797500	4420000	5992500	8915000	11837500	14760000
EBIT - (Capex+Govt)		-2255000	-892500	-287500	950000	1797500	3420000	4992500	7915000	10837500	13760000
NOTES:											
	CAPEX and OPEX	CAPEX is capital expenditure. OPEX is operational expenditure									
		1 Salary and wages are a fixed sum in years 1 and 2.									
		2 Marketing costs are adjusted upwards in years 1 and 2 and these are complemented by state agency promotional activities (allocation under Government Investment).									
		3 Travel costs adjusted upwards in years 1 and 2. It is assumed considerable travel will be needed to develop and maintain strategic alliances.									
		4 Consumables costs adjusted upwards in years 1 and 2.									
		5 Administration costs adjusted upwards in years 1 and 2.									

BEST BET SECTOR: Advanced Biotechnology		BEST BET 3: 'Value Miners Inc.'									
		File date:	01/07/08								
		Last review:	01/07/08								
10 Year Financial Projection Model (US\$)											
		YEAR									
		1	2	3	4	5	6	7	8	9	10
GOVT INVESTMENT	Description										
S&T research	Tech. & processes	400000	400000	400000	400000	400000	400000	400000	400000	400000	400000
Education	Training	350000	350000	350000	350000	350000	350000	350000	350000	350000	350000
Trade development	Market development	250000	250000	250000	250000	250000	250000	250000	250000	250000	250000
Total Govt investment		1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000	1000000
COMMERCIAL INVESTMENT											
		YEAR									
		1	2	3	4	5	6	7	8	9	10
REVENUE	Description										
Product/Service Line 1	R&D Contracts										
Volume	No. of contracts	3	4	5	7	9	11	13	15	17	19
Value/Unit	Value per contract	120000	120000	120000	120000	120000	120000	120000	120000	120000	120000
Gross line revenue		360000	480000	600000	840000	1080000	1320000	1560000	1800000	2040000	2280000
Product/Service Line 2	Consumer solutions										
Volume	No of units	0	10000	100000	300000	700000	1200000	1800000	2500000	3000000	4000000
Value/Unit	Royalty per unit US\$	1	1	1	1	1	1	1	1	1	1
Gross line revenue		0	10000	100000	300000	700000	1200000	1800000	2500000	3000000	4000000
Product/Service Line 3	IP Licenses										
Volume	No of licenses	0	0	1	3	7	10	13	16	19	22
Value/Unit	Value per license	120000	120000	120000	120000	120000	120000	120000	120000	120000	120000
Gross line revenue		0	0	120000	360000	840000	1200000	1560000	1920000	2280000	2640000
Product/Service Line 4	Innovative products										
Volume	No of units	0	10000	100000	200000	500000	1000000	2000000	4000000	6000000	8000000
Value/Unit	Royalty per unit US\$	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Gross line revenue		0	25000	250000	500000	1250000	2500000	5000000	10000000	15000000	20000000
Total Revenue		360000	515000	1070000	2000000	3870000	6220000	9920000	16220000	22320000	28920000
EXPENSES											
Capex	Description										
Item 1	Facilities & equipment	1000000	500000	500000	500000	500000	500000	500000	500000	500000	500000
Item 2											
Total Capex		1000000	500000	500000	500000	500000	500000	500000	500000	500000	500000
Opex	Description										
Packaging	Not applicable	0	0	0	0	0	0	0	0	0	0
Salary and wages	40% gross rev (1)	750000	850000	428000	800000	1548000	2488000	3968000	6488000	8928000	11568000
Freight	Not applicable	0	0	0	0	0	0	0	0	0	0
Marketing	5% of gross rev. (2)	50000	75000	53500	100000	193500	311000	496000	811000	1116000	1446000
Distribution	Not applicable	0	0	0	0	0	0	0	0	0	0
Travel	5% of gross rev.	18000	25750	53500	100000	193500	311000	496000	811000	1116000	1446000
Communications	2.5% of gross rev (3)	20000	20000	35000	50000	96750	155500	248000	405500	558000	723000
E-commerce	Not applicable	0	0	0	0	0	0	0	0	0	0
Rental	2.5% of gross rev. (4)	20000	20000	26750	50000	96750	155500	248000	405500	558000	723000
Consumables	7.5% of gross rev	27000	38625	80250	150000	290250	466500	744000	1216500	1674000	2169000
Administration	2.5% of gross rev (5)	30000	40000	53500	100000	193500	311000	496000	811000	1116000	1446000
Total Opex		915000	1069375	730500	1350000	2612250	4198500	6696000	10948500	15066000	19521000
EBIT		-555000	-554375	339500	650000	1257750	2021500	3224000	5271500	7254000	9399000
EBIT - CAPEX		-1555000	-1054375	-160500	150000	757750	1521500	2724000	4771500	6754000	8899000
EBIT - (Capex+Govt)		-2555000	-2054375	-1160500	-850000	-242250	521500	1724000	3771500	5754000	7899000
NOTES:											
	CAPEX and OPEX	CAPEX is capital expenditure. OPEX is operational expenditure									
		1 Salary and wages are a fixed sum in years 1 and 2. This figure also includes rewards paid to solution developers who are part of the 'idea factory'.									
		2 Marketing costs are adjusted upwards in years 1 and 2 and these are complemented by state agency promotional activities (allocation under Government Investment).									
		3 Communications costs adjusted upwards in years 1, 2 and 3.									
		4 Rental costs adjusted upwards in years 1 and 2.									
		5 Administration costs adjusted upwards in years 1 and 2.									