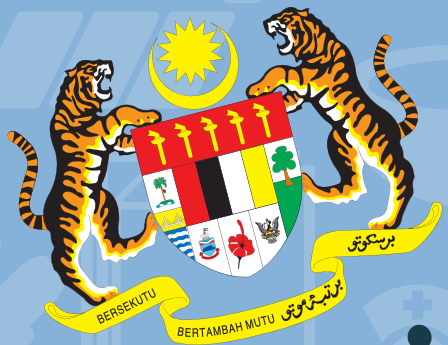
{ Innovation
Business
Opportunities }

# Wealth for Malaysia

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# Wealth for Malaysia

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# Wealth for Malaysia

## Foreword

**Innovation is not invention. Innovation is about generating benefits, be they societal or financial. Invention is about discovering or creating something new. An invention only becomes an innovation when it generates societal or commercial value.**

**The Innovation Business Opportunities in this booklet are just that, opportunities to turn Malaysian inventions into Malaysian innovations. Malaysian researchers and inventors spend a great deal of effort in discovering new things. Now it's time for entrepreneurs and businesses to step forward and work towards creating value from these discoveries.**

**We need to work together to make this happen; researchers and inventors are great at the ideation and creation of inventions, businesses and entrepreneurs are great at creating and capitalising opportunities; neither party can work alone, inventors need industry to help them derive benefits from their work, while industry needs the inventors to continue pushing the boundaries and develop products and services that will help make Malaysian industry more competitive on the international market.**

**However there is a big problem. The gap between industry and inventors is too large. This booklet is designed to help close the gap. Each of the projects here have the potential to become great products or services and we have tried to illustrate this by simplifying the technical descriptions and instead choosing to focus on the potential benefits of the projects, how they can be utilised and the potential value that they may be able to create. In doing this we hope to bridge the gap between industry and inventors by providing project overviews that industry can relate to. Only once the benefits have been made clear should the technical discussions take place.**

**If you are interested in any of the Innovation Business Opportunities that you see in this booklet please contact us at wealthcreation@innovation.my for further details.**

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# Money Making Opportunity

## Innovation Business Opportunity

**RM 44.5 Million**
Potential Yr3 Revenue

Cilibangi™
the joy of chili taste!
Since 1978

# CiliBangi
## (UKM006)

**Synchronised Flowering and Fruiting**
**Viral Disease Resistance**
**Standardised Hotness and Savoury**
**Seven Harvests per Plant**


# CiliBangi (UKM006)

## Project Overview
Over thirty years of conventional breeding has led to the development of disease resistant Cilibangi (Capsicum annum L.) varieties that provides predictable "hotness," while possessing a long shelf life and unique innovative features suitable for economical farming to produce higher fruit yield. These varieties are not genetically modified.

## Business Idea
To distribute Cilibangi seedlings and to conduct further research into chilli production for high-valued agricultural end-products.

## Business Model
Within Malaysia, Cilibangi House and Cilibangi Hut will be set up to produce and distribute superior and elite Cilibangi seedlings. Cilibangi seedlings will be distributed within Malaysia and Crunchious, premium variety of Cilibangi will be licensed to exclusive farmers. Once Cilibangi House and Cilibangi Hut are well-established, Cilibangi Shoppe & Cafe will open to be the distribution channel for fresh Cilibangi and end products of Cilibangi.

## Business Opportunity
Chili is an important global food and is especially popular in South East Asian cuisine. Currently, most chilli farming use traditional chilli varieties, which display numerous weaknesses compared to the Cilibangi varieties. While chili is most often used as a food, it also has applications in healthcare, cosmetics, fragrances and others.

## Market Analysis
Chilli has a large, important global market, with more than 7 million metric tons produced per year, as of 2009(i). Regionally, India and China are both the largest producers and consumers of chilies. According to the FAO dried chilli alone represents a RM 47 billion global market(ii). Malaysia is a huge importer of chillies, importing roughly RM 71 million worth of chillies in 2011 alone(iii).

## Competitive Advantages
Malaysia and S.E. Asia's climate offer a year round growing season, which contrasts with many western nations which can only grow chilli during the summer season. Furthermore, Cilibangi varieties have consistent "hotness" levels and a well-received reliable taste by consumers. The plants are able to produce more than seven harvests of chillies before they need to be replanted, contrasting with the three harvests produced by other chilli varieties.

## Competitor Analysis
Currently, India, China, and Pakistan are the largest exporters of chilli. The Netherlands and Spain are also among the largest exporters of chilli. No single firm or group of firms appear to be dominating chilli production as in China and Taiwan, but they do not have long warranty periods and have lower fruit quality.

## Technology Solution / Innovation
Backed by 30 years of R&D, Cilibangi is a product of extensive research producing six varieties of Cilibangi, corresponding to different content levels of capsaicin or "hotness," that will yield numerous advantages over currently used varieties. These Cilibangi varieties have a determinate plant habit that produces both synchronised flowers and fruits compared to indeterminate varieties currently available. As Cilibangi plants are disease resistant towards Chilli Veinal Mottle Virus, Cucumber Mosaic Virus and Anthracnose where it will increase the production of high quality chillies. With these unique features, planning for large scale planting is highly possible, both staggered and target plantings.

## Project Challenges
Malaysia will face stiff competition from international competitors which have already established in chili industries. Cilibangi seedlings will be distributed throughout the regions and Crunchious, the premium variety of Cilibangi will be licensed to reduce the competitive advantages granted to Malaysia's chilli industry.

## Intellectual Property Rights
The varieties of Cilibangi are protected and registered under Plant Breeder's Rights.

## Project Status
UKM has a spin-off company, Serotech Shd Bhd., to handle the production and distribution of the Cilibangi seedlings. The company is currently interested in searching for potential chili farmers and distributors to bring these highly innovative products to the market.

## Financials
Currently, Malaysia imports roughly 71 thousand tons of chilli per year, at a value of roughly RM 5000 per ton(iii). The first financial year is to build a strong Cilibangi farming industry while year two and three are projected for strong growth to meet local demand with continuous supply of Cilibangi. In the first year, the company estimates to take over approximately 5 percent of the import market, then 10 and 20 percent in years 2 and 3, respectively. These projects are based on the development of a full scale chilli industry, with Cilibangi constituting the primary supply of seedlings.

Y1- RM 18,750,000
Y2- RM 40,875,000
Y3- RM 44,550,000

## Funding Requirement
As the research and testing of these products has already been conducted, start-up costs should be manageable, especially if the product is licensed. As Malaysia does not currently support a large chilli industry, setting up a chilli plantation, or working closely with established agriculture firms in Malaysia might help kick-start the industry, but the fund raising would be required.

Source: **(i)** http://www.mcc.gov/documents/investmentopps/bom-ghana-english-chili.pdf **(ii)** http://faostat.fao.org/site/613/DesktopDefault.aspx?PageID=613#ancor **(iii)** http://www.trademap.org/Country_SelProduct.aspx

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# Money Making Opportunity

## Innovation Business Opportunity

RM
**24** Million
Potential Yr3 Revenue

# Red Seaweed For Pulp and Bioethanol
## (UM005)

**Producing Pulp in Shorter Time (2 Stages Only)**

**Energy Efficient and Low CO2 Emission**

**Smoother Paper and Higher Opacity**

# Red Seaweed for Pulp and Bioethanol (UM005)

## Project Overview
The research team at University of Malaya (UM) is working with the Fisheries Dept. Malaysia and Pegasus International (South Korea) to develop a sea farm system for growing red seaweed on a large scale in Malaysia and a production system to create pulp (for the paper industry) and bioethanol.

## Business Idea
To design and develop an efficient system to grow red seaweed (*Gelidium*) on a large scale in Malaysia and to produce pulp and bioethanol from the harvested seaweed.

## Business Model
(i) The first model is to collaborate with companies and agencies with access to sea-farm land to set up large scale seaweed farms. Then setup manufacturing facilities that will produce the paper pulp and bioethanol from the seaweed. (ii) The second model is to acquire sea-farm land on long term lease and setup the seaweed farms and the production facilities for the pulp and bioethanol.

## Business Opportunity
Producing paper pulp from wood contributes to deforestation and with the increasing eco-awareness of the negative effects of deforestation governments are increasing the restrictions on cutting down trees. There is a need for an eco-friendly process for creating paper.

## Market Analysis
In 2004, the seaweed industry had an estimated annual value of USD 5.5 to 6 billion – food products for human consumption was a major share of this value. [i] In 2010, Malaysia imported USD 230 million worth of Pulp of wood, fibrous cellulosic material and waste.[ii]

## Competitive Advantages
Compared to the wood pulp production process the process for producing pulp from red seaweed has been shown to be much shorter (2 stages compared to 6 stages). This process uses lesser energy and has lower CO2 emissions compared to the wood pulp process. The paper from this process is smoother and has higher opacity making it suitable for high quality printing usage.

## Competitor Analysis
One direct competitor is the paper pulp industry in Malaysia. But since Malaysia is currently an importer of paper pulp there is sufficient space for a new player to enter. Two key indirect competitors are – the neighboring countries with developed seaweed cultivation infrastructure (especially Indonesia) and few specialised companies operating in the field of producing renewable fuels and chemicals from seaweed (Bio Architecture Lab, Marine BioProducts Inc.).

## Technology Solution / Innovation
The process involves harvesting the red seaweed (algae), extracting agar and passing the left over material to the pulping process. This material is bleached and finally forwarded to the papermaking process. The extracted agar can be fermented and distilled to produce bio-ethanol.

## Project Challenges
To have large scale seaweed farms there is a need for large amounts of sea farm land – this could compete with the existing sea fish farms and other aquaculture activities. Also, technical expertise to grow the red seaweed in Malaysian conditions has to be developed and shared with the potential seaweed farmers.

## Intellectual Property Rights
The process was invented in Korea and patents were applied in 43 countries and granted in 41 countries.

## Project Status
The process was developed in Korea and by 2010 Pegasus International already had a pulp factory in Korea. It has been shown that Gelidium can be acclimatized and grown in Malaysian conditions (Farm at Pulau Bumbun, Langkawi).

## Financials
It is proposed that the first three years of operation the business produces and sells paper pulp and the extracted agar. Based on the range of sizes of the existing paper mills in Malaysia[iii] it is proposed that the business aim for a yearly paper pulp production capacity of 2,000 ton, 3,500 ton and 5,000 ton in years 1, 2 and 3 respectively. The estimated yearly revenues of the business are –

**Year 1:** RM 9.5 million
**Year 2:** RM 16.5 million
**Year 3:** RM 24 million

## Funding Requirement
Acquiring sea farm land to setup the sea weed farms might be a costly and lengthy process. This process can be optimised by collaborating with existing farmers involved in aquaculture in the sea. The manufacturing setup process can be further fastened by collaborating with existing paper pulp manufactures.

Source: **(i) Food and Agriculture Organization** - http://www.fao.org/docrep/006/y4765e/y4765e04.htm#bm04 – [Last Accessed - 13 Mar 2012]; **(ii) International Trade Centre, Malaysian Trade data** - http://www.trademap.org/Country_SelProductCountry_TS.aspx - [Last Accessed - 13 Mar 2012] **(iii) ASIA PRO ECO PROGRAM, Malaysia report** - http://hal.archives-ouvertes.fr/docs/00/19/60/37/PDF/Malaysia.pdf - [Last Accessed - 13 Mar 2012]

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# Money Making Opportunity

## Innovation Business Opportunity

RM
**650** Million
Potential Yr3 Revenue

# Grayns-Innovative Rice Cooker (ASCEN001)

**Healthy Rice**
**Automatic Draining of Excess Starch**
**Patented technology**

# Grayns-Innovative Rice Cooker (ASCEN001)

## Project Overview
The team at Ascenteus Sdn Bhd has developed an innovative rice cooker – GRAYNS™ – designed to automatically drain excess starch from the rice when it is cooked thus making it convenient to cook healthy rice with a touch of a button.

## Business Idea
To design, develop, produce and distribute innovative and smart rice cookers that will automatically cater to the needs of the various types of rice and also ensure healthier cooked rice using their patented technology.

## Business Model
The business plans to produce and sell three types of GRAYNS rice cookers – starting with a 1.1 liter model in the first year of operations, introducing a 1.9 liter model in the second half of the first year targeting bigger families and introducing a 15 liters model in the second year targeting commercial users. The business proposes to use a three pronged approach of Master Distributors, Multi-Level Marketing and Direct Sales.

## Business Opportunity
As a cereal grain, rice is the most important staple food for a large part of the world's human population, especially in Asia. Rice provides 20% of the world's dietary energy supply and in Asia the contribution is higher at 32%.[(i)] The world population is becoming increasingly health conscious and with the increasing incidence of diabetes (projected to grow from 285 million people in 2010 to 438 million by 2030[(ii)]) there is a need for healthier staple food with lower Glycemic Index.

## Market Analysis
In 2005, the rice cooker was the largest small kitchen appliance type, with nearly 40 million units shipped worldwide, generating more than USD 1 billion of revenue.[(iii)] In the first 10 months of 2010 over 15 million units of rice cookers were sold in the South-East Asia region with the market size in Thailand, Vietnam and Indonesia of USD 275million, USD 91million and USD 87million respectively.[(iv)]

## Competitive Advantages
The key advantage of the GRAYNS rice cooker is the patented technology for automatically draining the excess starch during the cooking process – this process is more effective and results in uniform quality and healthy rice compared to the existing techniques. The cooker is designed with a low component count resulting in optimized production cost.

## Competitor Analysis
There are several players in the electric rice cooker market ranging from major global electronics manufactures like Panasonic, Zojirushi and Sanyo to local companies in various markets. The major brands are offering 'smart' rice cookers with several features like Induction heating and Micro-Computer Technology and support for several varieties of rice.

## Technology Solution / Innovation
When white rice is cooked in boiling water, the Amylopectin molecules (a type of Rapidly Digested Starch) from the rice grains are released into the water – resulting in a higher Glycemic Index. Rice cooked in GRAYNS rice cooker undergoes an intelligent 4-stage process that determines the optimal cooking temperatures, moisture content and cooking duration to ensure optimal cooking and removal of most of the unhealthy starch content.

## Project Challenges
The key market for this product are in the Asian region and the population in this region is price sensitive – it will be challenging to create a niche for this product and penetrate these markets at a high price point. It will be challenging to compete against established global brands like Panasonic and Zojirushi – a strong marketing plan is crucial for success.

## Project Team
The business is led by Mr. Faizan Khan, Co-Founder and Managing Director and Mr. Zeeshan Khan, Co-Founder and Executive Director of Ascenteus Group. The Head of Marketing is Mr. Nitin Bhoria and Head of Business Development is Mr. AJ Meenai.

## Intellectual Property Rights
The technology behind GRAYNS™ TORC™ is duly patented by Ascenteus Sdn. Bhd. with the application number PI 2011000963. The following marks and taglines have been trademarked – 'GRAYNS', 'TORC', 'The Original Rice Cooker'.

## Project Status
The team has identified 2 major manufacturing houses with in-house manufacturing facilities that can support a total production capacity of about 500,000 units per month. They have signed Non-Disclosure / Non-Compete agreements with them. The team is in the process of finalizing with DHL Malaysia to be their logistics and warehousing partner.

## Financials
In Year 1 the business is projected to get potential orders in the range of RM 38 million from China and a minimum of RM 7.6 million worth of MLM sales in Malaysia. In Year 1 the business offers two products - GRAYNS TORC V1.1 and GRAYNS TORC V1.9. In the second year a third product is added to the lineup - GRAYNS TORC V15.

**Year 1** – RM 30.2 M + RM 13.8 M = RM 44 M
**Year 2** – RM 95.2 M + RM 69.3 M + RM 51.0 M = RM 215 M
**Year 3** – RM 259.1 M + 182.6 M + RM 208.5 M = RM 650 M

## Funding Requirement
The business projects an initial funding requirement in the range of RM 15 million covering the branding and marketing communications strategy, preliminary working capital, inventories and to establish overseas market networks.

Source: **(i) Rice and human nutrition, FAO** - http://www.fao.org/rice2004/en/f-sheet/factsheet3.pdf - [Last Accessed - 28 Mar 2012]; **(ii) Diabetes facts** - http://www.worlddiabetesfoundation.org/composite-35.htm - [Last Accessed - 28 Mar 2012]; **(iii) Rice Cooker Revenues, IMS Research** - http://imsresearch .com/news-events/press-template.php?pr_id=106 - [Last Accessed - 28 Mar 2012]; **(iv) GfK Retail and Technology Asia** - http://www.gfkrt.com/asia/news _events/news/news_single/009167/index.en.html - [Last Accessed - 28 Mar 2012];

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# Money Making Opportunity

## Innovation Business Opportunity

RM
**285** Million
Potential Yr3 Revenue

# Point of Care Diagnosis Using Biosensor Technology (AVIANA001)

**Can Identify Specific Infections Within 20 Minutes**

**Portable Both Rural and Urban Application**

# Point of Care Diagnostic Using Biosensor Technology (AVIANA001)

## Project Overview
Aviana Molecular Technologies has developed a "point of care" diagnostic "bio-sensor" that they believe will help them identify specific infections within 20 minutes. This bio-sensor will rely on a "Surface Acoustic Wave Chip" that uses "acoustic" waves to measure for microorganisms.

## Business Idea
To design, develop, produce and distribute hand-held point-of-care biosensors that will be able to detect a range of diseases.

## Business Model
There are two primary business models for this test: (i) Production is outsourced while distribution is kept in-house (ii) Production and distribution are both kept in-house. A secondary model could include licensing the product.

## Business Opportunity
Determining the specific cause of an illness is essential for medical treatment, however most diagnostic methods currently rely on expensive and time consuming lab testing, the use of expensive PCR equipment, and highly specialized staff. Often, results are inaccurate. This test has the potential to revolutionize the diagnostic market by offering a hand held biosensor able to cost-effectively test a range of diseases.

## Market Analysis
So far tests are being developed to detect Chlamydia, Urinary Tract Infections, Dengue Fever, C. Difficile, and Group B Streptococcus. Somewhere between 1.3 and 2.8 million people or more are infected with Chlamydia each year in the USA[i]. In 2008 Dengue Fever affected some 2.2 million people in the Americas, South East Asia, and the Western Pacific alone and now threatens some 2.5 billion people worldwide[ii]. C. Difficile affected some 3 million patients in the USA in 2010 alone[iii] and inflicts millions more around the world. Streptococcus is a major cause of newborn mortality, infecting over 1200 newborns and believed to be responsible for numerous miscarriages each year in the USA[iv]. Urinary Tract infections account for at least 8.3 million doctor visits in the USA alonev.

## Competitive Advantages
This biosensor could allow for the detection of micro-organisms within 20 minutes with results comparable to lab testing. The biosensor aims to be cheap, accurate, easy-to-use and able to test a range of diseases.

## Competitor Analysis
Most competing diagnostic tests rely on manual lab testing, Nucleic Acid Testing (including PCR and ELISA tests) or symptomatic diagnosis by doctors. These testing methods can be expensive and require advance equipment and/or training/education.

## Technology Solution / Innovation
This POC diagnostic biosensor uses a particular wave form to detect micro-organisms. This will allow for a portable, low-cost, easy-to-use and highly accurate test. The test has already been proven to be effective in detecting the bacterial infection Chlamydia and the Dengue Virus. These test should be easy to mass manufacture and able to be used both in hospitals and in remote areas.

## Project Challenges
There are numerous competing technologies available on the market and thus encouraging a high rate of industry adoption will be essential. In order to extract the full value of these tests continuing to expand the range of diseases tested will be an important but time and resource consuming process.

## Project Team
The team includes a mix of high-caliber medical, business, and industry professionals. Aviana was founded by Dr. Vanaja V. Ragavan who holds several years' experience in both medical care and working for medical technology companies.

## Intellectual Property Rights
Three patents have been filed to protect the core aspect of this technology, the particular wave form used for detection.

## Project Status
Currently a company, Aviana Molecular Technologies, has been set-up and the product has undergone test trials. The company and product are still in the "development" stage.

## Financials
The following financial projections have been provided in Aviana's business plan. Projections start in 2014.

**Y1** - RM 45,000,000
**Y2** - RM 135,000,000
**Y3** - RM 285,000,000

Given the importance of medical diagnostics worldwide, the size of the global market, and the potential for this product to eventually test an even wider range of diseases, these projections would appear to be sound. Over time this production has the potential to develop into a multi-billion dollar industry.

## Funding Requirement
The project team is asking for a USD 1.5 million dollar bridge loan, in the form of convertible debt financing, to complete an advanced prototype. The project team also plans to pursue further rounds of funding, including a USD 7-8 million Series A funding round, and a USD 2-3 million Series B Mezzanine funding round.

Source: **(i)** http://www.cdc.gov/std/Chlamydia/STDFact-Chlamydia.htm **(ii)** http://www.who.int/mediacentre/factsheets/fs117/en/index.html **(iii)** http://www.aafp.org/afp/2005/0301/p921.html **(iv)** http://www.cdc.gov/groupbstrep/about/newborns-pregnant.html **(v)** http://kidney.Niddk.nih.gov/Kudiseases/pubs/pdf/KU-03.pdf

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# Money Making Opportunity

## Innovation Business Opportunity

RM **43** Million

Potential Yr3 Revenue

# Mousticide™

## Novel Super Larvacide For Mosquito Control (ENTO001)

**Helps Control Dengue & Other Mosquito**
**Suitable for Ground and Aerial Application**
**A Biopesticide**

# Mousticide™ - Novel Super Larvacide For Mosquito Control (ENTO001)



## Project Overview
The company EntoGenex Industries Sdn Bhd is seeking approval from the National Biosafety Board (NBB) Malaysia to produce, supply and sell The MOUSTICIDE™ Super-BioLarvicide in Malaysia, to import TMOF_yeast (an active ingredient) with import duty exemption to manufacture finished products locally, and to secure the Malaysian government's support to scale up business in Malaysia and into other countries.

## Business Idea
MOUSTICIDE™ is being used (i) in Malaysia, Philippines and Ghana to control dengue, malaria and other mosquito-borne diseases, and plans are in-progress to register with World Health Organization Pesticide Evaluation Scheme (WHOPES). It is registered in Malaysia, Singapore, Philippines, Pakistan and Ghana. Registration is currently in progress in Hong Kong, Myanmar, Vietnam, Sri Lanka, Indonesia, South Korea, Caribbean and India.

## Business Model
As the company is already operational, two models of expansion are: (a) appointment of distributors and country resellers, and (b) licensing of the formulation technology to manufacturers for other applications.

## Business Opportunity
MOUSTICIDE™ Super-BioLarvicide uses a yeast formula that is highly effective for killing mosquito larvae and similar insect family, biodegradable, has no insect resistance issues and safe to humans, animals and environment.

## Market Analysis
An estimated 3.3 billion people(ii) were at risk of malaria in 2010. Of this total, 2.1 billion were at low risk (< 1 case per 1000 population), 94% of whom were living in geographic regions other than the WHO African Region. The 1.2 billion at high risk (> 1 case per 1000 population) were living mostly in the WHO African (47%) and South-East Asia Regions (37%). Funding committed to malaria control from international sources is expected to peak at USD 2 billion in 2011, and from 2012-2013, projected to remain relatively stable, but then decrease to USD 1.5 billion in 2015.

## Competitive Advantages
MOUSTICIDE™ Super-BioLarvicide is a new innovative tool for the natural, safe, effective control of mosquito larvae. The formulation is suitable for use with conventional ground or aerial application equipment including hand-pump, airblast and mist blower.

## Competitor Analysis
The insecticide market is very competitive, comprising many regional and global manufacturers offering chemical and biopesticides solutions: Hindustan Insecticides Ltd India, Bayer, BASF, Dow Chemicals, DuPont, Sumitomo, Novartis, Monsanto Technology LLC, Certis USA LLC, and many more.

## Technology Solution / Innovation
MOUSTICIDE™ Super-BioLarvicide utilizes the novel TMOF™ (Trypsin Modulating Oostatic Factor - natural mosquito peptide hormone that stops protein digestion in mosquito larvae, causing metabolic starvation and larval death) peptide technology expressed in a nonpathogenic yeast. When combined with another mosquito larvicide (Bti, Bacillus thuringiensis israeliensis) efficacy is synergistically enhanced by 257 times, resulting in immediate larval death for a sustained period of time. The MOUSTICIDE™ Super-BioLarvicide comes in Wettable Powder and Rice Husk (granule) formulations.

## Project Challenges
The greatest challenge is mostly marketing and securing the intellectual property on this technology in all the countries intended for sale penetration.

## Intellectual Property Rights
MOUSTICIDE™ is a trademark of EntoGenex Industries Sdn Bhd. The technology is exclusively licensed worldwide from the University of Florida and has a portfolio of international patents. No other IP was disclosed.

## Project Status
EntoGenex Industries Sdn Bhd was founded in 2008, and is in collaboration with Universiti Kebangsaan Malaysia, Universiti Teknologi Malaysia, Universiti Putra Malaysia and Universiti Sains Malaysia. It has a worldwide Exclusive License Agreement with University of Florida, and was granted BioNexus Status from the Malaysian Biotechnology Corporation and won the BioInno Awards Gold Medal at the BioMalaysia Conference and Exhibition 2010. MOUSTICIDE™ core technology is developed in USA, won the U.S. Secretary of Agriculture Silver Plow Award in 1999 and has obtained EPA approval(iii).

## Financials
Assuming the product is tested, commercially ready and already used in Malaysia, the next steps is to distribute through a network of resellers and agents globally. By setting a conservative sales target of USD 1 million (approx. RM 3 million) per country annually, and a licensing fee of say, 2% of annual sales, estimated at USD 500,000 (RM 1.5 million) per annum for each country from Year 2 onwards, the estimated incremental revenue are:

**Year 1:** RM 5 m; Year 2: RM 22.5 m; Year 3: RM 43.3 m

## Funding Requirement
The company requires support in the form of approval and endorsement from the Malaysian government, and financing facilities step up its marketing effort globally.

Source: **(i) Entogenex Malaysia's web portal, Products page.** [Last Accessed: 23 March 2012] http://www.entogenex.com.my/pages/products.php #mousticide; **(ii) World Health Organization, World Malaria Report 2011, Summary and Key Points, Page xiii** [Last accessed: 8 Mar 2012] http://www.who.int/malaria/world_malaria_report_2011/9789241564403_eng.pdf; **(iii) Entogenex Malaysia's web portal, Active Ingredients page.** [Last Accessed: 23 March 2012] http://www.entogenex.com.my/pages/products.php#mousticide;

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# Money Making Opportunity

## Innovation Business Opportunity

RM 25 Million
Potential Yr3 Revenue

# Non-Starch Polysaccharide (FRIM001)

**Regulates Glucose Levels**
**Can Be Refined to Become a Medicine or as a Food Supplement**

# Non-Starch Polysaccharide (UKM006)

## Project Overview
FRIM has developed a non-starch polysaccharide-based treatment for diabetes that should help regulate glucose levels. Non-starch polysaccharide is a naturally occurring compound, extracted from plant cell walls numerous plants, including the Morinda citrifolia. The non-starch polysaccharide can then be refined into a medicine or used as an additive for foods. Would be used in combination with insulin, not as a replacement.

## Business Idea
To utilised an advanced process to isolate non-starch polysaccharide from a specific faction of the Morinda citrifolia that can then be processed into a traditional medical treatment. The non-starch polysaccharide will then be sold to medicinal companies, food manufacturers, and other companies.

## Business Model
A processing facility could be set up to extract and refine the non-starch polysaccharide which can be sold to medicinal companies to who can then refine the non-starch polysaccharide into medicines and food companies who can incorporate it into their food.

## Business Opportunity
The global spread of diabetes has become one of the most pressing and dangerous medical conditions around the world and now threatens the well-being of millions of people. Non-starch polysaccharide may offer a way to treat diabetes through supplements and by being added to food, to help regulate glucose levels.

## Market Analysis
Almost 350 million people have diabetes (2010) and infliction rates are projected to rise substantially in the coming decades. Eighty percent of these patients come from developing countries. 1.4 million people in Malaysia and at least 125 million people in Asia suffer from diabetes. Nearly 100 million people are inflicted with diabetes in India and China aloneiii. The BRIC (Brazil, Russia, India, China) market for diabetes drugs was worth 4 billion in 2009 and is expected to grow to 8.7 billion by 2014iv. Supplements and traditional medicines are already widely used, with 22 percent of diabetic individuals in the USA using either supplements or vitaminsv. Current expenditures on diabetes are estimated to fall between USD 376 billion to USD 672 billion.

## Competitive Advantages
This product offers to be a safe, natural way to help treat diabetes. It does not promise to be either a cure, or a stand-alone treatment, but instead an all-natural component of a treatment regime.

## Competitor Analysis
The most serious competitors will be “modern” diabetic treatments and other dietary supplements. So far no single dietary supplement dominates the market. Non-starch polysaccharide can be used in conjunction with most modern medicines.

## Technology Solution / Innovation
An advanced process has been developed to efficiently extract non-starch polysaccharide from the Morinda citrifolia. There are already numerous ways to isolate non-starch polysaccharide from various citrus fruits. Most non-starch polysaccharide is used as a gelling agent for food stuffs. Further, FRIM has conducted testing that suggests that Non-starch polysaccharide can be used to help regulate glucose in diabetic individuals. When non-starch polysaccharide is added to food, the effects on tastes will be minimal. Non-starch polysaccharide is not mean to replace insulin, the most widely used treatment for diabetes. Instead, it is meant to supplement insulin and to help regulate fluctuating blood levels.

## Project Challenges
Non-starch polysaccharide is not a widely accepted treatment for diabetes and several studies and experts have denounced its effects. While nothing proved so far has been conclusive, there is a risk that this product will prove ineffective and will be rejected by the medical community. Also as a supplement and/or medicine, there will likely be strict testing requirements to ensure that the product is effective.

## Intellectual Property Rights
A patent has been filed for both the non-starch polysaccharide rich faction and the method to extract the non-starch polysaccharide.

## Project Status
This project is ready to be commercialised. FRIM is currently looking for partners to scale this production up into production and distribution.

## Financials
Supplements and traditional medicines are very popular. In the United States, for example, 22 percent of diabetic individuals use vitamins and supplements to try to control their diabetes. Traditional and herbal medicines, in general, are more popular in Asia then in the United States.

Y1 = (1.4 million) X ( 2 percent) X (6) X (RM 50)
= RM 8,500,000
Y2 = (1.4 Million) X ( 4 percent) X (6) X (RM 50)
= RM 16,000,000
Y3 = (1.4 Million) X ( 6 percent) X (6) X (RM 50)
= RM 25,000,000

## Funding Requirement
As the process to extract polysaccharide fraction has already been developed R&D costs will be minimal. Conclusive testing to measure whether Petcin is an effective treatment for diabetes may be needed however.

Source: **(i)** http://www.who.int/diabetes/en/ **(ii)** http://www.asiandiabetes.org/ **(iii)** http://www.worlddiabetesfoundation.org/composite-35.htm **(iv)** http://www.marketsandmarkets.com/PressReleases/BRIC-Diabetes-Drugs.asp **(v)** http://www.diabetes.org/living-with-diabetes/treatment-and-care/medication/herbs-supplements-and-alternative-medicines/

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# Money Making Opportunity

## Innovation Business Opportunity

RM **9.8** Million

Potential Yr3 Revenue

## Rice Plant Variety - Oryza (UKM009)

**Higher Padi Yield**
**Low Glycemic Index**
**High Resistance to Blast Disease**

# Rice Plant Variety - Oryza (UKM009)

## Project Overview
The research team at UKM in collaboration with Malaysia Agricultural Research and Development Institute (MARDI) has developed a higher quality variety of rice by cross breeding the commonly cultivated breed in Malaysia and a wild breed. The resultant variety of rice (UKMRC9) has a higher padi yield and also a low glycemic index suitable for diabetics.

## Business Idea
To design, develop, produce and distribute the seeds for high quality rice that will generate higher yields than the currently cultivated red pericarp varieties and also have other advantageous properties like low glycaemia index, rich in antioxidants and resistance to blast disease.

## Business Model
Two business models proposed are:
(i) Setup farm facilities to produce the high quality strain rice seeds and build a distribution network to sell the seeds to the farmers.
(ii) Provide technical consulting and support services to seed farmers for producing the high quality strain rice seeds.

## Business Opportunity
Rice is a staple food in the Asian continent and with the ever increasing population there is an ever-growing demand for rice. By improving the yield from crops the same amount of land resources can be used to generate more rice.

## Market Analysis
In 2011 Malaysia imported USD 607 million worth of rice grains – there is sufficient internal demand for rice and there is a need to improve the yield from the existing rice farms.(i) According to the WHO the number of people with diabetes in Asia (excluding China and India) in 2000 was about 22 million and this number is projected to grow to 58 million by 2030.(ii)

## Competitive Advantages
The Variant G33 developed by the research team has a high grain yield of about 5.5 tonnes/ha – this is approximately 2 times the yield from the currently used traditional varieties of red rice. The resultant rice is found to have properties with low glycemic index which is suitable for people with diabetes. This variant is resistant to blast disease, rich in antioxidants and has a high percentage of filled rough rice.

## Competitor Analysis
RB Biotech Sdn Bhd works in collaboration with MARDI to develop and cultivate padi varieties that produces higher padi yield, consistent rice quality and are resistant to local common diseases. They introduced the Siraj variety of rice in Malaysia.(iii). The palm oil conglomerate Sime Darby has also entered the hybrid variety breeding field.(iii)

## Technology Solution / Innovation
The UKMRC9 strain, also referred to as Variant G33, is derived from an advanced backcross between wild rice accessions, *Oryza rufipogon* Griff. (IRGC105491) and Malaysian rice cultivar MR219. Two high yielding sister lines with red pericarp and two with white pericarp are also available.

## Project Challenges
The rice farming is a price sensitive and cost dependent market – it will be challenging for the business to gain the initial critical mass of customers (farmers) – the business will have to be proactive in educating the advantages of going for the high quality strain vs. the initial higher price of the seeds. It will be challenging to compete against big farming companies operating in this field due to their access to high capital and high internal demand.

## Intellectual Property Rights
The team has filed for protection under the New Plant Varieties Act in Malaysia as UKMRC9 (Filing No. PVBT039/09).

## Project Status
The Variant G33 rice was planted on an experimental basis at the MARDI Station and the cultivated rice was tested by food scientists using human subjects. The project is been handled currently by university start-up company - Serotech Sdn Bhd and is currently collaborating with a company specialising in producing seeds for growers.

## Financials
The financial model for this business is based on the total area of padi fields in Malaysia - 650,000ha (iv) – and the targeted penetration of this market. It is assumed that the business will target a penetration of at least 1% by the third year of full operations. Also it is estimated that the market penetration will be slow the first year and once the advantages of the high quality strain are realised by the farmers there will be more farmers interested in cultivating this strain.

**Year 1** – 1500 ha x 150Kg/ha x RM 10/Kg = RM2.3 million
**Year 2** – 3500 ha x 150Kg/ha x RM 10/Kg = RM5.3 million
**Year 3** – 6500 ha x 150Kg/ha x RM 10/Kg = RM9.8 million

## Funding Requirement
The process for producing the rice seeds requires land to cultivate and thus it can be a capital intensive process. The funding requirement can be optimised by collaborating with existing seed farmers or with large scale padi farmers who would like to go upstream.

Source: **(i) Rice import statistics for Malaysia** - http://www.trademap.org/Country_SelProductCountry_TS.aspx - [Last Accessed - 15 Mar 2012]; **(ii) Global Prevalence of Diabetes (WHO)** - http://www.who.int/diabetes/facts/en/diabcare0504.pdf - [Last Accessed - 15 Mar 2012]; **(iii) Malaysia Hybrid Rice** - http://www.grain.org/article/entries/1658-malaysia-hybrid-rice-and-the-decline-of-public-breeding - [Last Accessed - 15 Mar 2012]; **(iv) Malaysia has 'the ability to be self-sufficient'** - http://www.bic.searca.org/news/2011/oct/mal/15.html - [Last Accessed - 15 Mar 2012]

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# Money Making Opportunity

## Innovation Business Opportunity

RM
**28.3** Million
Potential Yr3 Revenue

# MYScrim-OPT Parallel Oil Palm Scrim Lumber (FRIM002)

**Renewable Resource**
**Low Cost to Produce**
**No CFCs Used**
**Patented Technology**

# MYScrim-OPT Parallel Oil Palm Scrim Lumber (FRIM002)

## Project Overview
The research team at Forest Research Institute Malaysia (FRIM) has developed a novel process of using oil palm plantation biomass to produce strong, durable and reliable engineered lumber.

## Business Idea
To design, develop, produce and distribute engineered wood products based on the processes developed for using the oil palm biomass.

## Business Model
For the short term it is proposed that the business produce and sell engineered wood panels targeting the local furniture and flooring manufacturing market and the panel export market. For the long term producing and selling high value engineered wood products like furniture and flooring is proposed.

## Business Opportunity
The depleting global forest resources combined with the increasing environmental awareness has led to businesses and consumers looking for alternate sustainable sources of wood. In Malaysia, according to the Malaysian Palm Oil Council 4.48 million ha of land area is being used for oil palm plantations. Malaysia's oil palm industry is projected to spend RM4.4 billion to replant some 365,000 hectares from 2011 to 2013.(i)

## Market Analysis
The North American & European Engineered Wood Market was estimated to have generated revenue of USD 24.4 billion in 2009 and is projected to grow to USD 55.6 billion in 2016.(ii) According to the 2010 annual report from the Malaysia Timber Council (MTC) in 2010 Malaysia exported 1.2 million cubic meters of Medium Density Fiberboard (MDF) amounting to a value of RM 1.2 billion.

## Competitive Advantages
This product is based on the extensively available oil palm biomass in Malaysia – thus it provides an opportunity to use the oil palm replanting waste effectively and at the same time produce products based on a cheaper raw material. The developed process has a high yield of about 85% and the engineered lumber has low formaldehyde emissions.

## Competitor Analysis
The oil palm based panels produced by this business will compete with the various existing types of wood panels to be further used in applications like flooring, paneling and furniture. The commonly available Medium density fiberboard is also an engineered wood product based on hardwood or softwood residuals. Oriented strand board, Glulam and laminated veneer lumber (LVL) account for approximately 60 percent of the total engineered wood market.(i)

## Technology Solution / Innovation
According to the research team the issue with oil palm lumber is transportation - oil palm has 300% more moisture, so it is heavy and drying it is also a problem. Instead of drying the trunk into veneer, they decided to crush the wood into strands and glue them back under a certain pressure – this produces the Pressed Oil Palm Strand Lumber. Parallel Oil Palm Scrim Lumber technique crushes material a little more so that it would be more solid, with fewer gaps between the strands.(iii)

## Project Challenges
Malaysia has a well-developed wood and wood products industry – it will be challenging to penetrate this network and convince the distributors, suppliers and importers to try this new product. For the long term sustainability of this business it should be based around high value wood products like flooring and furniture – building this ecosystem will be a challenging process compared to just selling the wood and wood panels.

## Intellectual Property Rights
POPS Lumber has been protected with filed in Malaysia (MY-144683-A, Indonesia (Pooo200800581) and Thailand (0801005894) POPScrim patent is still pending (muka PI29984306)

## Project Status
The FRIM team has developed and prototyped the engineered lumber. It has been showcased at several local and international events and has one a few awards including WIPO best inventor at Geneva 2008 at International Innovation & Technology Exhibition (ITEX) in 2010.

## Financials
For the three year financial model it is assumed that the business will produce and sell high quality wood panels using the oil palm biomass. In the long term producing high value finished wood products like flooring and furniture will generate higher revenues. The model is based on a similar start-up case study – an engineered wood panel manufacturer based on a new technology(iii). Based on this model the projected revelues are year revenues are Year 1: RM 11.3 million; Year 2 : RM26.6 million and Year 3: 28.3 million

## Funding Requirement
The start-up process can be optimized by collaborating with existing large scale wood products manufactures for production know-how and infrastructure. Working with big oil palm plantations will ensure long term raw material security.

Source: **(i)** http://www.btimes.com.my/Current_News/BTIMES/articles/NKEApalm/Article/ – [Last Accessed – 23 Mar 2012]; **(ii)** http://www.frost.com/prod/ servlet/press-release.pag?Src=RSS&docid=235377871 – [Last Accessed – 23 Mar 2012]; **(iii) From waste to wealth** - http://thestar.com.my/metro/story.asp ?file=/2010/3/8/central/5806979&sec=central – [Last Accessed – 23 Mar 2012]; **(iv) FRIM Directory of Innovations** - http://www.frim.gov.my/?page_id=2071 – [Last Accessed – 22 Mar 2012]; **(v) Nelson timber plant (2012 startup)** http://www.nzwood.co.nz/industry-news/2011/08/17/new-technology-for-nelson-timber-plant-for-2012-startup/ - [Last Accessed – 23 Mar 2012];

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# Money Making Opportunity

## Innovation Business Opportunity

RM **15** Million

Potential Yr3 Revenue

# Torrefied Acacia Wood

## (FRIM003)

**Torrefied Wood Pellets**
**Alternative to Fossil**
**Cost Effective**
**Environmentally Sustainable**

# Torrefied Acacia Wood (FRIM003)

## Project Overview
The research team at Forest Research Institute Malaysia (FRIM) has developed a novel, highly efficient and cost effective torrefaction method for Acacia wood which can be used to produce biofuel from Acacia trees.

## Business Idea
To design and develop an efficient and cost effective process for torrefying wood from different portions of a tree and to produce and distribute torrefied wood pellets to be used as biofuel to replace coal or normal wood pellets.

## Business Model
It is proposed that the business collaborate with tree plantations and wood suppliers to source Acacia wood that will be processed to produce torrefied wood and further to torrefied wood pellets. The business will distribute globally the torrefied wood and torrefied wood pellets.

## Business Opportunity
As the global awareness on environmental sustainability grows and the cost of fossil fuel increases – businesses and governments are looking for cost-effective and environmentally sustainable alternatives to fossil fuels. There is an opportunity for torrefied wood pellets to initially substitute and eventually replace coal and wood being used commonly to generate heat, energy and electricity.

## Market Analysis
According to a report by consulting firm Hawkins Wright, the global demand for torrefied biomass is projected to exceed 70 million metric tons per year by 2020[(i)]. The past few years the global wood pellet market had high growth – from 8 million tons per year in 2007 to 13 million tons in 2009. Currently the European countries are the major consumers of the wood pellets (8 million tons in 2009).[(ii)]

## Competitive Advantages
The torrefied wood produced using this process has high energy density/efficiency and has calorific values higher than the EU standard. The process is applicable to different parts and different ages of *Acacia* – thus making most use of the wood. The pollutants from the torrefied wood are very low - less than 1% ash produced.

## Competitor Analysis
Torrefaction of wood pellets is a relatively new process. There are a few companies that developed new ways of torrefying wood and have set up plants to produce them. U.K. firm Rotowave Ltd. has developed one such technique that uses electromagnetic frequencies. Dutch developer Topell Energy has set up a plant with an annual capacity of 60,000 tons.[(iii)]

## Technology Solution / Innovation
Torrefaction is a heat treatment process similar to pyrolysis at 200-320 °C which is used to drastically reduce the moisture content in wood and increase the fuel quality by changing the molecular structure of wood. By combining the process with densification (pelletisation / briquetting) the wood is converted to torrefied wood pellets that are suitable to be used as biofuel and are convenient for storage and transportation.

## Project Challenges
The torrefied wood pellet market is nascent in Asia and initially the business will have to depend on demand in Europe or collaborate with major coal based power producers in this region. Also, currently the Acacia wood is also being used for producing paper and pulp – this business will be competing with the paper and pulp industry for the wood resources.

## Intellectual Property Rights
A patent for the torrefaction process has been filed in Malaysia.

## Project Status
The FRIM team has developed and tested the new torrefaction process. Further development is required to scale up the process to commercial scale.

## Financials
The average wood pellets plant capacity in Germany was about 60,000 tons per year in 2009.[(ii)] Also the startup in this field, Topell Energy, started with a capacity of 60,000 tons per year.[(iii)] Based on these and by normalizing for a nascent industry in Asia it is assumed that in the medium term (3 – 5 years) the business should target a capacity of 30,000 tons per year.

**Year 1** – 5,000 tons x 600 = RM 3 million
**Year 2** – 15,000 tons x 600 = RM 9 million
**Year 3** – 25,000 tons x 600 = RM 15 million

## Funding Requirement
In the start-up process two key activities will require high capital – the sourcing of the wood and the setup of the production facility. The sourcing of the wood can be optimised and stabilised by collaborating with big tree plantations and wood suppliers. Also collaboration with downstream companies (Coal based power producers) will insure initial demand and provide sufficient feedback for improving the process.

Source: **(i) Upswing in Torrefied Biomass Use** - http://biomassmagazine.com/articles/6145/report-projects-upswing-in-torrefied-biomass-use - [Last Accessed - 16 Mar 2012]; **(ii) Wood Pellets: An Expanding Market Opportunity** - http://biomassmagazine.com/articles/3853/wood-pellets-an-expanding-market-opportunity/ - [Last Accessed - 16 Mar 2012]; **(iii) BSP launches "torrified pellet" plant** - http://www.renewablesinternational.net/bsp-launches-torrified-pellet-plant/150/515/32501/ - [Last Accessed - 16 Mar 2012];

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# Money Making Opportunity

## Innovation Business Opportunity

RM **90** Million

Potential Yr3 Revenue

# C.D. Diarrhea Test Kit

## (UKM004)

**Rapid Test to Identify**
**Clostridium Difficile**
**Non-Invasive**
**An Assay Test**

# C.D. Diarrhea Test Kit (UKM004)

## Project Overview
A non-invasive and quick test kit to detect Clostridium difficile (C.D.) toxins in fecal specimens of diarrheal patients. C.D. is commonly found in the gut, however intensive antibiotic treatments occasionally wipe out the other bacteria naturally found in the gut, allowing C.D. to flourish[i]. The result is a severe, and sometimes deadly infection that can occasionally result in outbreaks in hospital settings.

## Business Idea
To produce and/or license C.D. test kits for use by healthcare professionals and hospitals.

## Business Model
The test kits could be produced and marketed "in-house" or the technology can be licensed out.

## Business Opportunity
C.D. infections and outbreaks occur around the globe, usually in hospital environments where intensive antibiotic treatments have created an in-balance in the gut. C.D. infections are becoming increasingly common and deadly, with mortality rates having grown by over 400 percent since 2000[ii]. Infections can be treated effectively if properly diagnosed in the early stages however, prompting a need for rapid, accurate, and cost effective testing.

## Market Analysis
The global molecular diagnostic market is expected to reach 15 billion USD by 2014, however C.D. tests will only represent a small proportion of said market. In the U.S. alone, over 3 million people are inflicted with C.D. infections per year and numerous other patients who develop diarrhea in the hospital will need to be tested[iii]. Only 1 in 5 diarrheic infections that occur after anti-biotic treatment end up being caused by C.D. however all said cases should be tested[iv]. Over 1.1 billion USD was spent on C.D. treatment within the United States alone[iii].

## Competitive Advantages
This product promises a rapid and accurate test that will be cheaper than the tests currently available on the market. Given the large number of tests needed to be conducted and the low incident rate of infection (20%), a low price will be essential.

## Competitor Analysis
While there are rapid tests available, the project team states that many are highly inaccurate, misdiagnosis up to 30 percent of the time. One rapid and highly accurate test assay, the Cepheid Xpert C, has been developed and has recently gained approval from the FDA[v]. Currently, "traditional" lab methods are used, however said methods are both expensive and take a long time to complete.

## Technology Solution / Innovation
When a patient becomes sick with C.D. their body will release antibodies to fight the disease. An ELISA Assay test has been developed to test for antibiotics corresponding to C.D. in sick patients. Because some C.D. strains are toxic and others are not, it is necessary to test for the toxin directly[vi]. This will allow for fast, rapid and accurate testing. Given the ability of C.D. to spread through-out hospitals quickly and to kill scores of people in one outbreak it is essential to identify cases early. By and large C.D. infections occur within hospitals, who will thus be the most relevant customers.

## Project Challenges
Numerous competitors are poised to enter the market. It is likely that once a few of these tests gain a strong reputation they will be able to hold a strong control over the market. As the Cepheid Xpert C test has already gained approval from the FDA, it may develop a strong hold on the market.

## Intellectual Property Rights
This test has been patented in Malaysia (No: MY-142206–A).

## Project Status
The project team stated that this project is ready for commercialization. A spin-off company, Biotech Diagnostics, has been established by UKM.

## Financials
Given that all diarrheic outbreaks in hospitals should be tested for C.D. infections, the market for tests will be far greater than the number of C.D. outbreaks. Given the threat posed by C.D. and the need to identify cases early, there could be potentially high adoption rates for tests, especially in middle and upper-income countries with advanced healthcare systems. We project 45 million cases of Antibiotic related cases of diarrhea, all of which will need to be tested for C.D. These projects demonstrate revenue streams if 0.1, 1 and 2 percent of potential cases are tested at RM 100 per test.

**Y1** - RM 4,500,000
**Y2** - RM 45,000,000
**Y3** - RM 90,000,000

## Funding Requirement
Funding will be needed to produce, en-masse, and market the tests. Further research and development may be required to ensure the maximum effectiveness of this test and to gain approval in foreign markets, such as the United States.

Source: **(i)** http://wwwnc.cdc.gov/eid/article/13/9/06-1116_artic **(ii)** https://www.premierinc.com/quality-safety/toolsservices/safety/topics/cdad/downloads/MMWR_C_diff_2012.pdf **(iii)** http://www.aafp.org/afp/2005/0301/p921.html **(iv)**http://cid.oxfordjournals.org/content/34/3/346.full **(v)** http://www.medpagetoday.com/InfectiousDisease/GeneralInfectiousDisease/25838 **(vi)** http://www.ncbi.nlm.nih.gov/pmc/ articles/PMC1326024/

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# Money Making Opportunity

## Innovation Business Opportunity

RM **60** Million

Potential Yr3 Revenue

# Personalised MEMS BioSensor (Cancer)

## (IIUM004)

**Determine The Number of Cancer Cells Before and After Chemotherapy Allows Doctors to Prescribe The Correct Drug Dosage**

# Personalised MEMS BioSensor (Cancer) (IIUM004)

## Project Overview
A personalised biosensor has been developed that will allow doctors to more accurately determine the amount of cancer cells present before and after chemotherapy. This will allow doctors to better select the amount of drugs required to treat a patient, thus encouraging higher-quality and more comfortable chemotherapy treatments.

## Business Idea
To design, develop, produce and distribute personalised biosensor kits to accurately measure the amount of cancerous cells present.

## Business Model
A business can be set up to produce and distribute the product, both locally and internationally, or production can be sourced to an outside firm. Also, production and/or distribution can be licensed to another firm.

## Business Opportunity
Hundreds of billions of dollars are spent on cancer treatment each year, and cancer is now one of the leading forms of serious illness and the world's leading cause of death. Hundreds of billions of dollars are now spent on cancer treatment and diagnostic tests that would help doctors customise chemotherapy treatments would be well-received.

## Market Analysis
Worldwide over 12 million people are diagnosed with cancer each year with associated costs of some 286 billion dollars[i] per year, for new cases alone. In the United States alone, over 124 billion dollars will be spent treating cancer[ii]. Between 4 to 7 percent of all healthcare expenditures in advanced countries is spent on cancer[iii]. Economic costs due to death and disability from cancer are meanwhile estimated at 895 billion dollars[iv]. Cancer is a significant health concern in Malaysia with 18 to 19 cases being diagnosed and registered in 2007[v] and in all the likelihood, many cases go undiagnosed.

## Competitive Advantages
This test will measure circulating cancer cell counts in real time, without modifying or dying the cells in any way. The test could prove to be a low-cost and reliable testing method.

## Competitor Analysis
Currently, cancer cell counts are obtained either through examining samples manually, using a haemocytometer, or through an automated process using dyes and a colorimetric assay. Numerous Colorimetric Assays have been developed in recent years, promising lower costs and more effective analysis. Manual counts are expensive and prone to human error. Colorimetric assays cannot provide "real-time" data, only end-point analysis.

## Technology Solution / Innovation
This diagnostic test aspires to be a real-time, low cost, and accurate way to measure cancer cell counts. Cancer cell counts are rarely conducted due to the high current costs. As a result, most patients are given "standardised" doses, which is both less effective and often more painful for the patient. This process may potentially lower costs, allow for real time testing, and could prove to be more accurate than methods currently available. Details of the technological process have not been provided at this time.

## Project Challenges
More conclusive testing skill needs to be conducted to fully measure the accuracy and performance of the test, thus creating a high development risk. Approval from relevant authorities, such as the Malaysian Ministry of Health and the FDA (USA).

## Intellectual Property Rights
This product has been patented under US patent (No. 7,964,144).

## Project Status
This project is still in the development/commercialisation stage, though the project team believes it can be ready for the market in within 7 to 12 months.

## Financials
Pricing is extremely difficult to determine without input from the research team, however we know that colorimetric assay test kits currently run for RM 1500 on the current market. These test kits are disposable, whereas the Cancer Biosensor should be reusable. We project the test kits to sell for approximately RM 15,000.

**Y1** = [(12 Million Patients) X (1 percent) X (4 tests per year) X (RM 15,000)]/ 365 = **RM 20,000,000**

**Y2** = [12 Million Patients) X (2 Percent) X (4 tests per year) X (RM15,000)/ 365 = **RM 40,000,000**

**Y3** = (12 Million Patient) X (2 Percent) X (4 tests per year) X (RM 15,000)/ 365= **RM 60,000,000**

## Funding Requirement
Further funding will be needed for the development and pre-commercialisation stage. Thorough tests must be conducted to insure that this product is as accurate as promised and the team has requested funding to develop components of the test.

Source: **(i)** http://www.medscape.com/viewarticle/750990, **(ii)** http://www.cancer.gov/newscenter/pressreleases/2011/CostCancer2020 **(iii)** http://www.medscape.com/viewarticle/750990, **(iv)** http://www.sciencedaily.com/releases/2011/09/110926083402.htm, **(v)** http://www.carif. com.my/index.php?sc=CancerinMalaysia

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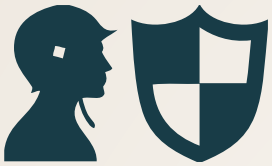
# Money Making Opportunity

## Innovation Business Opportunity

RM 12 Million
Potential Yr3 Revenue

## Coconut Body Armour (UTeM001)

Light Weight
Low Cost Solution
Patented Pending



# Coconut Body Armour (UTeM001)

## Project Overview
A body armor utilizing coconut fibers, Kevlar, and glass has been developed that could potentially reduce the cost and weight of body armor while still being able to effectively stop bullets. This body armor is rated Type IIA and is able to effectively stop 9mm and other small caliber handgun bullets[i]. There is also a potential to adopt this technology for protective sports equipment, strong and specialized building materials, etc.

## Business Idea
To design, develop, produce and distribute body armor, including vests and helmets using coconut fiber in-combination with Kevlar and special glass materials.

## Business Model
There are three primary business models: (i) production and distribution can be licensed out (ii) production can be outsourced while distribution would stay in-house (iii) production and distribution can both be kept in-house.

## Business Opportunity
Body armor is widely used in both military and police forces and also by civilians working in "hot-spots," such as war zones.

## Market Analysis
Type IIA body armor is targeted for use by police forces and other individuals who may come under "small-arms" fire[ii]. Overall about USD 4 billion was spent in 2010 on Body Armor around the world, however only USD 500 million was spent on armor and bullet resistant armor[iii]. Importantly, if the coconut body armor is significantly cheaper than standard Kevlar body armor there is a strong potential that it could expand the market. Law enforcement officials within low and middle-income countries could decide to expand their purchasing of body armor to protect more officers. While prices may vary, bullet proof vests rated at Type IIA and similar ratings are available for as low as USD 400[iv].

## Competitive Advantages
This product offers the potential to be both lighter weight and lower cost while still being able to effectively stop bullets. Given how heavy Kevlar vests typically weigh. These competitive advantages could lead to significant gains in market share once the product builds

## Competitor Analysis
The primary competitor will include Kevlar based body armor, specifically Type IIA. Kevlar body armor is well-known and widely accepted across the industry. It is heavy, expensive, and can be uncomfortable to wear in warm climates. Novel technologies are being explored. Researchers in Singapore, for example, have been working on composite materials based on corn that may prove useful in body armor manufacturing.

## Technology Solution / Innovation
Further, if the body armor is as light as expected, it may enlarge the market. Many police officers and others in "hot zones" or constantly exposed to danger may not have a need for the large heavy Kevlar dominant body armor available on the market, but may have a need for lighter but equally protective body armor.

## Project Challenges
The body armor field is well-established and already dominated by several major global companies. Breaking into established markets, such as the European Union and United States, may prove to be especially difficult. Defaults in the performance of the product could show up with increased testing or under varying circumstances (i.e. degrading over time).

## Intellectual Property Rights
Patents have been filed in Malaysia to protect both the process to make the material and the material itself.

## Project Status
A prototype has been built and the product has already won recognition and awards, such as the gold award at the 35th International Exhibitions of Inventions New Techniques and Products in Geneva.

## Financials
The financial success of this product will depend on its performance and costs, among other factors. Breaking into the well-established body armor field, especially with such a novel product, may prove to be difficult. Our projects show the financial revenues that could be gained if this project is able to capture .1 percent, .5 percent, and .8 percent of the global market (in terms of revenue). Acceptance will likely be slow over the first few years, but as the product's reputation increases, sales will also increase. The product may also be able to tap into less well-funded markets, such as low and middle income countries.

**Y1** - RM 1,500,000
**Y2** - RM 7,500,000
**Y3** - RM 12,000,000

## Funding Requirement
The funding requirement will depend on the business model adopted. Licensing out the product would come with low funding costs but could also curtail profits. Given how novel this product is, there is a strong chance that funding and/or support will be needed to develop a manufacturing facility whether production is outsourced or not.

Source: **(i)** http://www.pinnaclearmor.com/body-armor/ballistic-chart/ **(ii)** https://www.ncjrs.gov/pdffiles1/nij/189633.pdf **(iii)** http://www.bccresearch.com/report/advanced-protective-gear-armor-avm021g.html **(iv)** http://www.armasure.com/vests.html?gclid=CMjygpjT964CFYoc6wodmjwYvw#.T2mbzhEgcmt

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# Money Making Opportunity

## Innovation Business Opportunity

**RM 6 Million**
Potential Yr3 Revenue

# Biopesticide For Control of Mosquito Larvae (IMR001)

**Cost Effective**
**Long residual**
**Specific Against Mosquito Vectors**
**Environmentally Friendly**
**Highly effective**
**Patented in Malaysia**

# Biopesticide For Control of Mosquito Larvae (IMR001)

## Project Overview
An optimised bioprocess for the mass production of a local isolate of mosquito-killing bacterium, *Bacillus sphaericus (Bs)*. The bacterium is highly effective in killing mosquito larvae especially the anophelines (malaria vectors) and *Culex* mosquitoes (nuisance & Japanaese encephalitis vectors) and provides an effective alternative to chemical insecticides.

## Business Idea
To mass produce a novel mosquito-killing bacterium called *Bacillus sphaericus* isolated from soil samples through fermentation processes, into a compound that could be distributed in aqueous suspension, pellets, granules or liquid form.

## Business Model
Two business models are proposed: (1) To develop, mass produce and distribute the compound to mosquito controllers, regulators, local councils and environmental management organizations, and (2) To license the compound to bio-chemical companies or bio-pesticide manufacturers, for the control and eradication of mosquitoes globally.

## Business Opportunity
The mass produced bacterium is highly effective against mosquito larvae, yet is non-toxic to all other non-target organisms. It is an environmentally friendly mosquito control agent. Globally, the World Health Organization and its donors have disbursed more than USD2 billion in 2011 for malaria control.[i] The next five years allocation is projected to hover between USD1.5-1.75 billion based on current commitment.

## Market Analysis
Current methods used to control insect larvae are mostly based on chemical insecticides that have drastic effects on non-target organisms. Biopesticides are becoming more popular as it is environmental friendly and is expected to grow from USD1.6 billion in 2009 to USD3.3 billion in 2014.[ii]. Microbial biopecticides such as Bs and Bacillus thuringiensis (Bt) is estimated at 60% of the global biopesticides market.[iii]

## Competitive Advantages
Bs has the potential to be cost effective, costing USD8 per litre while chemical insecticides are costing USD 30 per litre.[iv] Bs only needs 1-3 applications per year with persistence of 8-12 weeks versus of 40-50 applications per year with persistence of 1 week for chemical insecticides.

## Competitor Analysis
Bt is another bacterium that is also used in vector control programs of endemic diseases such as dengue, malaria and filariasis. Product development based on Bt has been produced commercially by many companies and these bacteria-based products account for about 90% of the worldwide market for biological control agents. Major companies producing these are Abbott Laboratories, Baker Microbial Products (BMP) etc.

## Technology Solution / Innovation
Use of biological control agents such as the *Bacillus* genus are among the most widely used entomopathogenic microorganisms, especially for its ability to form spores and toxins highly specific to target insects. Bs and Bt are employed in programs to control larvae of important mosquito disease vectors.

## Project Challenges
To develop a process that could design, develop and mass produce the product in a cost-effective manner, comparable with Bt. The challenges are technical, sociopolitical and economic. Often these solutions are required in remote locations which are not easily accessible. Administering effective insect-control programs are subject to country health regulatory controls and legislation.

## Intellectual Property Rights
A patent has been filed and granted in Malaysia (MyIPO Patent No. MY-138027).

## Project Status
The project team has indicated they are ready to speak with companies, government agencies and local councils to further this invention.

## Financials
Based on the Malaysian market, the total federal budget spent on disease control is RM 25 million [v], (the State's budget is RM 10 million are for the purchase of the pesticides). Assuming a 10%-15% conversion to biopesticides, Year 1 revenues is estimated at RM 1 - 1.5 million for the Malaysian market.

Year 2 and 3, targeting the neighboring countries dengue control budget (Thailand: Baht 800 million[vi], Philippines USD 1.42 million[vii], Indonesia: USD 2.52 million[viii]), a 10% conversion to biopesticides, will give an estimated incremental revenue of RM 3 - 5 million for year 2, and RM 5 – 7 million for year 3.

## Funding Requirement
1. Setup cost of facilities to develop the project into products that can be mass produced and marketed globally,
2. Legal fees to ensure branding, licensing and marketing rights are protected.

Source: **(i) World Malaria Report 2011, World Health Organization.** Chapter 3, page 15. **(ii) BCC Research (2010). Biopesticides: *The Global Market*.** Last accessed 20th Feb 2012 at: http://www.bccresearch.com/report/biopesticides-market-chm029c.html **(iii) Ravensberg,W.J (2011). A Roadmap to the Successful Development and Commercialisation of Microbial Pest Control for Control of Arthropods (iv) Pesticide Action Network UK (2001). Zapping Mosquitoes with Biopesticides.** Last accessed 20th Feb 2012 at: http://www.pan-uk.org/pestnews/Issue/pn54/pn54p9.htm **(v) Ministry of Health, Malaysia. Disease Control Division, Vector Borne Disease Control Program**, 11-15 August 2008, **(vi) Action Against Dengue: Dengue Day Campaigns Across Asia**, World Health Organization, 2011; page 73. ISBN: 978 92 9061 539 2. **(vii) Asia Pacific Dengue Program Managers Meeting Report**, 5-9 May 2008, Singapore. World Health Organization, pages 95, **(viii) WHO country cooperation strategy for Indonesia 2006-2011**, World Health Organization, 18 Jan 2007, page 18.

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# Money Making Opportunity

## Innovation Business Opportunity

RM **6** Million
Potential Yr3 Revenue

# Mosquito Repellant Gel

## (UKM008)

**Gel Based Formulation**
**Natural Ingredients**
**Non-Greasy**
**No DEET**
**Lasts Up to 4 Hours**
**Tested & Proven**

# Mosquito Repellant Gel (UKM008)

## Project Overview
To design and develop a gel-based natural mosquito repellent containing the essential oil from local plant extract that is DEET free (Diethyl-meta-toluamide – a common active chemical ingredient used in insect repellent) for use in tropical climates.

## Business Idea
To develop, produce, distribute and license the product in a form that can be mass marketed to consumers in tropical climate countries.

## Business Model
Two business models are proposed: (1) To develop, mass produce and distribute the gel as an ingredient to producers of mosquito repellents, (2) To license the formula to bio-chemical companies as ingredient to produce other variants of mosquito-repelling products (eg: wristband, coils, H2O-based sprays, scented candles, repellent mats, sticks & liquids)

## Business Opportunity
To position the product as natural and eco-friendly, non-toxic (DEET-free) and bio-friendly insect repellent.

## Market Analysis
The global fear of mosquito-borne diseases especially malaria and dengue with a reported 5.5 billion[i] at risk, where 37% are likely to occur in South-East Asia, coupled with the increasing arrivals of tourist from Europe, Americas and Middle East into South-East Asia[ii], is seen in the estimated global sales of USD 2.4 billion for aromatics and insecticide in USA in 2005[iii]. Projecting this to 2011 at estimated 7%, will mean a potential market size of USD 3.8 billion.

## Competitive Advantages
The UKM product has already been: shown to be effective for 4 hours, formulated into a non-greasy gel, suited for tropical climates with its pH balanced to avoid skin irritation.

## Competitor Analysis
The market is crowded with few global large players, namely; OFF! (from SC Johnson), Cutter & Repel (from Spectrums Brands) – all claiming to be organic, natural, herbal and DEET-free. Regional players includes 21st Century, Tabard (from Acorn Group, South Africa), Skeetolene (found mostly in Thailand) and Tiger Balm (from Haw Par, Singapore). Prices are mostly retailing at RM 20 – RM 30 per tube/ spray[iv]. Another research team in UKM has a similar product branded as Bio-D, available in lotion and spray[v].

## Technology Solution / Innovation
The project innovation is the research team's discovery of a local plant with mosquito repelling properties, and their ability to extract, test, transfer and preserve these properties into a consumer-based gel product, and to produce at a low cost.

## Project Challenges
To get the formulation into various forms (spray, patches, cream, lotion, etc) to cater to different needs and applications. To complete toxicological, safety and efficacy test of each product formulation in compliance with regulatory controls.

## Intellectual Property Rights
The innovation is protected as trade secret. The gel is currently branded as "Mosregel".

## Project Status
The project is in pre-commercialisation stage, and has fulfilled 30% of regulatory requirements. (eg: National Pharmaceutical Control Bureau of Malaysia).

## Financials
Targeting the tourists arrivals from Europe, Americas, Oceania and Middle East into South-East Asia, where Year 1 is targeted at arrivals in Malaysia, Year 2 and 3 targeted at arrivals in Malaysia, plus arrivals in Thailand and Indonesia, the potential market for year 1 is 20,499 people (or, 10% of 2011 arrivals in Malaysia), year 2 is 85,699 (12% for Malaysia, 1% arrivals in Thailand and Indonesia), and year 3 is 336,249 (15% for Malaysia, 5% for Thailand and Indonesia).

Assuming the average retail unit price for one tube / one bottle mosquito repellent is RM 18.00, the projected sales revenue will be RM 368,982 in Year 1, RM 1,542,583 in Year 2 and RM6,052,478 in Year 3.

## Funding Requirement
Further development work has to be done to get the formulation into other forms and to ensure the product characteristics are retained. Regulatory tests in compliance with regulatory controls need to be completed.

Source: **(i) World Health Organization, Fact sheet No. 117, Jan 2012.** [Last accessed: 8 Mar 2012] http://www.who.int/mediacentre/factsheets/fs117/ en/ ; World Malaria Report 2011, Page xiii; http://www.who.int/malaria/world_malaria_report_2011/9789241564403_eng.pdf **(ii) Tourism Malaysia, Tourists Arrival by Country of Residence,** [Last Accessed: 8 Mar 2012] http://corporate.tourism.gov.my/images/research/ pdf/2011/ TouristArrivals_January_2011 .pdf; **Thailand's total visitor arrivals in first seven months of 2010 still up 13%**, September 10, 2010 http://www.eglobaltravelmedia.com.au/tourist- boards/thailand%E2%80%99s-total-visitor-arrivals-in-first-seven-months-of-2010-still-up-13.html; Badan Pusat Statistik Republik Indonesia. http://dds.bps. go.id/eng/tab_sub/view.phptabel=1&daftar=1&id_subyek=16&notab=16 **(iii)EstimatedbyEuromonitor,2005**.http://www.bio-hnt.com/data/Eng% 20Mosquito%20Repellent%20IR%201006.pdf?PHPSESSID=441c09d7e9662bb58bc8e991ac67561a **(iv)Variousportalssellingmosquitorepellents**[Last Accessed: 7 Mar 2012] http://www.21stcentury.com.my/products.aspx?t=c&v =14; http://list.lelong. com.my/ Auc/List /List.asp?DA=A&SubmitButton= Search& TheKeyword= mosquito+repellent&x=44&y=9&CategoryID=&PriceLBound =&PriceUBound=; http://www.alibaba.com/ trade/search?Country= MY&SearchText=mosquito+repellent&IndexArea=product_en&fsb=y **(v) Entogenex** [Last Accessed: 7 Mar 2012] http://www.entogenex.com.my/pages/ products.php# Lotions **(vi) Plants as Mosquito Repellent, blogspot**. [Last accessed: 7 Mar 2012] http://toomalaysian.blogspot.com/2009/09/plants-as- mosquito-repellants.html; http://www.wildernesscollege.com/plants-that-repel-mosquitoes.html; http://www.streetdirectory.com/travel_guide/4451/ home_improvement/ mosquitoes_in_your_garden_try_planting_these. html

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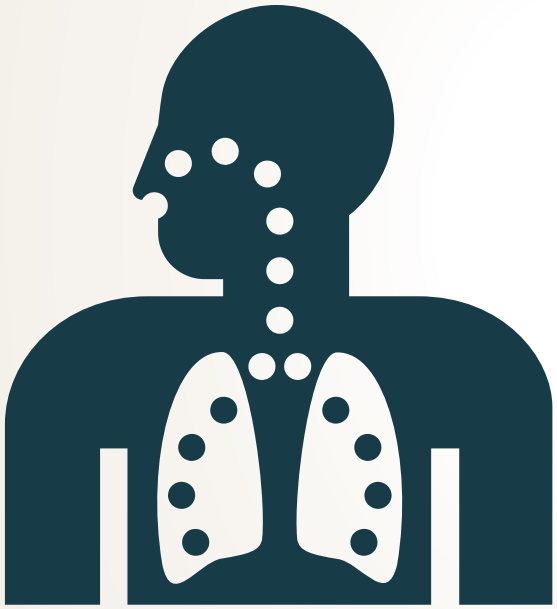
# Money Making Opportunity

## Innovation Business Opportunity

RM 25 Million
Potential Yr3 Revenue



# Tuberculosis Diagnostic (IMR002)

**A Lateral Flow Immunoassay**
**Fast & Accurate**
**Suitable for Low Income Markets**

# Tuberculosis Diagnostic (IMR002)



## Project Overview

Nucleic Acid Lateral Flow Immunoassays are a combination of small devices and test strips that can be used to test a range of diseases and conditions. Perhaps the most common lateral flow lateral flow immunoassays are common pregnancy tests. In this case, a lateral flow immunoassay has been developed to detect Tuberculosis.

## Business Idea

To produce and/or distribute a detection strip for detection of tuberculosis (TB). This detection strip will consist of an immunoassay strip for detection of the amplified products. The detection strip will allow health practitioners to quickly and accurately diagnose TB.

## Business Model

The production and distribution of this product can be licensed to medical diagnostic companies and other relevant companies, or production and distribution can be kept in house. In this business model the business will also sell the PCR mastermix necessary for making the diagnosis.

## Business Opportunity

Tuberculosis is a widespread and deadly disease. Importantly, every one person infected with TB can infect up to 15 other individuals, making this a high-rate of transmission disease, thus increasing the need to diagnosis patients quickly[i]. TB is most prevalent in low and middle-income countries who also cannot afford most diagnostic testing methods. This test offers the potential to be both accurate and affordable.

## Market Analysis

About 1/3 of the world's population is infected with the TB bacterium, and between 5 to 10 percent of those infected will eventually develop the disease. Tuberculosis is a wide-spread disease, causing the death of 1.7 million people per year. This disease is especially prominent in low and middle-income countries, which unfortunately cannot afford the standard diagnostic procedures for testing TB. High-income countries are also seeking to cut costs spent on healthcare and will likely view a lower-cost, higher-speed test. South East Asia has the highest infection rates, accounting for 35 percent of all new cases. About 9.5 million people are inflicted globally per yeari.

## Competitive Advantages

This product will aim to be cheaper, more accurate, and faster than tests currently available on the market. The low cost of the tests will be affordable in low and middle income markets.

## Competitor Analysis

The most widely used diagnostic methods involve a combination of medical examination, chest x-rays and biological cultures and can take up to three months to complete conclusive testing. Cheap, "fast" alternatives available, but they are not accurate enough to be conclusive.

## Technology Solution / Innovation

A PCR machine will be used to produce the amplified products which can then be tested using the detection strip. Most TB diagnostic procedures now are cumbersome, expensive and can require  months to prove conclusive. The tests should be easy to use and read in comparison to diagnostic procedures currently available. Other "fast-tests" have proven unreliable.
The components of
The detection strip can be stored for long periods of time, are portable, and should be easily usable in the field. Another test has been developed that can accurately test for TB in 100 minutes, however the test machine costs about USD 17,000 (with 75 discount to countries with high TB rates) and each test costs at additional USD 25. The procedure will require an extraction kit for extracting the DNA, a PCR machine for amplification of the targeted fragment, a master mix for the amplification process and the detection strip.

## Project Challenges

Continued testing may be needed to prove –beyond doubt- the effectiveness of this test. Approval and meeting the standards of national and international drug and pharmaceutical organisations, such as the FDA (USA), will also be needed.

## Intellectual Property Rights

A patent application is needed to protect this product.

## Project Status

A patent application needs to be prepared, and the initial research and development of the product has already been carried out. The project team is now looking to license this product to relevant companies and organisations

## Financials

The costs for the extraction, amplification component and detection strips will be approximately RM 80, as provided by the project team. The financial projections project a targeted roll out in Asia through the first three years, though other international markets would also be attractive once the business is at scale and prepared for global distribution. Our projects show testing rates of 2, 4, and 6 % of all new incidents for years 1, 2, and 3 respectively. Future growth could push the numbers far higher.

**Y1** - RM 8,500,000
**Y2** - RM 16,000,000
**Y3** - RM 25,000,000

Funding Requirement
The prototype is ready to be commercialised, and/or licensed. Funding may be needed for field testing and applying to regulatory bodies for approval.

Source: **(i)** http://www.who.int/mediacentre/factsheets/fs104/en/ (ii) http://www.who.int/diabetes/en/

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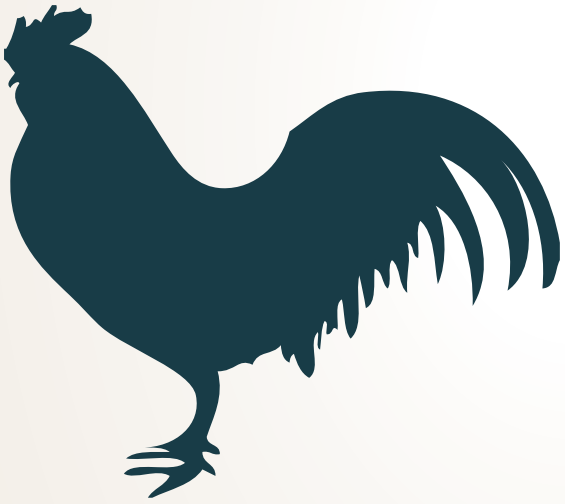
# Money Making Opportunity

## Innovation Business Opportunities

RM **11.5** Million

Potential Yr3 Revenue



# TetraCycline Biosensor Test Kit (MARDI001)

**Lower in Cost and Higher in Speed than Current Test Kits**

# TetraCycline Biosensor Test Kit (MARDI001)

## Project Overview
A rapid and low cost test kit has been developed to detect Tetracycline, an antibiotic commonly given to livestock to increase growth and final output of meat produced. Tetracycline can pose a health danger if overused.

## Business Idea
To license and/or produce and distribute both an Electronic Testing Machine (EMT) and test strips and an electronic testing device for the detection of Tetracycline.

## Business Model
There are two business models; A) Production and distribution is kept in-house, B) The technology is licensed to outside companies who will then produce and distribute the test kits.

## Business Opportunity
Tetracycline is widely used in the meat production industry however many countries are now banning or regulating its use. The FAO/WHO recommends the maximum residual level for meat not exceed 300 m g/kg for liver, and 600 m g/kg for kidney[(i)]. EU has banned the use of antibiotics for "fattening" outright. A cheap and rapid test could be well-received by inspectors and organisations/companies seeking to monitor tetracycline in meat.

## Market Analysis
The worldwide production of meat is huge, with poultry production alone accounting for 85 million tons of meat produced per year[(ii)]. Tetracycline is the most widely used antibiotic within meat production, though specifics are not available. Global production of meat totals about 270 million MT[(ii)]. East and South East Asia are among the fastest growing regions for livestock production[(iii)]. Given that Tetracycline is widely used and can pose a threat to human health if found in too great of concentrations, there is a need to spot check meat produced.

## Competitive Advantages
While Tetracycline tests are on the market, this test promised to be both lower in cost and higher in speed then currently available tests. Such a test could help Malaysia's growing pharmaceutical industry and would offer a concrete and important innovation for global markets.

## Competitor Analysis
Other tests are currently available on the market. These test kits are largely produced by medium sized firms, such as Bioo Scientific, a medium sized firm located in Austin Texas. So far, no major pharmaceutical company (Pfizer, etc.) is producing test kits in this sector.

## Technology Solution / Innovation
This test kit exhibits several important solutions and innovations. For one, the fastest widely available competing product takes 2 hours to test, whereas this test takes only five minutes. Further, this is a low-technology, low-skill product, thus specialized technicians are not needed. These competitive advantages may allow the product to gain considerable market-share to become one of the world's most widely used tetracycline test kits.

## Project Challenges
As there is already an established competitor, gaining market share may be difficult. Further, many countries and companies may chose not to test for Tetracycline or regulate its usage. Companies selling and using Tetracycline may push back against efforts to reduce its use and application.

## Intellectual Property Rights
Currently, there is a patent pending for the process to produce this test kit.

## Project Status
While further testing may be needed to conclusively prove its accuracy, this product should be commercially ready in the near term. The project team estimates that they need 7 to 12 months before this project is commercially ready.

## Financials
The first set of financial projects show revenue if the test kit can only be used for poultry. We assume that 1 in 100 tons of poultry is tested locally and 1 in 10,000 ton is tested internationally.

**Y1** - RM 5,700,000
**Y2** - RM 6,750,000
**Y3** - RM 8,000,000

If the Tetracycline test can be used (or developed) for all forms of meat and milk, we project the revenue as:

**Y1** - RM 8,000,000
**Y2** - RM 9,600,000
**Y3** - RM 11,500,000

## Funding Requirement
Funding will be needed to conduct further product testing, to pay for marketing and distribution costs, and production may all be needed. Licensing this product would reduce overhead costs, but potentially lower revenue and or profits.

Source: **(i)** http://www.biokits.com/productinfo/941/MaxSignalTM-Tetracycline-ELISA-Test-Kit.html **(ii)** Compiled from FAO stats for sheep, cattle, pork, and poultry **(iii)** State of Food and Agriculture; Livestock in balance PG 13 **(IV)** http://www.fao.org/countries/55528/en/mys/

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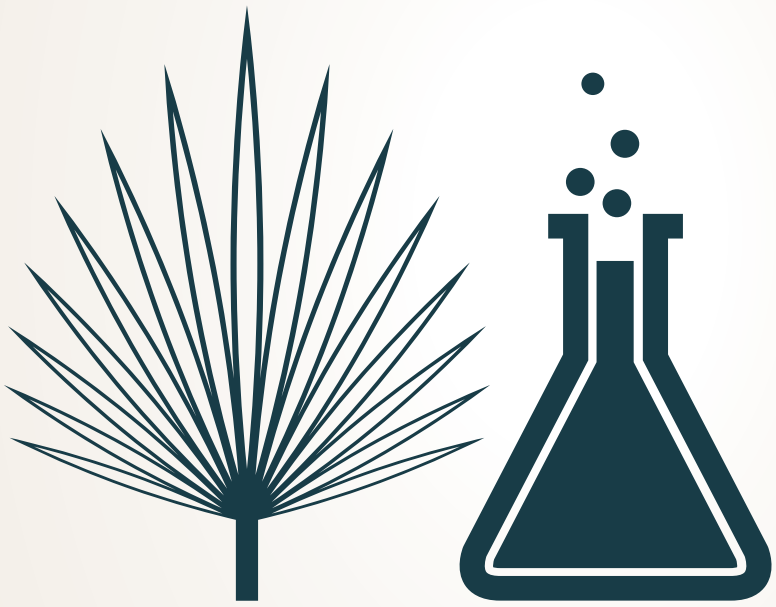
# Money Making Opportunity

RM **114.6** Million
Potential Yr3 Revenue

## Innovation Business Opportunities



## Polyols (UKM007)

## Renewable Patented Technology

# Polyols
## (UKM007)

### Project Overview
UKM has produced a process for preparing natural oil polyols (NOPs) from palm oil, palm kernel oil and other natural oils such as coconut oil and soybean oil having a multiple functionality ranging from 1.0 to 6.0. The polyols produced from the process of present invention are polyesters and polyamides that are suitable for use in the manufacturing of polyurethane materials.

### Business Idea
Polyols derived from natural oils (renewable resources) enable manufacture of "green" polyurethanes , a major plastic used in a variety of applications from building materials to flexible foam seating

### Business Model
There are two primary business models for this product. 1) The technology can be licensed out to large palm plantations and plastics companies, especially those within Malaysia. 2) To collaborate closely with a small number of palm companies to develop a joint venture.

### Business Opportunity
Cost of chemical precursors for petroleum-based polyols is subjected to swings in price of oil in response to global macroeconomic and political constraints – translates to instability in polyurethane pricing structure. PU cost will trend upwards as demand for this non renewable resource outstrips supply due to depletion. A number of commercial manufacturers are embracing sustainability, but properties of PUs from today's commercially available natural oil based polyols are inferior to polyols from petroleum, hence most efforts to go green are limited to blending with petroleum based polyols and then only to a small amount, e.g., 5-20% NOP.

### Market Analysis
The Polyurethane market itself currently stands at USD 33 billion (2011) and is projected to grow to USD 56 billion by 2016[i]. Asia is the largest market, accounting 40%[ii]. As construction and consumer consumption continue to increase, the demand for polyurethane should also increase. As NOP based polyurethane is a relatively new field there are no statistics currently available, however there has been an increasing emphasis on sustainable sourcing.

### Competitive Advantages
This product is sourced from a renewable resource, palm-oil and should be cheaper to produce than other NOPs. Petro-based polyols will likely remain cheaper in the short-term. This product also offers numerous technological advantages, please see the Technology Solution / Innovation section.

### Competitor Analysis
NOPs, especially for polyurethane, represent a relative new field however various companies are becoming actively involved. Cargill and Dow are both working in NOP polyol. They have already developed numerous products and breakthroughs in polyol. Production capacities are in the 10's of millions of pounds[iii]. Most other competitors are smaller scale start-ups. Currently, the largest polyol company in Malaysia, and only company currently using palm oil, is PolyGreen. They have an annual production capacity of 10,000 metric tons[iv].

### Technology Solution / Innovation
The present invention overcomes many of the disadvantages of petrochemical-based polyols and prior art attempts to produce polyols, and have many desired properties. Firstly, the present method is attractive and economical in the sense that natural oil-based polyols are naturally formed macromolecules that are created in abundance at a very low cost. Natural oil is easy to process and refine, capable of being cultivated with minimum capital investment and suitable for conversion into quality polyols using an inexpensive reaction process. Secondly, the present method is safe compared to the manufacture of petrochemical-based polyols, in which it involves the usage of low hazardous chemicals that are non-flammable, non-toxic and of low volatility. Thirdly, the present method involves shorter reaction time with higher production yield. Fourthly, the present method utilizes low cost materials that include palm kernel oil and coconut oil that are present in abundance and easily available. Fifthly, the method of present invention produces wide range of polyesters and polyamides with multiple functionalities.

### Project Challenges
Many bioplastics are not as strong or as high of quality as petroleum based plastics. Further, palm oil is already a high-value added sector, making a switch to refined products less attractive. Further, such projects will likely increase demand for palm oil, which could lead to the destruction of environmental resources as palm plantations expand their acreage. This could also raise prices for palm oil used for cooking and food production. Further, competition may prove difficult given that both MNC's such as Cargill and local companies are already in the market.

### Intellectual Property Rights
The process for the production of the polyol has already been patented.

### Project Status
Funding has already been secured to develop a full-scale industrial pilot program. Next, the development team would like to begin discussion and collaboration with companies to commercialise this process (esp. those working in oleochemicals).

### Financials
Business Start-up fund (BSF) from MTDC is a very good option to start the commercialization of this project. BSF will support this project to provide fund for capital and operational expenses for first three years.

**Y1** - 7,000 MT x USD 3000 = RM 63,000,000
**Y2** - 10,000 MT x USD 3,090 = RM 92,700,000
**Y3** - 12,000 MT x USD 3,182 = RM 114,552,000

Funding Requirement
RM5,000,000 is needed to support this start-up company for first three years expenses

Sources: **(i)** http://www.marketsandmarkets.com/PressReleases/mdi-tdi-polyurethane-market.asp **(ii)** http://www.marketsandmarkets.com/Market-Reports/mdi-tdi-polyurethane-market-381.html **(iii)** http://www.bioh.com/bioh_faqs.html **(iv)** http://www.bioh.com/bioh_faqs.html

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# Money Making Opportunity

## Innovation Business Opportunity

RM **10.5** Million

Potential Yr3 Revenue

# Pink Guava Fibre Sources (MARDI002)

**Low Cost**
**High in Antioxidants**
**Low Calorific Value**
**Patent Filed**

# Pink Guava Fibre Sources (MARDI002)

## Project Overview
The research team at Malaysian Agricultural Research and Development Institute (MARDI) has developed a process for converting pink guava by-product into dietary fibre in the form of powder or drink.

## Business Idea
To design, develop, produce and distribute different forms of dietary supplements (powder, beverage, etc.) based on the dietary fibre processed from the pink guava by-products.
.

## Business Model
Two models are proposed for this business (i) Setup a manufacturing plant to produce the dietary fibre powder and further process it to produce the dietary fibre drink and sell the powder and the drink to the consumers. (ii) Produce the dietary fibre powder and sell it to other food processing companies as an intermediate product and to consumers.

## Business Opportunity
An aging world population and the public's increasing concern over health issues have created a growing demand for natural and healthy food and supplements. Further, due to the increasing burden on the land resources there is a need to minimize the wastage of food during processing.

## Market Analysis
The U.S. food fiber industry earned revenue of USD 193.1 million in 2004 and was projected to generate USD 495.2 million in revenue in 2011. [(i)] According to KFSU Dietary Fibre, an Australian manufacturer, the global market for dietary fibre is more than USD 3 billion a year and growing at 13 per cent a year.[(ii)]

## Competitive Advantages
Using this process the team has created an effective and inexpensive source of dietary fibre. It is a good source of antioxidant ingredient as it contains high total antioxidant activities (86.72 % AOA). Furthermore, dietary fibre powder from pink guava by-product has low calorific value (246 kcal/100 g) and can be used as an ingredient in low calorie products. This dietary fibre has been found to have prebiotic and hypocholesterolemic effects.[(iii)]

## Competitor Analysis
The business will be primarily competing with existing dietary fibre manufacturers who use other sources for extracting and producing the dietary fibre based products. For example Quanstar Biotech Sdn Bhd. produces and sells 'Total Fiber', a non-GMO and non-gluten dietary fibre powder. Similarly, KFSU Dietary Fibre produces and sells Kfibre, a dietary fibre powder produced from sugarcane by-product.[(iv)]

## Technology Solution / Innovation
It is estimated that during the processing of pink guava by the puree and beverage industry about 10 – 20 % of the fruit is considered by-product or decanter waste. This by-product is mainly constituted by pulp and seed. The pink guava by-product is hot water treated, then passed through a wet mill, dried and passed through a dry mill. The resulting powder is sieved and packed.[(iii)]

## Project Challenges
It will be challenging and time consuming to conduct extensive clinical studies on the dietary powder and on its usage in various food products like bakery, beverages etc. To access international markets the product might have to gain regulatory approval from different countries.

## Intellectual Property Rights
The team is in the process of filing a patent to protect their innovation.

## Project Status
The project is in pre-commercialization stage. The team has collaborated with Sime Darby Beverages Sdn. Bhd. for sourcing the pink guava by-products. Once pilot scale production is done, a bioavailability study and clinical study need to be conducted on the pink guava dietary fibre powder.

## Financials
For building the financial model for this business a case study of another recent dietary fibre startup in Australia is taken. Based on this model it is assumed that the business should target a similar full production capacity (1100 tonnes per year) by the 3rd year of operations. Based on this the annual capacity will grow from 300 tonnes in Year 1 to 700 tonnes in Year 2 and finally reaching 1100 tonnes in Year 3.

**Year 1** - 300 tons x RM 9.6 per kg = RM 2.9 million
**Year 2** - 700 tons x RM 9.6 per kg = RM 6.7 million
**Year 3** - 1100 tons x RM 9.6 per kg = RM 10.5 million

## Funding Requirement
The start-up funding requirement can be optimized and the process accelerated by collaborating with large scale pink guava producers and fruit pulp and beverage manufacturers. Collaboration with them will ensure long term raw material security and access to their existing network of pink guava users and consumers.

Source: **(i) Trends in Dietary Fiber in the U.S.**- http://www.cnpp.usda.gov/Publications/FoodSupply/FiberFactSheet.pdf - [Last Accessed - 21 Mar 2012]; **(ii) Sugar cane yields new edible fibre** - http://www.couriermail.com.au/business/business/sugar-cane-yields-new-edible-fibre/story-e6freqo6-1225992608685 - [Last Accessed - 21 Mar 2012]; **(iii) High Value Health Food from Pink Guava Processing Waste** - http://www.mardi.gov.my/c/ document_library/get_file?uuid=d746f741-59a7-42f6-9774-318ec6942def&groupId=10138 -[Last Accessed - 21 Mar 2012]; **(iv) Kfibre** - http://www.kfibre.com/product.html - [Last Accessed - 21 Mar 2012];

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# Money Making Opportunity

## Innovation Business Opportunity

RM 30 Million
Potential Yr3 Revenue

# QMAP Digital Based Map In Precision Farming (MARDI004)

**Extensive Farm Data**
**Precision Agriculture**
**Patent Pending**
**Low cost**

# QMAP Digital Based Map In Precision Farming (MARDI004)

## Project Overview
QMAP is a low cost digital mapping technique for rapid field plot generation and analysis. This digital field plot mapping system is an alternative to the expensive manual surveying and labor intensive manual digitizing method, and has been successfully implemented for precision padi production.

## Business Idea
To design and develop a novel mapping technique to produce reliable and up-to-date digitized maps, particularly farm maps of remote areas, for managing and planning land use and natural resources, and for engineering studies.

## Business Model
To offer a subscription or fee-based service to produce digital field plot maps, using the novel innovative digital mapping technique that combines high resolution multi-spectra image collected from commercial earth observation satellites. A secondary revenue model is to re-sell the software module developed jointly with the software developer for a fee.

## Business Opportunity
The mapping industry relies on high resolution remote-sensing images to produce digital maps, which are mostly costly for the users of such maps. Conventional methods, used by many countries in Asia, rely on slow and costly scanning and manual digitizing methods of satellite, aerial and ground survey mapping. The lack of regular up-to-date and timely information on agriculture land creates a compelling business opportunity.

## Market Analysis
FAO estimates 2010 global output of rice production to reach a high of 699.1 million tonnes (466.0 million tonnes, milled basis), a 2 percent upturn from the 2009 poor result. The achievement was primarily sustained by greater plantings from the padi production area of 161.0 million hectares[(i)]. Asia is estimated to contribute more than 90% (approx. 145 million hectares of land) of the world's rice production.

## Competitive Advantages
QMAP is a novel and innovative digital mapping technique combining satellite images (IKONOS images) with Geographical Information System (GIS) processing. Combined with the research team's extensive knowledge of rice growing areas, farmers' field plots information, farmland ownership information, and other relevant agriculture information, QMAP provides map-based variable rate application in precision agriculture.

## Competitor Analysis
In terms of mapping system, there are many geographical information systems available. However, most, if not all, are costly and incorporate some Global Positioning System (GPS) data. There are limited systems targeted for farm lands in Asia, specifically in Malaysia, due to the lack of current data.

## Technology Solution / Innovation
The innovation is in the design and development of techniques, and automation of some of the QMAP processes in the software.

## Project Challenges
Some of the project challenges highlighted by the project team are: (a) Negotiation with the software developer company in using some of its sub-modules for commercialization, (b) Fine tuning the automation of some of the QMAP processes, (c) Continued enhancement of map-based variables like fertilizer and chemical applications in precision agriculture, spatial and temporal variability of water related variables, decision support systems, etc.

## Intellectual Property Rights
The research team indicated that the service is copyrighted and patent is pending (ref: P120081438) in Malaysia.

## Project Status
The project team has successfully developed digital maps of field plot on a 4,000 ha commercial padi estate using a 1m resolution IKONOS images. A Letter of Intent was received on 16 March 2011 from potential commercialization partners: Jurupro Sdn Bhd and its Canadian principal, PCI Geomatics Canada (the software developer).

## Financials
Taking the costing from the project team, the cost of digitizing the maps are RM 5 per hectare, where the total arable land[(ii)] in Malaysia is 1.8 million hectares, in Indonesia is 23 million hectares, in Thailand is 14.1 million hectares, in Vietnam is 6.6 million hectares and in Cambodia is 3.7 million hectares.

Suppose the business target to achieve 10% in Malaysia, 5% in Thailand and Indonesia and only 1% in Vietnam and Cambodia by Year 3, the estimated revenue is:

**Year 1:** RM 180,000
**Year 2:** RM 6.1 million
**Year 3:** RM 30 million

## Funding Requirement
The project team will need to finalize the agreement between the commercial partner (software developer) in terms of licensing fees, revenue and profit sharing, plus fine-tune the software to include the additional features required to take the system globally.

Source: **(i) Rice Market Monitor, Trade and Markets Division, Food and Agriculture Organization of the United Nations, April 2011. Vol XIV, Issue 2.** [Last Accessed: 20 March 2012] http://www.fao.org/docrep/014/am491e/am491e00.pdf **(ii) Agriculture Statistics By Country.** [Last Accessed: 21 March 2012] http://www.nationmaster.com/graph/agr_agr_gro-agriculture-agricultural-growth

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# Money Making Opportunity

## Innovation Business Opportunities

RM **7.3** Million

Potential Yr3 Revenue

# Greenfinity Solar Charger (UKM014)

**Shorter Time for Charging**

**Supports Wide Range of Consumer Electronic Devices**

# Greenfinity Solar Charger (UKM014)

## Project Overview
The research team at Universiti Kebangsaan Malaysia (UKM) has developed a solar portable charger that can effectively use solar energy to charge mobile phones, GPS, camera, laptop and other consumer electronic devices.

## Business Idea
To design, develop, produce and distribute cost effective and energy efficient portable solar chargers that can be used to charge consumer electronic devices when access to grid-electricity is not available.

## Business Model
For the short term (1 to 2 years) it is proposed that the business develop the product targeting the rural mobile users and nature tourists (hiking, beaches) markets – looking for cheap and robust portable charging devices. For the long term the business should diversify their product line – for ex. Solar chargers easily attached to automobiles and able to charge the laptops – higher price for aesthetics and usability.

## Business Opportunity
In recent years mobile penetration in the rural markets has increased considerably – in Malaysia (2007) 22% of total hand phone users were from rural regions. [i] In the rural region the grid infrastructure is not as well developed as in the urban areas – thus creating the need for an alternative to grid charging. Also, the modern day travelers try to find a balance between staying connected and traveling to non-urban areas – this balance can be achieved with the help of the solar portable charger.

## Market Analysis
The market for advanced charging technologies was estimated to be worth USD 1.5 billion in 2010. [ii] The green charger market (solar and wind chargers) is estimated to grow at a CAGR of 15% from 2008 to 2014 and the solar chargers occupy a majority share of the green charger market. [iii] Also, Malaysia is one of the top 10 countries in terms of international travelers with an estimated 24.7 million tourists in 2011. [iv]

## Competitive Advantages
The key advantages of the Greenfinity Solar Charger are – efficient design resulting in shorter time for charging, support for wide range of consumer electronic devices and a higher period of durability warranty.

## Competitor Analysis
This business will be competing with conventional battery chargers and green-energy battery chargers (solar and wind powered). The current popular green energy charges are targeting the developed markets like U.S. and Europe – for example Freeloader PICO Solar Charger in the U.S. There are cheap solar chargers exported from China and Taiwan but they do not have long warranty periods and have lower quality.[v]

## Technology Solution / Innovation
The solar charger system includes a 5 Mwp capacity solar panel, an electronic controller unit, connectors supporting multiple devices and a robust casing designed to resist harsh weather conditions.

## Project Challenges
The initial primary market for this product is the rural mobile users – this demographic has relatively lower eco-conscious compared to urban market and also pricing is key for them. The secondary market is the tourists – as they are in Malaysia for a short period it will be challenging to create a brand image among them and then also to leverage that brand image.

## Intellectual Property Rights
Patent filed in Malaysia and through PCT filing. A copyright has been registered.

## Project Status
A first version of this product was partially commercialised in Saudi Arabia and Bangladesh. The new improved version's design has to be further refined and extensive testing needs to be conducted. The team has collaborated with Solartif Sdn Bhd (Malaysia) and Greenfinity Energy Limited (Bangladesh).

## Financials
It is assumed that in the first year the business will target the Malaysia rural mobile users and the international tourists market. The estimated first year revenue is RM 2.25 million. In the second year the business is proposed to enter the neighboring rural mobile users market to tap in to the high volumes there. It is estimated that the second year revenue amounts to RM 6.3 million. In the third year it is assumed that the business will grow at the same rate as the green charger market growth rate of 15%. [iii] This amounts to revenue of RM 7.3 million in the third year. It is proposed that for further expansion the business should consider introducing new products in the field of small medical equipment chargers used in the rural areas and chargers that can be used in automobiles for charging laptops.

## Funding Requirement
The cost of the startup process can be optimised and the timeline fastened by collaborating with solar panel manufacturers for easy integration of the solar components into the system.

Source: **(i) Handphone Users Survey 2007 by MCMC** - http://www.skmm.gov.my/link_file/facts_figures/stats/pdf/Handphone_Users_Survey_2007.pdf [Last Accessed - 09 Mar 2012]; **(ii) PC World** - http://www.pcworld.com/businesscenter/article/209066/market_for_green_gadget_chargers_brightens.html; - [Last Accessed - 09 Mar 2012]; **(iii) Frost & Sullivan: Solar and Wind Chargers Market Pushed by Laptops and Mobile Phones** - [Last Accessed - 09 Mar 2012]; **(iv) Malaysia Tourism Figures** - http://www.tourism.gov.my/facts_figures/- [Last Accessed - 09 Mar 2012]; **(v) List of 10 popular solar chargers** - http://www.greendiary.com/entry/10-solar-chargers-gadget-gear/ - [Last Accessed - 09 Mar 2012]

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# Money Making Opportunity

## Innovation Business Opportunities

RM **1.03** Million

Potential Yr3 Revenue

# WhiteSteg Steganographic Application (UM001)

**Double-layered approach using both steganography and cryptography techniques**

**Able to embed any type of digital files and does not require any additional information**

# WhiteSteg Steganographic Application (UM001)

## Project Overview
A standalone, highly secure steganographic (steganography is the term applied to any number of processes that will hide a message within an object, where the hidden message will not be apparent to an observer) software application using both steganography and cryptography techniques, enabling users to communicate via a public communication channel.

## Business Idea
To design, develop and license the product and innovation to software developers, government agencies, government-linked companies, and third party software developers to use this method of security into their applications software.

## Business Model
Two models are proposed: (a) licensing agreement to third party software developers as a development toolkit, and (b) sale and licensing agreement for the software application.

## Business Opportunity
Work with Majlis Keselamatan Negara, Malaysian Communications and Multimedia Commission, and Kementerian Hal Ehwal Dalam Negeri to incorporate this method of security as their standard for transmission of sensitive and confidential documents.

## Market Analysis
Global Industry Analysts, Inc estimates the Global Information Security Products & Services Market to exceed USD125 Billion by 2015.[(i)] Due to the fast growth of mobile and Internet networks, the need for adhering to global compliance standards and the growing risk of hackers, are compelling companies to continue investing in security solutions.

## Competitive Advantages
Unlike other security solutions, WhiteSteg™ uses a double-layered approach using both steganography and cryptography techniques which allows more data to be embedded into the cover-text, and the ability to embed any type of digital files and does not require any additional information regarding the size or type of the digital file or the size of the cover text.

## Competitor Analysis
The global information security products market is highly competitive. Major players includes ActivIdentity Corp, Check Point Software Tech Ltd, Cisco Systems Inc., CA Technologies Inc., F-Secure Corp, IBM Internet Security Systems, Juniper Networks Inc., McAfee Inc., Novell, SafeNet Inc., Sophos Plc, Symantec Corp, Trend Micro Inc, among others.

Two categories of steganography software are available: Enterprise and Consumer versions. For the enterprise versions, pricing ranges from USD 4,000 upwards. For the consumer versions, many are offered free or at low cost (eg: USD 59) [(ii)].

## Technology Solution / Innovation
Combination hybrid solution using both steganography and cryptography that allows more data to be embedded into the cover-text and does not require any additional information regarding the size or type of the digital file or the size of the cover text.

## Project Challenges
Three challenges are identified: (i) Develop a compression algorithm into the system in order to reduce the output file size, (ii) development of a software development toolkit for third party developers, and (iii) ensure compliance with ISO/IEC information and data global security standards and to accredit the product[(iii)].

## Intellectual Property Rights
The WhiteSteg™ methodology and product is protected by copyright and a registered trademark. A patent has been filed in Malaysia, pending approval.

## Project Status
The WhiteStegTM software application is fully developed into a standalone product, tested and is ready to be commercialized.

## Financials
Assuming this security method is adopted for use by one or more of the Malaysian government agencies, government-linked companies and large private corporations, and positioning this for enterprise or corporate use for high level data and information security.

Assuming a one-time fee for installation and setup at RM 5,000 per site, with sliding scale simultaneous licensing fee (1st tier at RM 99 per simultaneous user per annum, tier 2 at RM 89 per simultaneous user per annum and tier 3 at RM 59 per simultaneous user per annum), and annual maintenance upgrade fee, the potential revenue are:

**Year 1** revenue at RM 195,000 for one site.
**Year 2** revenue at RM 585,000 for three sites.
**Year 3** revenue at RM 1,034,000 for five sites.

## Funding Requirement
Further development is needed in the area of data compression (to reduce the output file size), development of a software development toolkit, full compliance testing and accreditation with ISO / IEC information and data security standards.

Source: **(i) Information Security Market to Exceed $125 Billion by 2015. Info Security Magazine, Oct 18, 2010.** [Last Accessed: 13 Mar 2012] http://www. infosecurity-magazine.com/view/13263/information-security-products-and-services-market-to-surpass-125-billion-by-2015/ **(ii) Results for "steganography" in www.download.com** [Last Accessed: 13 Mar 2012] http://download.cnet.com/1770-20_4-0.html?query=steganography&searchtype=downloads; **Sims Software pricing** http://simssoftware.com/pricing.html; **Invisible Secrets by Neobyte Solutions SRL** http://www.invisiblesecrets.com/ **(iii) PR Web Online news portal, Oct 18, 2010.** [Last Accessed: 13 Mar 2012] http://www.prweb.com /releases/ information_security/products_services/ prweb4661844.htm]

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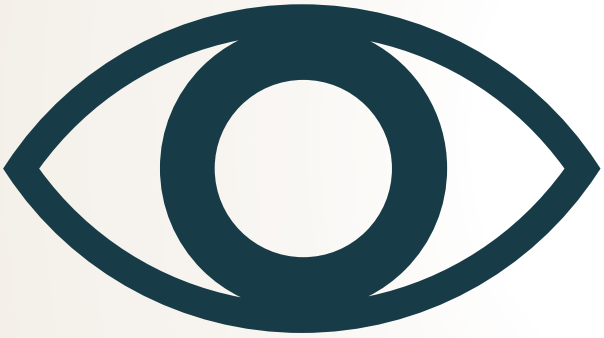
# Money Making Opportunity

## Innovation Business Opportunities

RM 1.3 Million
Potential Yr3 Revenue



# KieVision*
## - Reading tool to detect a child's reading ability (UKM003)

**Online Screening Tool**
**Detects Reading Performance, Progress, Learning Disabilities & Eye Problems**
**The Only Malay Language Screening Tool**

# KieVision - Reading tool to detect a child's reading ability (UKM003)

## Project Overview
KieVision is an online screening tool and portal that helps to detect the reading problem among children. It is a reading tool to detect a child's reading performance and progress, learning disabilities & eye problems.

## Business Idea
To design, develop and license for use an online reading assessment tool for children aged 3 years and above. This tool is in Bahasa Malaysia language, and will need 10-15 minutes to administer, where diagnosis and assessment is done.

## Business Model
Two potential business models: (a) license the system to educational and healthcare providers to administer these tests to school-going children in Malaysia, and (b) provide hosting services and rental of the systems to primary schools and pre-school nationwide to administer these tests for their children.

## Business Opportunity
Malaysia has 7,714 primary schools, and an enrollment of 178,622 pre-school students, 2.86 million primary school students and 2.3 million secondary school students a year [i], with Bahasa Malaysia as their medium of learning. As noted by Sajlia Binte Jalil, Susan J. Rickard Liow, et al in the publication "*Semantic Assessment Battery for Malay-speaking adults with Aphasia*"[ii], says "there are no language assessment tool designed specifically for the 200 million Malay-speaking people in South-East Asia".

## Market Analysis
Globally, there are many reading assessment tools available. A quick check online has identified at least 88 such tools, mainly in English language and Spanish language [iii]. 78 of these tools are targeted for children aged 4-6, while 42 of them are also meant for children aged 7 upwards. 24 of these tools are assessing the children's reading comprehension.

For the Online assessment tools, many variations are found. Variations include Listening, Mathematics, Reading, Speed reading, and Comprehension. These products are mostly administered and available online, where a person logs on and complete the assessment within 15-30 minutes.

## Competitive Advantages
The only Malay language version learning disabilities screening system with integrated screening tools, reports plus physical medical devices applications, fast and easy to use, able to give instant results, detect and generate recommendations.

## Competitor Analysis
For the online reading assessment version, direct competitors in terms of functionalities, there are many (eg: freevisiontest.com, ldpride.net, etc). These are all English versions. For the BM version, none has been identified so far.

## Technology Solution / Innovation
The innovation has the ability to recognise eye problems (blurred vision, convergence, ability to focus) with the rich knowledge-based content the project team has on learning disabilities and optometry

## Project Challenges
Two challenges are identified: (a) Sufficient number of field tests is needed across the country to ensure the tests results are accurate, suitable for the environment, and (b) endorsement from professional bodies like the National Optometrist Association, the Malaysian Dyslexic Association / Council, Ministry of Education Malaysia, Therapists Practitioners association and the Pediatrics Practitioner association.

## Intellectual Property Rights
The product is protected under Trade Marks ACT 1976 (ref code : UKM-TM/013/16/as/ 2010009920). The Kievision Online Version is copyrighted.

## Project Status
The project is in pre-commercialisation stage, where a company KieVision Technology Sdn Bhd is already established. Currently collaborating with Stevens Institute in USA for Psycholinguistic automated testing, Apple Application development and Kievision International content.

## Financials
Assuming support is given by the various government ministries and the appointment of several screening test centers, the target is to complete 25%-30% of all school-going children aged 12 years and below by Year 3.

Based on a one-time setup fee, yearly maintenance charges and a nominal assessment fee of, say, RM2 (or, RM1 for higher volume) for the diagnostics and assessment report, the revenue projected are:

**Year 1** revenue is RM 117,000
**Year 2** revenue is RM 751,000
**Year 3** revenue is RM 1,335,000

## Funding Requirement
The project has to be further developed to make it robust to cater to the thousands of simultaneous users logging-in and running the test. The software system will need to be fine-tuned for optimal performance at high volume transaction; equipment and some customization may be needed.

Source: **(i) Ministry of Education, Malaysia homepage.** [Last Accessed: 14 March 2012] http://www.moe.gov.my/index.php?id=1&lang=my; **(ii) Semantic Assessment Battery for Malay-speaking adults with Aphasia, Sajlia Binte Jalil, Susan J. Rickard Liow & Tng Siok Keng, pages 415-433, Psychology Press, Volume 25, Issue 4, 2011** http://www.tandfonline.com/doi/abs/10.1080/02687038.2010.489259#preview; **(iii) Southwest Educational Development Laboratory (SEDL), List of All Assessments from the Database.** [Last Accessed: 14 Mar 2012] http://www.sedl.org/reading/rad/list.html

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# Money Making Opportunity

## Innovation Business Opportunities

RM
**974,400**
Potential Yr3 Revenue


# AsarFonts - Writing Software for Islamic & Arabic Studies (UMP001)

**Arabic-Jawi**
**QWERTY & English-Arabic Transliteration Keyboard Layouts**
**Easy to Use**

# AsarFonts - Writing Software for Islamic & Arabic Studies (UMP001)

## Project Overview
AsarFonts is a font set consisting of standard fonts such as Times New Roman, Traditional Arabic, Jāwī and Arabic transliteration letters. It was designed to meet the educational needs of Islamic and Middle Eastern studies. AsarFonts also comes with Arabic-Jawi QWERTY and English-Arabic transliteration keyboard layouts. Jawi is loosely understood as Arabic alphabetic scripts

## Business Idea
To design, develop and distribute a software interface or font that creates standard characters in English, Arabic, Arabic transliteration and Jāwī letters in a single font set.

## Business Model
Two business models are proposed: (a) to develop and license the software font for use by Windows-based software developer for the Islamic and Jāwī users, and (b) to license the fonts to software and printer companies.

## Business Opportunity
Most Islamic students in Malaysian schools learn Jāwī by hand-writing instead of typing on computers, due to the limited availability of software. Prof Dr Kang Kyoung Seok of the Pusan University of Foreign Studies, a Korean expert in Jawi has expressed concern that the script is increasingly being forgotten in Malaysia and may become extinct[(i)].

## Market Analysis
Malaysia's J-QAF programme, introduced in 2004, had improved the students' mastery in Jawi, Al-Quran reading, Arabic and Fardhu Ain, hope to have 33,000 teachers[(ii)] nationwide so that primary and secondary school students can master the programme. This is a result of the implementation of the J-QAF programme in 4,747 primary schools since 2005.

## Competitive Advantages
AsarFonts comes with Asar keyboard layouts for both Arabic Romanization and Arabic-Jāwī keyboard layouts. Asar keyboard layout for English / Latin typing comprises all standard characters used in English, and it also comes with all required macron and dot below letters for Islāmic and Arabic studies. (eg: Ā(□) ū Ū,(□) ī Ī (□),ẓ Ẓ (□), ṣ Ṣ (□), ḍ Ḍ(□), ṭ Ṭ(□), ḥ Ḥ(□), ḫ Ḫ (□)). AsarAR is a keyboard layout for all standard characters used in Arabic and Jāwī writings.

## Competitor Analysis
Several niche competitors exist: e-Jawi.net[(iii)]: online work, only Jāwī letters. Does not have certain Arabic transliteration letters. IIUM's ROTAS[(iv)] (Roman Transliteration of Arabic Script): on screen keyboard, does not have Jāwī letters. Software Trading's Jawi Writer[(v)]: on screen keyboard and for Jāwī letters only. Other freeware Jāwī software are: Pintar Jāwī, Jāwī Smart Box, kJawi, Jawiware etc.

## Technology Solution / Innovation
It has all the characters in Islamic studies and traditional Arabic language following the standard QWERTY keyboard format. Claims to be the first innovation where the typing of the Jāwī script is more user-friendly, stable and applicable for use on a Microsoft Windows operating system.

## Project Challenges
Jāwī script fonts systems are mainly used in Malaysia and perhaps in Brunei, and thus has a limited growth opportunity. Further development, efforts will be required to extend the product into other platforms (eg: mobile devices, Internet, Mac O/S, etc).

The challenge is to extend the fonts to embed into Microsoft Windows as a typeface and make it widely available.

## Intellectual Property Rights
A trademark (ref: 2011001878) and Patent (ref: 2011000709) was filed in 2012. The software is copyrighted

## Project Status
The product (AsarFonts) was completed in Sept 2010. At pre-commercialization stage. No commercial partner as yet

## Financials
Assuming the product is adopted and supported by the 20 public universities in Malaysia, and by the Ministry of Education's J-QAF programme, on a yearly licensing agreement for unlimited users. The proposed licensing fee for universities is RM 5,000 per annum, and RM 2,000 for primary and secondary schools per annum.

**Year 1** revenue = (1 public univ x 5,000) +
(1% x 4,747 schools x RM 2,000) = RM 99,940
**Year 2** revenue = (3 public univ x 5,000) +
(5% x 4,747 schools x RM 2,000) = RM 489,700
**Year 3** revenue = (5 public univ x 5,000) +
(10% x 4,747 schools x RM 2,000) = RM 974,400

## Funding Requirement
As the product is supposed to be ready, the effort required will be towards extensive field testing among academia and students of Islamic studies in Malaysia. Extensive cooperation from all related organizations or bodies such as Dewan Bahasa & Pustaka (DBP), Kementerian Pelajaran Malaysia (KPM), Kementerian Pengajian Tinggi (KPT) is crucial.

Source: **(i) Jawi at risk of extinction, The Star, Mon Jan 30, 2012** http://thestar.com.my/news/story.asp?file=/2012/1/30/nation/10562169&sec=nation **(ii) J-QAF in secondary schools by mid next year, Daily Express, Sunday, Dec 04, 2011** http://www.dailyexpress.com.my/news.cfm?NewsID=79926; **Parliament: Malaysia Short Of 14,000 J-QAF Teachers, BERNAMA April 5, 2011** http://mynewshub.my/2011/04/05/parliament-malaysia-short-of-14000-j-qaf-teachers/ **(iii) E-Jawi**. [Last Accessed: 19 March 2012] http://www.ejawi.net/v3/; **(iv) International Islamic University Malaysia ROTAS website** http://rotas.iium.edu.my/; **(v) Software Trading Jawi Writer Online website** http://jawiwriter.belidiweb.com/ContactUs.aspx
**Writer Online website** http://jawiwriter.belidiweb.com/ContactUs.aspx

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# Money Making Opportunity

## Innovation Business Opportunities

RM **20** Million

Potential Yr3 Revenue

# SARTAMS - Search & Rescue Tactical Management System (UPNM002)

**Uses "Off-The-Shelf" Hardware and Software**

**Caters for Jungle and Dense Forest Search & Rescue**

# SARTAMS - Search & Rescue Tactical Management System (UPNM002)

## Project Overview
SARTAMS is a computing and communication management system using commercial off-the-shelf hardware and software solution, through the use of network centric and global positioning system to improve search and rescue operations.

## Business Idea
To design, develop, produce and distribute a cost-effective and efficient search and rescue (SAR) tactical management system that will help SAR teams locally and globally to locate lost or missing person(s) in dense jungle or forest areas.

## Business Model
Three business models are proposed: (a) sell and distribute the system, with maintenance service on the software system, (b) provide rental services for the system complete with technical personnel to operate equipment, (c) license the technology to other SAR equipment providers.

## Business Opportunity
This product has the opportunity to be marketed to SAR teams in the South-East Asia region, especially in areas with dense forests, difficult terrains and geographical areas with porous boundaries between neighboring countries. It is suitable for the national SAR teams, police, armed forces, fire-fighters, border patrols and private companies involved in SAR efforts.

## Market Analysis
Many of the commercial Search and Tactical Rescue systems are designed for the developed countries, where there is the availability of geographical and mapping data, state of the art equipment, airborne support and real-time data feed, designed for sea, mountain and land rescue.

Since 1997, the Special Malaysia Disaster Assistance and Rescue Team (SMART) participated in more than ten major SAR operations, where an average of 25-40 members were involved for 7-14 days each time. In Asia Pacific, six countries are in the INSARAG group[(i)] – China, Japan, Korea, Australia, Singapore and Malaysia, each with its rescue sub-centres.(ii)

## Competitive Advantages
This solution uses commercial off-the-shelf hardware and software solution so that it is affordable to developing countries. It is especially designed for SAR operations in dense jungle or forest environment, with its various thick flora and fauna, which usually will hamper SAR efforts.

## Competitor Analysis
There is limited number of commercial management systems catered for jungle SAR operations. Most are integrated with mapping, web-based and uses GPS data[(iii)] for sea, mountain and land rescue. SARTAMS is designed for coordination, communication and tracking.

## Technology Solution / Innovation
Effective integration of existing hardware and software technology to produce an innovative method of managing search and rescue tactical efforts in difficult terrain, where coordination of manpower, resources and time is critical. The system will also integrate with unmanned ground vehicle (UGV) and unmanned aerial vehicle (UAV) system for its SAR operations

## Project Challenges
The product has yet to be tested in a live environment, and further research and development may be required to test for extreme weather conditions, durability of the equipment and backup systems.

## Intellectual Property Rights
Patent 2011001337 filed on April 2011 - A SYSTEM AND METHOD FOR SEARCH AND RESCUE.

## Project Status
Working prototype is completed, but will need to be field tested in a live environment. MOU signed with consultant Skyview Communications & Technologies Sdn Bhd (Jan 2011)

Achieved MDEC's Most Promising Solution Imagine Cup 2010, Silver Medal at the 21st International Invention, Innovation and Technology Exhibition (ITEX) in 2010, Bronze Medal at Malaysian Technology Expo 2011, Bronze Medal at Pencipta 2011.

The product was showcased at Defence Service Asia (DSA) 2010, Langkawi International Maritime & Aerospace Exhibition (LIMA) 2011.

## Financials
Assuming we target all the search and rescue teams in the country in Year 1, and neighboring country's SAR team in Year 2 and 3, at projected sale price of RM 10,000 per workstation (for a 10 men team -minimum).

**Year 1** revenue is: RM 10,000,000
**Year 2** revenue is: RM 15,000,000
**Year 3** revenue is: RM 20,000,000

## Funding Requirement
Further developments and testing is needed to ensure its durability and reliability in live-environment, and compatibility with various communication equipment.

Source: **(i) The INSARAG - International Search and Rescue Advisory Group, Search and Rescue Directory, Special Malaysia Disaster Assistance and Rescue Team** [Last Accessed: 16 Mar 2012] http://vosocc.unocha.org/USAR_Directory/USARTeam.asp?USARTeamID=32; **(ii) Department of Civil Aviation Malaysia, AIP Malaysia., GEN 3.5 – Search and Rescue** http://aip.dca.gov.my/aip%20pdf/GEN/GEN%203/GEN%203.6/Search%20And%20Rescue.pdf; **(iii) SAR Management System from Pawprint Network**, [Last Accessed: 16 Mar 2012] http://www.pawprint.net/sar/; **SAR Technology: 'Incident Commander Pro'**. http://sartechnology.ca/sartechnology/ST_ProgramOverview.htm; **UltiChart: Tactical Mission Management System**, http://www.canrep. com/pdf /products/surveillance/tactiques/Capabilities.pdf; **Marine Rescue – MRT** http://www.seamarshall-us.com/marine-rescue-search-rescue-systems.html;

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# Money Making Opportunity

## Innovation Business Opportunities

RM 683 K
Potential Yr3 Revenue

# Direct Methanol Fuel Cell Assembly (UKM013)

## Local Content
## Low Cost to Produce

# Direct Methanol Fuel Cell Assembly (UKM013)

## Project Overview
The research team at Institut Sel Fuel, UKM has developed a Direct Methanol Fuel Cell (DMFC) demonstration assembly/ kit that can be used as an educational tool to assist students in understanding the functioning of a fuel cell.

## Business Idea
To design, develop, produce and distribute educational kits based on the Direct Methanol Fuel Cell (DMFC) demonstration assembly/kit developed by them.

## Business Model
The two proposed business models are (i) To produce and sell educational kits that include the DMFC demo kit and supporting educational materials (like booklet and DVD) in English and a relevant regional language targeting the regional markets. (ii) To license the technology to existing regional Fuel Cell manufacturers.

## Business Opportunity
Mass market adoption of Fuel Cells in the Asia-Pacific market is projected to take-off by 2015 for stationary fuel cells and by 2020 for portable fuel cells.[(i)] There is a need for creating awareness about this technology among the students. By promoting the building of knowledge infrastructure for this technology a foundation can be built for advanced research.

## Market Analysis
The global fuel cell industry is expected to generate USD 18.6 billion by 2013 [(i)] – with the depleting natural oil resources and increasing demand for fuel for various applications – the world is moving towards researching and developing alternative and sustainable fuel technologies. There are 2282 secondary schools in Malaysia[(ii)] and if we consider the neighboring markets – there are 3731 private schools providing formal education in Thailand[(iii)] and 5377 private general secondary schools with upper secondary courses in Indonesia.[(iv)]

## Competitive Advantages
In terms of competing with books and information available online – this educational kit provides a much more interesting and hands-on experience to the students. In terms of other existing fuel cell educational kits, this kit has the advantage of being highly localized to the local curriculum and language. Also the pricing for this kit will be lower than the internationally available ones.

## Competitor Analysis
Horizon Fuel Cell Technologies Pte Ltd (Singapore) and Heliocentris Energy Solutions AG (Germany) have built an international reputation for operating in the fuel cell field. Apart from other fuel cell based products they also provide educational kits – thus they have the advantage of multiple revenue streams and an opportunity to integrate the experience from one product into other related products.

## Technology Solution / Innovation
Direct-methanol fuel cells (DMFC) are fuel cells in which methanol is used as the fuel. These fuel cells are currently targeted at portable applications due to their higher energy and power density.

## Project Challenges
It will be challenging to generate high sales volume for this product especially in the international market. Also for the long term sustainability of the business new models of educational kits with various technologies will have to be developed and introduced periodically.

## Intellectual Property Rights
Patent filed in Malaysia (PI 20092260 and PI 20092617).

## Project Status
The research team has created a prototype model and tested the basic functionality. In order to take this product to the market a few trial units need to be manufactured to get market testimonials/approval.

## Financials
For the financial model for this business it is assumed that the product will be further developed and material for supporting the educational course (in the form of booklets and DVDs) will be provided in two languages – English and the relevant local language (taking into consideration the regional market like Thailand and Indonesia). The resulting revenue projections are:

**Year 1** – 456 kits x RM 500 = RM 228,000
**Year 2** – 829 kits x RM 500 = RM 414,500
**Year 3** – 1367 kits x RM 500 = RM 683,500

## Funding Requirement
The start-up of this business can be optimized by collaborating with companies operating in the field of Fuel Cell research and manufacturing (like G-Energy Technologies Sdn Bhd) – by promoting the fuel cell technology these companies will gain exposure and at the same time facilitate the building of long term knowledge infrastructure in this field. Working with the Ministry of Education will provide a good support platform to reach the various educational markets and will also help in customizing the kit to the specific needs of the curriculum.

Source: **(i) Fuel Cell Industry Trends Slide 12** - http://www.slideshare.net/athandz/fuel-cell-industry - [Last Accessed: 23 March 2012]; **(ii) Ministry of Education, Malaysia homepage**. - http://www.moe.gov.my/index.php?id=1&lang=my - [Last Accessed: 23 March 2012]; **(iii) UNESCO Development of Private Secondary Schools in Thailand** - http://www.unesco.org/iiep/PDF/pubs/Thailand.pdf- [Last Accessed: 23 March 2012]; **(iv) UNESCO - Secondary Education Regional Information Base: Indonesia** - http://unesdoc.unesco.org/images/0019/001902/190270e.pdf - [Last Accessed: 23 March 2012];

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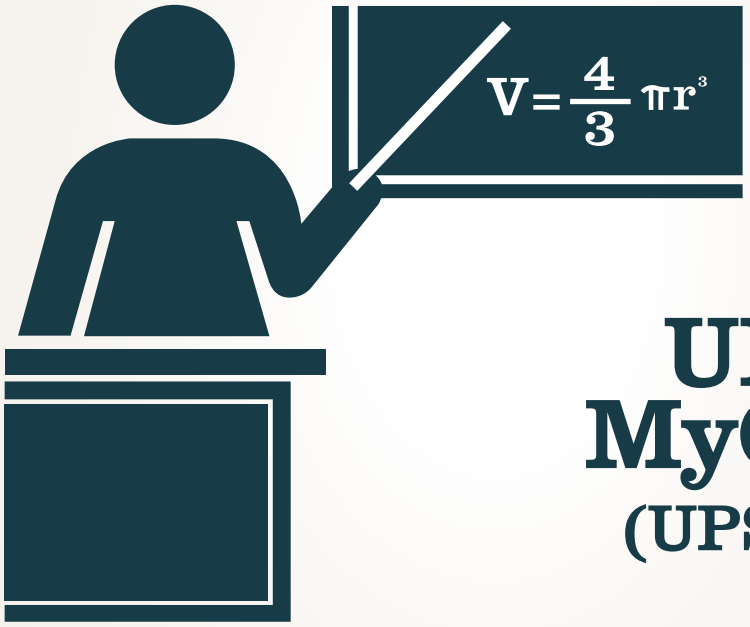
# Money Making Opportunity

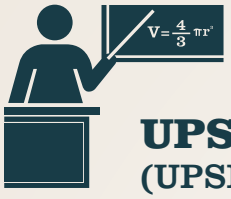
## Innovation Business Opportunities

**RM 6 Million**
Potential Yr3 Revenue




## UPSI MyGuru (UPSI001)

## Localised Online Teaching and Learning




# UPSI MyGuru
## (UPSI001)

### Project Overview
UPSI MyGuru is an Internet and Intranet portal designed as a system for students and academicians to share information across faculties, among individuals and support online and collaborative teaching and learning processes.

### Business Idea
To design and develop a localised and customised Malaysian learning management system (LMS) as an Internet and Intranet solution to foster collaboration and online teaching and learning among students and academicians within the university and within the country.

### Business Model
Two potential business models: (a) sell the software systems to other Universities or higher education institutes (eg: politechnics, vocational schools, university colleges, colleges), (b) provide hosting services and rental of the systems to other Universities or higher education institutes that may not have the capability to maintain their own system.

### Business Opportunity
UPSI has the opportunity to promote and sell its LMS to any one or more of the 20 government universities[i] in Malaysia, 33 private universities and university colleges, 4 foreign university branch campuses, 22 polytechnics, 37 community colleges and about 500 private colleges.

### Market Analysis
Globally, the market for Learning Management System (also known as, e-Learning system) is dominated by Blackboard Inc Moodle Trust (A Course Management system developer), Sakai, Desire2Learn, SumTotal Systems in an estimated USD 1.16 billion industry[ii] projected for 2011.

Locally, several similar systems exist, developed by Malaysian vendors and local Universities; namely, Open University Malaysia's myLMS, Universiti Malaysia Sabah's SmartUMS (built on Moodle), International Islamic University's LMS, as well as those developed by private local Universities.[iii]

### Competitive Advantages
UPSI's product has the following advantages over other similar systems, namely, (a) it is entirely localised and available in Bahasa Malaysia, (b) The system has been used live since 2008, and is today at version 3, with 24,000 students inclusive 11.000 distance-learning students. It is proven, stable and reliable.

### Competitor Analysis
The primary competitors are the many local Universities (public and private) with their own inhouse LMS developed on Open-Source platforms.
China and Taiwan but they do not have long warranty periods and have lower quality.[v]

### Technology Solution / Innovation
UPSI's MyGuru is developed based on Open Source solution, thus allowing it to be compatible with other platforms. Additional features for web conferencing, concurrent video conferencing and elements of Web 2.0 have been incorporated. It is also designed ready for Cloud computing environment

### Project Challenges
The greatest challenge for this project is to differentiate this system from the many locally built versions developed by local Universities. Innovations may be required to include the digital mobile platform, real-time functionalities and target the requirements for a specific niche segment that is underserved (eg: politechnics, vocational schools, community colleges) that requires Bahasa Malaysia language support.

### Intellectual Property Rights
Protected under the Malaysian Copyright Act 1987.

### Project Status
The system is already widely used within UPSI, with version 3 recently launched.

### Financials
The system is available in cloud (SAAS) for use by many local polytechnics, community colleges and vocational colleges catering to the vast majority of Bahasa Malaysia speaking students and academics, at the following rates:

Sliding scale user subscription based on 1st 1,000 users, 1001-5,000 users, more than 50000 users

Subscription fee is at RM 60.00 per student per semester

**Year 1** projected revenue is: RM 120,000
**Year 2** projected revenue is: RM 600,000
**Year 3** projected revenue is: RM 6,000,000

### Funding Requirement
Further development is needed to modularize the system to cater for the customization requirements of the new customers (polytechnics, vocational and community colleges), and the development of billing and payment modules.

Source: **(i) Ministry of Higher Education (MOHE)**. [Last Accessed: 12 Mar 2012] http://www.mohe.gov.my/educationmsia/index.php?article=mohe **(ii) Learning Management Systems December 2011, Bersin and Associates Executive Summary V1, Page 13**. http://www.bersin.com/uploadedFiles/ 121410_ES_ LMS2011_DM_Final.pdf; **The Evolving LMS Market, Dec 21, 2010**. http:// mfeldstein.com/the-evolving-lms-market-part-i/; **Taleo Acquires Learn.com: A Shoe Drops in the LMS Market, Sep 01, 2010**. http://www.bersin.com/blog /post/2010/09/Taleo-Acquires-Learncom-A-Shoe-Drops-in-the-LMS-Market.aspx **SumTotal Acquires GeoLearning: LMS Market Consolidation Continues, Jan 5, 2011**. http://joshbersin.com/2011/01/05/sumtotal-acquires-geolearning-lms-market-consolidation-continues

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# Money Making Opportunity

RM
**736,000**
Potential Yr3 Revenue

## Innovation Business Opportunities

## FaceBARS:
## - Biometric Access & Recognition for Security
## (USM001)

**Facial Recognition**
**Security System**
**Low Cost**
**PC Based**

# FaceBARS - Biometric Access & Recognition for Security (USM001)

## Project Overview
FaceBARS is a low-cost PC-based security verification system that uses face recognition algorithm. This system can be used to enhance current fingerprint system to enroll and verify an individual's record against a database of available faces.

## Business Idea
To design and develop a face recognition algorithm and system known as FaceBARS that can be used as a software development kit (SDK), or as a standalone system.

## Business Model
Three business models are proposed: (a) sell the system with maintenance service, (b) rental and subscription service, and (b) license the technology to third party software developers as software development toolkit (SDKs).

## Business Opportunity
Applications where this technology can be useful are: employee identification system for attendance and card access systems, security identification instead of fingerprint or signatures, security surveillance system for airports, train stations or places requiring constant monitoring.

## Market Analysis
A Frost & Sullivan report estimates that the global biometrics market will hit USD 12 billion by 2015 from USD 5 billion in 2009; fingerprint identification technology will see the biggest gains growing to USD 6 billion by 2015; the market for face, iris, vein, and voice recognition will reach USD 3.5 billion.[(i)]

In 2005, BCC Research projected face recognition systems to grow from approx. USD 200 million to USD 1.35 billion by 2012[(ii)]. Professor Kwon of Chung-Ang Univ, Korea estimates that face recognition system revenue is USD 390 million in 2009, projected to reach USD 1.42 billion in 2014[(iii)].

In Asia, the leading biometrics system users are Japan, China and South Korea, where government and large corporation support has seen its applications being widely used at cross-border control, airports, banks, entry into facilities, etc.

## Competitive Advantages
FaceBARS is robust to illumination changes, robust to facial expressions, claims to be fast in processing, uses low-cost PC-technology and is scalable.

## Competitor Analysis
Most of the commercial biometrics face recognition systems originate from USA and Europe, costing USD 200 - USD 700 for a single unit version to. Eg: Artec Group 3D face recognition technology, Neurotechnology, and more [(iv)]
Those used in Asia – Japan, China, Korea – are mostly large customised projects, where the government or large organisations are the clients.

## Technology Solution / Innovation
The research team uses illumination invariant techniques to handle different lighting conditions, stores accessed data in terms of ID, name, time and photo, and requires less than one second to produce the result commencing from image acquisition.

## Project Challenges
Two challenges are identified: (a) the project has to be field tested in a real-life environment with larger datasets, and (b) the system will need to be enhanced to be able to identify (recognise) the record and retrieve related information.

## Intellectual Property Rights
The University plans to patent once the prototype assembly is completed. The research outcome is purely on the algorithm (software), therefore, cannot be patented directly.

## Project Status
A prototype version is available. The research team is currently collaborating with system integrator Heitech Padu Berhad (MOU signed to test the face recognition algorithm with their employees' database) and VIndustries Sdn. Bhd. (NDA signed to fabricate and assemble the prototype under the University Cradle Investment Programme).

## Financials
Assuming revenue is from three sources: (a) sell the system with maintenance service for RM 500 per workstation, beginning with 100 units in Year 1 growing to 300 units in Year 3, (b) rental and subscription service, where yearly hosting fee of RM 1,000 per month, and transactional fee of RM 1.00 per image processed, and (c) license the technology to third party software developers as SDKs, at RM 10,000 per SDK, targeting 1, 3 and 5 clients for year 1, 2 and 3 respectively.

**Year 1** revenue is: RM 172,000
**Year 2** revenue is: RM 354,000
**Year 3** revenue is: RM 736,000

## Funding Requirement
Further development and fine-tuning is required to convert the project from prototype to production quality. This will require a larger database, a robust and user friendly interface, and more extensive field testing on large scale simultaneous users

Source: **(i) Homeland Security News Wire, Biometrics market expected to hit $12 billion in 2015, 18 Jan 2011**. [Last Accessed: 15 Mar 2012] http://www.homelandsecuritynewswire.com/biometrics-market-expected-hit-12-billion-2015-0; **(ii) BCC Research, Dec 2007**. [Last Accessed: 15 Mar 2012] http://www.bccresearch.com/report/biometrics-global-market-ift042b.html; **(iii) Biometrics in Asia, Professor Young-Bin Kwon, Chung-Ang University, Seoul, Korea, Sep 22, 2009, Slide 8**. [Last Accessed: 15 Mar 2012] http://biometrics.org/bc2009/presentations/tuesday/ Kwon%20MR%20 14%20Tue%20345%20PM%20-%20400%20PM.pdf; **(iv) Facial Recognition System:** http://www.alibaba.com/Facial-Recognition-System_pid303004; http://www.discounttimeequipment.com/mb1000.html

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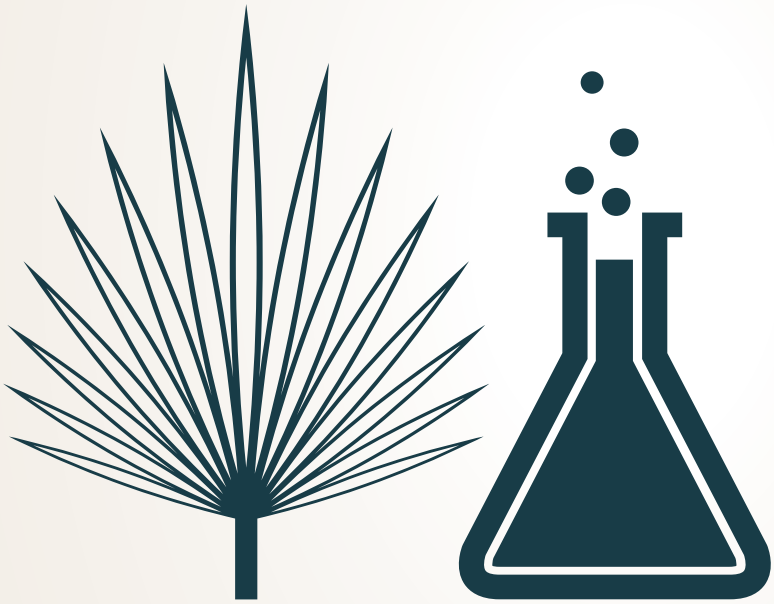
# Money Making Opportunity

## Innovation Business Opportunity

RM **4.74** Million

Potential Yr3 Revenue



## Wax Ester (UKM005)

**Not Petroleum Dependent**
**Works at Low Temperatures**
**No Effluent / Waste Produced**
**Cheap to Produce**
**Patent Pending**

# Wax Ester
## (UKM005)

### Project Overview
To design and develop a low cost method of synthesising wax ester using low cost palm oil derivatives to make them useful as plasticisers, mould release agents, emulsifiers, chemical intermediates and printer ink toners.

### Business Idea
To design and develop a new low cost method of synthesis using palm oil derivatives that requires a coupling agent instead of expensive enzymes and catalysts, and that works at low temperatures.

### Business Model
The business model proposed is to license the technology to wax manufacturers and printer ink toner manufacturers globally, as there are numerous established players supplying the many application industries.

### Business Opportunity
To capitalise on the global trend towards using natural materials in the fast growing wax industry, and to provide a low cost alternative to the various industries that uses this product. The method described here has direct application to ink toner industry.

### Market Analysis
The Global demand for waxes reached an estimated 9.59 billion lbs in 2010[i], where mineral waxes (include petroleum) accounted for estimated 85%, synthetic waxes for 11% and natural (animal and vegetable) waxes for 4%. Wax consumption is expected to grow at an average annual growth rate of more than 2% from 2010 to 2020. However, the fate of petroleum wax supplies is largely outside the control of the wax industry. As such, there is an urgent need to develop and grow the natural wax industry supply.

The global ink industry was worth more than USD 14 billion in 2010, with USA, Europe and Asia Pacific accounting for the largest portions[ii]. Global Industry Analysts, Inc (GIA) estimated, in volume terms, the worldwide printing ink market has a compounded growth rate of about 2.8% [iii]

### Competitive Advantages
UKM's wax ester invention can be prepared from cheap renewable resources – namely, palm oil derivatives that work at low temperature, produces zero effluents and waste, and does not require purification to remove the coupling agent in order to reach the end product state.

### Competitor Analysis
The primary competition is essentially from manufacturers that produces petroleum-based waxes since they account for 85% of the world's output. With the numerous (250 in USA alone) ink manufacturers competing in this fast growing industry, the greatest concern is not about who to compete against, but rather about raw material pricing and supply [iv].

### Technology Solution / Innovation
UKM's method of synthesis uses palm oil derivatives, does not depend on petroleum, and as such requires less complex and expensive equipment, catalysts or enzymes, works at low temperature and does not produce any effluents and waste, unlike conventional methods that produce considerable amount of waste and volatile by-products.

Most importantly, the output has a very sharp melting characteristic suitable for use in toner resins preventing blocking and aggregate during storage.

### Project Challenges
Some of the possible project challenges that can be foreseen are: (a) to scale up the simple prototype system for mass production capacity, (b) to design and develop a process flow that can be integrated or transferred to various applications industry. Eg: for printer toner, for other industrial processes, for candle manufacturing, etc.

### Intellectual Property Rights
A patent application for this technique of synthesis has been filed and pending approval.

### Project Status
The research team has completed a simple prototype system and has demonstrated that the method works. The next stage may require further development for production scale.

### Financials
The financials proposed here are only for the licensing model. With the global sales from the top 18 international ink companies estimated at USD 15.8 billion (approx. RM47.4 billion) for 2010(iv), a mere target of capturing global sales of 0.1% by Year 3, with a licensing fee of 0.1% of sales from this target, will achieve the following:

**Year 1.** Target of 0.01% of global sales, will give licensing fee of RM 47,400.
**Year 2.** Target of 0.05% of global sales, will give licensing fee of RM 237,000.
**Year 3.** Target of 0.1% of global sales, will give licensing fee of RM 4.74 million.

### Funding Requirement
Further development and testing will be needed to scale up the simple prototype system to a integrated and automatic process system that can handle mass production. For each of the application (eg: printer ink toner, wax production, etc), design and development of the process flow is required.

Source: **(i) Global Wax Industry 2010 Report: Market Analysis and Opportunities**, [Last Accessed: 9 Mar 2012] http://www.klinegroup.com/reports/brochures/y635a/brochure.pdf. **(ii) Global Printing Ink Market. Total Value USD14b**. [Last Accessed: 9 Mar 2012]. http://www.inkworldmagazine.com/pdf/ INK_Media_Planner.pdf **(iii) Ink market to reach USD 17bn by 2010**, http://www.i-grafix.com/index.php/news/packaging/ink-market-to-reach-usd-17bn-by-2010.html. **(iv) As Recovery Continues, Raw Material Concerns Grow**. http://www.inkworldmagazine.com/articles/2011/07/top-companies-report

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# Money Making Opportunity

## Innovation Business Opportunity

RM
**9** Million
Potential Yr3 Revenue

# TAL Rapid Test Kit (UMT001)

**Less Invasive**
**Accurate Results**
**Low Cost**
**Patented Technology**

# TAL Rapid Test Kit (UMT001)

## Project Overview
A Limulus Amebocyte Lysate (LAL) test kit has been designed to screen medical equipment to ensure that it is not infected with endotoxins, by using blood extracted from the horseshoe crab[i]. LAL test kits are used to detect endotoxins, which come from gram-negative bacteria. While LAL test kits already exist, scientists at UMP have created a non-invasive way to extract blood from the horseshoe crab.

## Business Idea
To design, develop, produce and distribute TAL test kits in local and international markets.

## Business Model
There are three primary business models and one secondary model (i) the technology will be licensed to relevant companies who will then produce and distribute products (ii) the production will be outsourced but distribution will remain in-house (iii) production and distribution will both remain in-house (iv) a secondary business model could focus on selling the horseshoe crab's blood to manufacturers of LAL kits.

## Business Opportunity
LAL tests are necessary to test medical equipment that comes into contact with blood to ensure that there are no endotoxins.

## Market Analysis
Exact data on the LAL test kit market is unknown, however estimates range from USD50 Million to USD75 million[ii]. The project team estimates that the local market is approximately RM 8 million. These test kits are essential to medical equipment companies, hospitals, etc. Healthcare spending and services world-wide are expanding as population's age and countries continue to develop[iii].

## Competitive Advantages
The Tal Rapid Test Kit aims to both reduce the mortality rate among horseshoe crabs and will not need to use anti-coagulants to work, this lowering costs. Ensuring that crabs survive the process is essential for both environmental and supply reasons, while lowering costs will make these tests more affordable, though horseshoe crab blood will still make up a large part of the cost as it can cost USD15,000 per pintiv.

## Competitor Analysis
A few companies currently dominant the LAL test kit market. These companies include Charles River and Thermo Fisher Scientific. Most are based in the developed countries, such as the United States and have been established players for several years. Importantly, researchers have developed and are now marketing Gram-Negative test kits based on other technologies. Rabbits can also be used to test for Gram-Negative bacteria but take a long time to produce results.

## Technology Solution / Innovation
LAL test kits already exist on the market, however the process used in this project to extract blood from the horseshoe crab may prove to be less invasive and dangerous to the horseshoe crab then current solutions available on the market.

## Project Challenges
There are currently three main competitors in the market who may already have too strong of a hold to displace. Further, there have been rapid advances in horseshoe crab blood extraction and LAL test kit design that may render this product unnecessary.

## Intellectual Property Rights
The process for extracting the Horseshoe Crab blood is protected by Malaysia Patent (No. PI2010005112) and PCT filing.

## Project Status
The product is already patented, has been tested and appears to be ready for commercialization. The project team has initiated talks with potentially interested clients.

## Financials
Sales of LAL test kits are not available; however, we know that the market is between USD50 to 75 million. Given the continued growth of healthcare provision and healthcare costs around the world and the importance of LAL tests we will assume the market is USD75 millioni, or RM225 million. It will be assumed that in year one the business will be able to capture 1 percent of the global revenue share, year two will see a revenue share 2 percent and year three will see a revenue share of 4 percent.

**Y1** - RM2,250,000
**Y2** - RM4,500,000
**Y3** - RM9,000,000

The long term potential of this product to capture significant market share should be good as the product builds on its reputation. Gaining a revenue share of 20 percent or more should be feasible, and could generate as RM45 million or more in revenue.

## Funding Requirement
Funding may be needed to continue research, testing and development. Funding will be needed for marketing, business related travel, production and distribution.

Source: **(i)** http://www.biocenter.hu/teszt/pdf/lalkat10.pdf **(ii)** http://books.google.com.my/books?id=0OSAKny-6M4C&pg=PA338&lpg=PA3 38&dq =LAL+test+kit+market&source=bl&ots=uk_ldrClW&sig=u2zdciE4CEOxAdnL2ANHgpu9KSw&hl=en&sa=X&ei=gdpqT4rwDoLIrQe2i9GXAg&ved=0CFwQ6AEwAw#v =onepage&q&f=false **(iii)** ( http://www.frost.com/prod/servlet/press-release.pag?docid=213684496 **(iv)** http://www.pbs.org/wnet/nature/episodes/crash-a-tale-of-two-species/video-blue-blood-at-15000-a-quart/614/

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# Money Making Opportunity

## Innovation Business Opportunities

RM **3.4** Million

Potential Yr3 Revenue

# Low Cost PCR Diagnostics (USM002)

**Minimal Training Required**
**Accurate Results**
**Low Cost**
**Patented Technology**

# Low Cost PCR Diagnostics (USM002)

## Project Overview
The development of a low-cost high-speed PCR testing kit, designed especially for emerging markets. In essence, a PCR machine is a DNA amplifier, replicating large amounts of DNA which can then be examined. When a DNA sample is placed in a test kit, if the sample contains the specified DNA the DNA will be replicated and thus detected.

## Business Idea
To design and develop, PCR testing kits. The kits can then be produced and distributed, or production and distribution can be licensed to other firms. The tests will be used for testing various diseases, especially those prevalent in developing countries.

## Business Model
Two business models are proposed. In both models, the business conducts the design and development of PCR test-kits. In model (i) production and distribution of the test-kit is outsourced to relevant companies. In model (ii) production and development of the test-kits is kept in-house. In both models the enteric tests are packaged as a "battery test" and that the other tests are sold separately.

## Business Opportunity
Various pathogens cause billions of infections/illnesses per year. In most cases healthcare professionals must diagnose infections based on symptoms and visible signs, which is complicated by the fact that various diseases often display similar symptoms. Researchers at USM have developed PCR tests that will allow for more conclusive tests based on DNA extracted from biological samples.

## Market Analysis
Enteric diseases afflict roughly two billion people per year. While many infections are not serious, enteric diseases still kill millions of patients each year and are especially dangerous in developing countries. Typhoid Fever and Cholera alone are responsible for more than 26 million illness per year [11]. Which numerous different pathogens causing enteric illnesses, it would be useful, if not essential to pin-point the pathogen. As AIM's report points out, the world molecular diagnostic market will reach 6.5 billion dollars by 2015. This market could expand by targeted the unmet demand of developing countries. This product would also be useful in developed countries.

## Competitive Advantages
These testing methods will require minimal training and will be able to produce accurate, easy-to-read results at a low cost, and is targeted specifically for diseases prevalent in developing countries.

## Competitor Analysis
Competitors range from small regional firms, such as Biovanta (Russia) to large MNC's, such as Dupont. Funding levels correspondingly vary. Most tests are targeting developed markets.

## Technology Solution / Innovation
The primary innovation offered by this project is its ease of use, relevancy for developing countries, and low cost. Many current tests rely on either difficult to obtain biological samples, are expensive, or can only test for a few diseases. This method should allow for the use of easy to obtain samples, such as saliva, should be able to test a range of diseases, and should be affordable.

## Project Challenges
The actual profit potential of PCR tests for developing markets poses a risk. Pharmaceutical companies in developed markets have largely ignored products for developing markets out of the belief that they will not be able to make a large enough profit to justify the investment. While there may be a large demand for these products, they may have difficulty paying for their demand.

## Intellectual Property Rights
The products would appear to be patented.

## Product Status
Two tests, EZ DNA and EZ TB Amp have been commercialized and they are interested to commercialize the following: EZ Typhi Carrier DNA, EZ Campy DNA, EZ Amp Octaplex Cholera, EZ Cholera Amp, EZ EBV Amp, EZ VRE Amp, EZ Dysentery DNA, and Cholera Genosensor.

## Financials
This financial breakdown is for the sale of diarrheic battery tests to be sold at a discounted rate of RM15 to public hospitals, aid agencies, etc. and a rate RM 30 to private hospitals, developed countries, etc. Single disease tests will sell for RM5 in developing countries and RM30 in developed countries.

**Year One** : RM1,175,000
**Year Two** : RM1,350,000
**Year Three** : RM3,472,000

## Funding Requirement
The initial funding requirements of this business will vary greatly, depending on whether production is outsourced / licensed or if kept in-house. The following areas will need funding support:

## Legal Fees
Continuing R&D Production Costs (whether in-house or out-sourced) Set up costs for facilities

Source: **1** http://www.who.int/mediacentre/factsheets/fs107/en/
**1** http://www.who.int/vaccine_research/diseases/diarrhoeal/en/index7.html#disease burden

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# Money Making Opportunity

RM **2.8** Million

Potential Yr3 Revenue

## Innovation Business Opportunities

# BRIM Pelvic Binder (UKM010)

**Portable & Adjustable**
**Unique Accessibility**
**Transparent to X-Rays**
**Reusable**

# BRIM Pelvic Binder
## (UKM010)



### Project Overview
A team of doctors at UKM have developed a new design for the Pelvic Binder by customising it to the needs of the Malaysian user and improving it based on their experience in treating life threatening injuries. This binder is effective in minimising internal bleeding in Pelvic trauma cases and will be instrumental in saving lives.

### Business Idea
To design, develop, produce and distribute BRIM Pelvic Binders that will be used in emergency trauma situations and to provide training for it to be easily integrated into hospitals and ambulances.

### Business Model
Two business models are proposed – (i) The first model is to develop, manufacture and sell BRIM Pelvic Binders targeting the hospitals and emergency ambulances. (ii) The second model is to license the technology and design for manufacturing the BRIM binder to other manufacturers – this will be relevant in case of global expansion.

### Business Opportunity
Internal bleeding is known to be life threatening in cases of pelvic trauma cases and the process of pelvic binding is being used globally using different tools (ranging from a strip of cloth to sophisticated clamps). The Pelvic Binders available globally are either too expensive or not designed for the Malaysian body types – there is a need for a customised pelvic binder that can be used in this region effectively to save lives.

### Market Analysis
In Malaysia, there are 135 government hospitals listed on the Malaysian Ministry of Health's (MOH) portal (i) and more than 100 private hospitals registered with the Association of Private Hospitals of Malaysia. According to the MOH's Annual Report for 2009, 794 ambulances with equipment were provided to all states in Malaysia. Considering neighboring countries - there are about 1000 public hospitals in Thailand (ii) and about 1500 hospitals in Indonesia (iii).

### Competitive Advantages
The BRIM pelvic binder is designed to be applied by non-specialist personnel and is portable and adjustable to fit the patients of different sizes. Even while using the binder, the key medical points around the pelvic region are accessible; it is also transparent to X-rays. The device is designed to be reusable and can be conveniently sterilized.

### Competitor Analysis
Globally there are a few companies selling Pelvic Binders – Sam Medical in the U.S. and Pelvigrip in South Africa. But both the products are developed for the local population and might not be as extensively designed as the BRIM pelvic Binder.

### Technology Solution / Innovation
The BRIM Pelvic Binder has been designed with three key parameters in mind – portability, adaptable to multiple sizes thus making it reusable and ease of use. The device uses a strong material and is easy to sterilise and re-use it.

### Project Challenges
One key challenge for this project is to gain regulatory approval in neighboring countries so that the business can expand to these countries – this might be a time consuming process in some cases. Another challenge is to develop a well-defined training module around the Pelvic Binder that can be easily integrated into the hospitals and ambulances.

### Intellectual Property Rights
Several features of the BRIM Pelvic Binder have been protected with patents filed in Malaysia, and other aspects have been protected by the means of registered designs.

### Project Status
A UKM Start-up company has signed an MOU with Neopharma Biotech Diagnostic Sdn Bhd (NBA), among other things, to collaborate and market the BRIM Pelvic Binder (iv). The inventors are consulting with other experts to refine the design of the BRIM Pelvic Binder. 20 BRIM binders were produced and distributed to a few key hospitals for trials – feedback is being taken from the hospitals (v).

### Financials
The project team estimates the price of the BRIM binder to be about RM 1,500 (v). The Ministry of Health, Malaysia guideline (vi) requires hospital with specialists to have at least 3 Nina pelvic clamps for training. On average a hospital will purchase 6 binders and an ambulance will buy 1 binder. In Year 1, assuming a 20% market penetration, the estimated revenue is RM 0.7 mil. Year 2 and Year 3 (with expansion into Thailand, Indonesia and others) is projected at RM 1.4 and RM 2.8 million, assuming 5% and 10% share of this new market.

### Funding Requirement
The key startup costs include –
- Setup of a production facility – involves primarily equipment for handling medical fabric.
- Setup of facilities for marketing the product.
- Legal expenses

Source: **(i)** Ministry of Health Malaysia - http://www.moh.gov.my/gov_hospitals?offset=132 - [Last accessed on 22 Feb 2012]. **(ii)** http://eng.moph.go.th/ - [Last accessed on 22 Feb 2012]. **(iii)** http://www.jakartaupdates.com/794-12/many-hospitals-in-indonesia-are-not-accredited - [Last accessed on 22 Feb 2012]. **(iv)** UKM Technology News - http://www.ukmtech.com/index_files/Page14846.html- [Last accessed on 22 Feb 2012]. **(v)** http://www.ukm.my/news/index. php/en/research-news/895-ukm-medical-centre-created-binder-to-stop-bleeding-.html - [Last accessed on 22 Feb 2012]. **(vi)** Policy on Resuscitation Training for MOH - http://www.moh.gov.my/images/gallery/Polisi/Policy_on_Resuscitation_Training_For_Ministry_of_Health_Hospitals.pdf.

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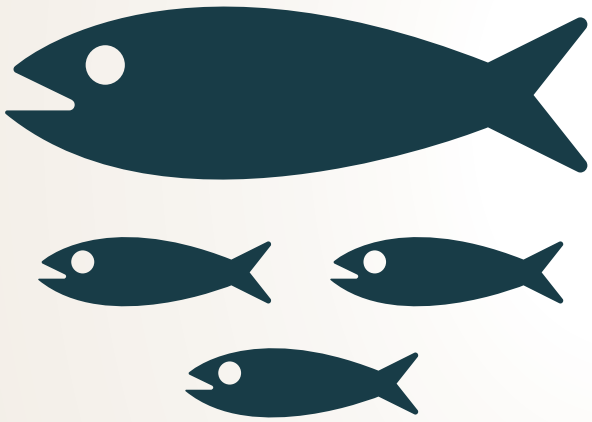
# Money Making Opportunity

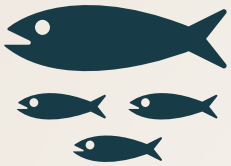
## Innovation Business Opportunities

RM 656 K
Potential Yr3 Revenue



# Copepod Aquaculture Feed System (UMT003)

**Low Maintenance**
**Low Fish Mortality Rates**
**Increased Fish Fry Growth**
**Reduced Waste**
**Increased Outputs**



# Copepod Aquaculture Feed System
## (UMT003)

### Project Overview
An advanced food system, using the near microscopic organism, copepods has been designed to feed shrimp larvae and commercial fish and fish fry being raised via aquaculture. The Copepod feed can also be converted into a frozen "paste." This feed system can then be used to feed fish fry, fingerling, and shrimp larvae.

### Business Idea
To design, develop, build and implement advance aquaculture feeding systems using Copepods. The Copepods will be distributed to fish fry and fingerling hatcheries around the country in 1 liter or larger plastic bottles.

### Business Model
There are several business models for this product and some of them can be pursued concurrently; (i) a service can be put in place to provide both equipment and consultation/ design for setting up the feeding systems (ii) copepod live feed can be sold to fish farmers (iii) equipment and knowledge can be sold or licensed to other distributors/fish farmers.

### Business Opportunity
Aquaculture is a large and important industry within Malaysia and the South East Asian region, with billions of fry being raised each year. Mortality rates for fish fry and shrimp larvae can be high due to cannibalism and other issues. A highly-effective fry feed could help reduce mortality rates, increase the growth of the fish fry, and reduce the amount of waste generated through feeding, and otherwise increase outputs.

### Market Analysis
Aquaculture is an important industry within Malaysia and South East Asia. Aquaculture accounts for 45 percent of humankind's seafood production and amounts to over 52 million metric tonnes (MT) in produced food per year[i]. Asia produces 88 percent of the world's aquaculture output[i]. Malaysia also produced almost 2 billion carnivorous fish fry, fingerlings and shrimp larvae, which were sold in Malaysia[ii]. Aquaculture production in Malaysia has also been growing at a tremendous rate over the last few years, having more than doubled from 258 thousand MT in 2007 to 581 MT in 2010[iii].

### Competitive Advantages
Malaysia has a well-organized aquaculture industry that grows many of the higher-value carnivorous fish fry that can be fed using the Copepods.

### Competitor Analysis
Current fish feeds involve other live animals, which are often harder to maintain and utilize. Other fish feed systems utilized pulverized fish flakes and pellets though these are not always either as nutritious or as well-received by the fish fry.

### Technology Solution / Innovation
Feeding fish often relies on providing either live feed or processed pellets. Other live feed systems are often hard to maintain, however Copepods are hardy, low-maintenance animals that can be easily maintained and shipped. Copepods themselves offer numerous advantages over other feeds. Due to their small size, fish fry and hatchlings with small mouths are able to easily feed on them. Copepods are also easier to feed and do not require micro-algae. They can be placed in a dormant state and shipped long distances.

### Project Challenges
Hatcheries and fish farmers may be skeptical of adopting a new product and may prefer to stick with long standing methods.

### Intellectual Property Rights
Protected through trade secret.

### Project Status
Initial research, development, and testing have all been conducted and so far the product has shown the potential to perform and deliver. A pilot production facility has already been built but needs to be scaled up.

### Financials
Given the importance of aquaculture in Malaysia and the region this project has a potential to generate high revenues. With nearly 2 billion carnivorous fish fry and fingerlings and also shrimp larvae sold in Malaysia alone the market is extensive. The project team projects revenues of RM360,000 in the first year. Given the size and importance of aquaculture in Malaysia, strong growth rates of 35% or more are feasible over the coming years.

**Y1** - RM360,000
**Y2** - RM486,000
**Y3** - RM656,000

### Funding Requirement
Funding will be needed to scale up the pilot production facility to a full-scale production facility. Funding will also be needed to develop a distribution network and to market the product.

Source: **(i)** http://www.fao.org/docrep/013/i1820e/i1820e.pdf
**(ii)** http://www.dof.gov.my/c/document_library/get_file?uuid=b5c1d765-6136-4724-bc3a-d4b504b9ee95&groupId=952434

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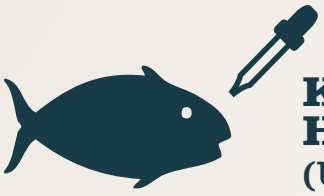
# Money Making Opportunity

## Innovation Business Opportunities

RM 630 K
Potential Yr3 Revenue

# Koi Herpes Test (UMT002)

**Cost Effective**
**Rapid Testing**
**Patented Technology**



# Koi Herpes Test (UMT002)

## Project Overview
A test kit has been developed to test for the Koi Herpes Virus, a highly transmittable disease that affects the common carp species and can ruin entire fish crops. Mortality rates run between 80 to 100 percent[i]. Other species of carp and the related gold fish species are also grown in Malaysia, however they seem unaffected by KHVi.

## Business Idea
To develop, produce, and distribute a PCR test kit to test for the Koi Herpes Virus in the common carp, including ornamental breeds, such as the Koi.

## Business Model
The four most likely business models for this project include: (i)setting up a serve laboratory and then encouraging aqua farmers to mail/submit samples (ii) Outsource production but remain in control of distribution (iii) Keep both production and distribution "in-house." (iv) Licensing the production and distribution to an outside company.

## Business Opportunity
The KHV virus is a highly contagious and economically damaging virus. Being able to diagnose and react to the spread of the disease quickly is essential for containing and minimizing damage caused by an outbreak. The project team for this project states that Malaysia is no longer able to export carp because of health concerns, though this remains invalidated. It would be essential to address any risk to Malaysia's substantial carp production and export industry.

## Market Analysis
The Common Carp species of fish is important for Malaysia, being one of the largest sectors of fish produced by aqua-culture. High-value ornamental variants of the carp are also breed in large numbers. According to the FAO production of common carp in Malaysia peaked at 994 MT in 2009[ii]. This is a tiny portion of the estimated 3.45 million metric tonnes produced globally per year[iii]. Equipment and testing methods could likely be sold or licensed overseas, however the market will be competitive.

## Competitive Advantages
This will be a cost-effective and rapid test for KHV, a fast-moving disease that must be closely monitored. Most importantly, there are not any major competitors in the Malaysian market, thus creating a market gap.

## Competitor Analysis
The most common competing tests are ELISA PCR assays, a very similar process to the one used in this test. Most tests are provided as more of a service; tissue samples are sent to a lab that then tests the fish. As of right now, however, these testing services are not available in Malaysia.

## Technology Solution / Innovation
A rapid PCR test has been developed to test and monitor for the KHV virus, a deadly disease that can wipe out entire crops of the common carp. This test will allow aqua-farmers and fisheries authorities to closely monitor for KHV in real-time. Such services exist around the world, but currently there is no service or technology offered for KHV monitoring within Malaysia.

## Project Challenges
This will be a niche market as the test will only be good testing one disease prevalent in one fish. Growth and expansion within domestic markets will be limited beyond the local market. The project team also believes that Malaysia has a tarnished reputation in this area. The team also states that UMT was using this test for 3 years before biosecurity failures caused exports to halt.

## Intellectual Property Rights
This project is protected by Malaysian Patent PI20041773.

## Project Status
These test kits were used for three years by UMT before biosecurity issues caused them to be discontinued. Solving these biosecurity issues and ensuring that Malaysia is able to continue to export will be essential for the advancement of the industry.

## Financials
These projections are built for a testing serving within Malaysia. As Common Carp should be spot-checked, we project 10 different sample tests per one ton of fish, once per month. We assume that in year 10 ten percent of fish produced is tested, 20 percent for year 2 and 35 percent for year 3. We assume that RM30 is charged per tests and that testing is conducted bi-monthly. Additional revenue may be gained by offering services to regional neighbors or licensing/selling the test kits if foreign markets.

**Y1** - RM180,000
**Y2** - RM360,000
**Y3** - RM630,000

If samples were taken from every metric tonne produced, potential revenue could exceed RM1.8 million.

## Funding Requirement
As this product has already been in the market, there is ample evidence that it works. If the product is licensed, or least production is licensed, there will be little up-front costs.

Source: **(i)** http://edis.ifas.ufl.edu/vm113 **(ii)** http://www.fao.org/fishery/statistics/global-aquaculture-production/query/en **(iii)** http://www.fao.org/figis/servlet/SQServlet?ds=Aquaculture&k1=SPECIES&k1v=1&k1s=2957&outtype=html

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# Money Making Opportunity

## Innovation Business Opportunity

RM **420**k

Potential Yr3 Revenue

# Salmonella Paratyphoid Fever PCR Test (UM004)

**Fast Results**
**Easy to Use**
**Low Cost Solution**
**Patented Pending**

# Salmonella Paratyphoid Fever PCR Test (UM004)

## Project Overview
A PCR diagnostic test for detecting S. paratyphi A, a salmonella bacteria responsible Paratyphoid fever, has been developed. S. Paratyphi A is a less severe relative of Salmonella Paratyphoid a S. Typhi, the cause of Typhoid fever, but is still a deadly and widespread diseasei.

## Business Idea
To develop, produce, and distribute a PCR test to detect S. Paratyphi.

## Business Model
There are three primary business models for this product: (i) To license the production and distribution of the PCR test to relevant companies (ii) To license the production of the PCR test to relevant manufacturers and keep distribution in-house (iii) To keep both the production and distribution in-house.

## Business Opportunity
This test is important both for being able to detect "Paratyphoid Fever" and being able to rule out the more dangerous "Typhoid Fever." Both diseases are wide-spread, affecting millions of people each year and causing the deaths of tens of thousands.

## Market Analysis
Paratyphi fever is estimated to infect some 6 million people per year and Typhoid fever is estimated to cause an addition 22 million infectionsii. Combined they are referred to as Enteric fever, thus infections approximately 28 million people. Due to the similar symptoms and epidemiology of both diseases, it is likely that many people infected by Typhoid Fever will also be tested for Paratyphoid Fever. Enteric Fever is most pronounced in developing countries and most people who develop Enteric Fever in developed countries had recent traveled to developing countriesi. The diseases are most prevalent in South East and South Asiaii. The value of this PCR test kit may be increased by combining it with other Enteric PCR tests, and especially one for Typhoid Fever.

## Competitive Advantages
This product will offer a fast, accurate, affordable, and relatively easy way to test for Paratyphoid Fever.

## Competitor Analysis
Cell culture tests can be carried out by taking samples from blood or stool. Serology tests can also be conducted to measure corresponding antibodies found in blood. However, these methods often fail to detect Paratyphoid Fever until its later stages of development and strong antibiotic treatments can reduce the accuracy of the tests. Bone marrow tests can also be conducted with an 80 percent accuracy, but they evasive, expensive, and require highly trained staff.

## Technology Solution / Innovation
This product is a PCR test and relies on using PCR DNA primers to copy the target DNA, assuming its present (in this case Paratyphoid Fever)iv. This test should be affordable for international organizations, such as the WHO, and non-profits. This product should also be affordable for government and public health authorities in developing countries, and especially South/South East Asian countries, which are also the most vulnerable to Paratyphoid Fever and Typhoid Fever outbreaks.

## Project Challenges
The value of these tests is reduced as they only test one disease from a range of diseases that exhibit similar symptoms. This product may be more valuable packaged with other diarrheal diseases so that health care professionals can determine the exact causes of outbreaks.

## Intellectual Property Rights
There is a Malaysian patent pending for this invention.

## Project Status
The product is ready to be licensed.

## Financials
There will likely be a relatively slow roll out rate for testing, with S.E. Asian countries being the first markets entered. Over time there is a strong chance that this test could be adopted in other regions, such as Africa, especially by international organizations as the WHO. Tests could also be sold in advanced countries. Given the reduced cases of Enteric Fevers in such countries the number of tests sold will be less, however more money could be charged

Y1- RM 42,000
Y2- RM 84,000
Y3- RM 420,000

These numbers are relatively conservative, however if 1 percent of those infected with enteric fever were tested revenues would reach 4.2 Million RM. If 10 percent were tested, revenues would reach RM 42 million.

## Funding Requirement
Outsourcing production would lower initial funding requirements but may also lower profit margins. A considerable amount research and development has already been conducted though more funding may be required for testing, especially if/when certifications from national and international bodies, such as the FDA (USA), are sought.

Source: **(i)** http://www.who.int/water_sanitation_health/diseases/typhoid/en/ **(ii)** http://wwwnc.cdc.gov/travel/yellowbook/2012/chapter-3-infectious-diseases-related-to-travel/typhoid-and-paratyphoid-fever.htm **(iii)** http://www.genome.gov/10000207 **(iv)** http://www.biobest.co.uk/diagnostics/techniques / dnapcr.html

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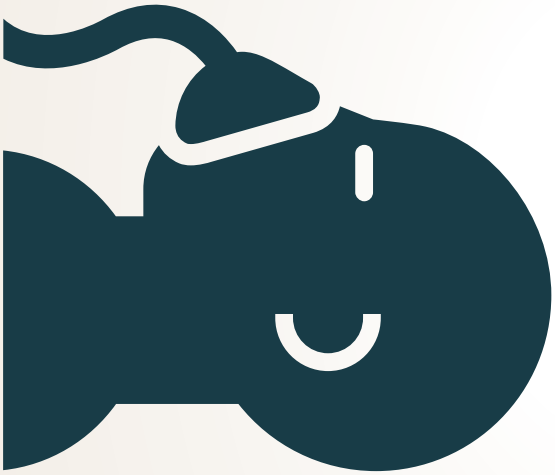
# Money Making Opportunity

## Innovation Business Opportunities

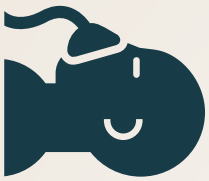
RM 732 K
Potential Yr3 Revenue



# HUKM Integrated Resuscitation Pendant System (HIREPS)

(UKM012)

**Easy to Use**
**Low Cost to Produce**



# HUKM Integrated Resuscitation Pendant System (HIREPS)
## (UKM012)



### Project Overview
Medical pendant system is an infrastructure that hangs from the ceiling serving as a workstation for the medical personnel while treating their patients. It allows all or most of the medical equipments that are used to treat the patient to be place or mounted on the pendent system so that it allows greater accessibility to the equipments but minimizing space required. It makes the work places more organized in a user friendly environment

### Business Idea
To design, develop, produce and distribute a cost-advantage commercial version for hospitals in this region, particularly adapted to fit the equipment and hospital room sizes that are commonly available in local hospitals in Asia.

### Business Model
Two business models are proposed: (a) sell the product as an integrated system, or modularize the design and offer some components as options, and (b) license the design to Original Equipment Manufacturers (OEM) for resell globally.

### Business Opportunity
There are two compelling business opportunities for this innovation: (a) the pendant system is customized, used and well tested in a real-life environment (in the emergency department resuscitation room of HUKM) and is thus suitable for local environment, and (b) it is cost-effective, affordable and practical for hospitals in Asia where healthcare is largely borne by the government and not privatized.

### Market Analysis
In Malaysia, there are 135 government and 117 private hospitals[i]. The healthcare industry is estimated at a value of USD 8.4 billion in 2009[ii], where approximately 4.3% of GDP is dedicated to the health care sector. For the 2011 budget, the government announced plans to allocate RM 15.2 billion to the construction of new hospitals, increase the number of doctors and nurses, and for supplies and equipment.

### Competitive Advantages
HIREPS being a single pendant-arm (but can be convertible to two pendent-arm) allows more spaces in a small working area. It gave greater mobility to the health care personnel while working. On top of that its modularity features, makes it easy to assemble and dissemble to fit most working area and condition. It also has AV system that allow important procedures to be recorded and review for auditing and teaching

### Competitor Analysis
A short list of Pendant Systems available globally[iii]: Johnson bar pendant, Trumpf Pendant ,Amico Clinical Pendant Systems, Helios Pendant Unit, Starkstrom Clinical Pendants, EMS Pendant Systems, etc. Some made-in-China pendant systems are also retailing online at prices ranging from USD 3,000 – USD 5,000[iv] for a ceiling-mounted rail system, where its quality and reliability may be unknown.

ns are the customization of the system
suitable for the Asian hospital environment, where there is limited available space and limited staff on hand at any point in time.

### Project Challenges
The challenges are from competing with other imported products and proving local products' superiority is very much higher compared to those imported. Also to make the product much lighter in term of replacing some of the stainless steel structure with alternative materials.

### Intellectual Property Rights
The design and concept of HIREPS has already been filed in Malaysia

### Project Status
The product has been used in the Hospital UKM Emergency Department Resuscitation Room since 2006, and had won the Gold Award at the 17th International Invention Industrial Design and Technology Exhibition (ITEX) 2006 [v].

### Financials
By comparison, the Johnson system was range between RM60,000 to RM80,000 while the Trumpf system was price at more than RM200,000. Assuming the HUKM system is positioned between the made-in-China unbranded system and the branded European or American type ones, the average unit selling price of HIREPS is USD6,600 (RM20,000) for a base unit with multiple adjustable rack, and USD20,000 (RM60,000) for an integrated system.

Putting a conservative target of 10% of hospitals in Malaysia, and at least two units to neighbouring countries by Year 3, plus license the system to an Original Equipment Manufacturer (OEM) for a percentage, say 5% of their revenue, say 5% of retail price, in Year 2 onwards.

Estimated Year 1 revenue = RM27,000
Estimated Year 2 revenue = RM314,500
Estimated Year 3 revenue = RM732,500

#### Funding Requirement
As the system is already being used at HUKM, the next step is to produce the first batch commercially, and ensure the system is adequately protected in terms of intellectual property, branding and trademark.

Source: **i) Critical Technology Assessment: Five Axis Simultaneous Control Machine Tools, Bureau of Industry and Security, US Department of Commerce, July 2009, Page 12.** [Last Accessed: 22 March 2012] http://www.bis.doc.gov/defenseindustrialbaseprograms/osies/ defmarketresearchrpts/final_machine_ tool_report.pdf; (ii) ibid. Page 15. (iii) Economical com/fullstory/CNC-Tool-and-Cutter-Grinder-resharpens-tools-at-high-speed-568295 (iv) SMECorp Malaysia's Official website http://www.smecorp.gov.my/v4/node/7;

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# Money Making Opportunity

RM 34 Million
Potential Yr3 Revenue

## Innovation Business Opportunity

# Micro Electromechanical Systems (MEMS) (UKM011)

**Robust Single Foundry Solution**
**Low Temperature CMOS Compatible**

# Micro Electromechanical Systems (MEMS)
## (UKM011)

### Project Overview
Over thirty years of conventional breeding has led to The research team at Institute of Microengineering and Nanoelectronics (IMEN), UKM has developed an improved technique for packaging micro electro-mechanical systems (MEMS) – this technique is economical, simple and works at low temperatures.

### Business Idea
To design, develop and improve micro electro-mechanical systems (MEMS) that integrate high performance, robustness and lower cost of production. To work with manufacturers to provide customized solutions based on these designs.

### Business Model
Two business models are proposed - (i) The first model is to set up a manufacturing facility to design and produce MEMS products that will be used as Microphones, Accelerometers and Pressure Sensors. Provide technical consulting for customized design, prototyping and testing of the designs. (ii) The second model is to license the technology to manufacturers and also provide the technical consulting.

### Business Opportunity
Due to their small size, lower power consumption, lower cost, increased reliability, higher precision and ability to communicate easily with electrical elements in semiconductor chips – MEMS are becoming standard components utilizing semiconductors. In the MEMS industry 50% - 80% of the device manufacturing cost is attributed to packaging.[(i)]

### Market Analysis
The global MEMS market in 2010 was estimated at USD7 billion and it is projected to grow at CAGR of 10.5% from 2010-2015 reaching about USD11.5 billion in 2015.[(ii)] Consumer electronics (including mobile), Automobile and Data Processing are the three major application areas of MEMS accounting for 75% of the market in 2010.[(ii)]

### Competitive Advantages
The MEMS encapsulation technique developed by the UKM team results in robust and hermetic packaging effectively protecting MEMS' movable elements during the back end process steps. It is a single foundry solution and works at low temperatures making it CMOS compatible and cost effective.

### Competitor Analysis
The top four global players in the MEMS market are – Texas Instruments, Hewlett Packard, Robert Bosch and STMicroelectronics. In 2010 these four accounted for USD2.9 billion of the global MEMS market.[(iii)] In the regional market - MEMStech Bhd. is considered to be a major player in the Asian market.[(iv)]SilTerra Malaysia Sdn Bhd is another key local player.

### Technology Solution / Innovation
The research team has developed an improved encapsulation technique for MEMS that is less complex and uses vacuum packaging and hermetic packaging simultaneously by forming a eutectic gold-Si layer on the encapsulation structure. This technique is effective in protecting the movable parts.

### Project Challenges
MEMS is a highly active field and along with Nanotechnology is undergoing fast technological improvements – it is challenging for this project to constantly compete with new advancements and to try and improve over them. There are big semiconductor companies that are operating in this field – these companies have high access to capital and high internal demand to accelerate their developments.

### Project Team
The project is developed by the Institute of Microengineering and Nanoelectronics at UTM – the lead researcher is Prof Dato' Dr. Burhanuddin Yeop Majlis and the project is managed by Mr. Ahmad Rizal Azwir. The team has extensive experience in working in the field of MEMS.

### Intellectual Property Rights
A patent covering the packaging technique has been granted in Malaysia.

### Project Status
A set of preliminary tests have been conducted on the preliminary lab scale samples and now the team is moving to the prototype stage. The research team estimates it requires about 3 months to take the innovation to market. The team has collaborated with SensFab Pte Ltd and has created ElectroNano-Tech Sdn Bhd to commercialize this project.

### Financials
It is assumed that the financial model for this business will be close to that of MEMS Technology Berhad – an existing Malaysian company operating in this field. The market entry penetration of MEMSTech in 2002 is used to estimate the same for this business and their growth figures for three years are assumed to be similar to this business's growth. The estimated revenue in the first year of full operations is RM6 million. The second and third year revenues are estimated to grow to RM20 million and RM 34 million respectively.(v)

### Funding Requirement
MEMS can be fabricated using modified semiconductor device fabrication technologies, normally used to make electronics. Thus funding requirement can be optimized by collaborating with big semiconductor companies (for large scale, standard production) and smaller companies (for low volume, highly customized production).

Source: **(i) Technology Roadmap for MEMS** - http://www.mosti.gov.my/mosti/images/pdf/MEMS.pdf- [Last accessed: 08 Mar 2012];
**(ii) IHS iSuppli** - http://pradeepchakraborty.wordpress.com/2011/11/14/mems-market-overview-ihs-isuppli/ - [Last accessed: 08 Mar 2012];
**(iii) Yole Development** - http://www.yole.fr/iso_upload/News/2011/Top30MEMSCompanies2010_April2011.pdf - [Last accessed: 08 Mar 2012];
**(iv) Boucher-Lensch Associates** - http://www.boucherlensch.com/bla/IMG/pdf/BLA_MEMS_Update_121409.pdf - [Last accessed: 08 Mar 2012];
**(v) MEMS Technology Berhad** - http://announcements.bursamalaysia.com/EDMS/Annweb.nsf /8b25383a269fcce548256d79001af770/482568ad00295d07482572ad003d0ef6/$FILE/RR-310107-2.pdf - [Last Accessed - 08 Mar 2012]

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# Money Making Opportunity

## Innovation Business Opportunity

RM **10** Million

Potential Yr3 Revenue

# Bioplastics (SIRIM002)

**Environmentally Friendly**
**Cost Efficient**
**Non-Petroleum Source**
**Biodegradable**
**Patented Technology**

# Bioplastics
## (SIRIM002)

### Project Overview
This project is for commercialisation of a novel & innovative technology to production of PHA, PLA & PH-LA bioplastics from palm oil and Sago Starch. The plastic can then be used in various consumer and industrial sectors.

### Business Idea
To produce biodegradable plastics from palm oil for a wide range of uses and applications. This will reduce the impact of petroleum based plastics on the environment. This project will produce two types of plastic, PLA which uses palm oil to grow bacteria which then produce plastic, and also PHA plastic that is refined from Sago Starch.

### Business Model
1) License technology local plastic manufacturers and palm oil companies to design, develop, and produce bio-plastic resins based product. 2) Design, develop, and produce bio-plastic resins and then sell to product manufacturing companies.

### Business Opportunity
Plastics are used in a wide range of applications across the world and in numerous industries. Refined plastics products include toys, disposable bags, disposable utensils, storage containers, etc. The impact of the use of petroleum plastic on the environment is high. This project can focus on either producing resin or finished goods.

### Market Analysis
In the USA 330 million barrels of oil, or 5 percent of oil consumed, is converted to plastic.(i) In Malaysia petroleum chemicals and plastics sales totaled RM 128 billion in sales in 2010 and the sector has been posting strong growth.(ii) Said industry also employs some 96,100 workers in Malaysia (iii). The use of bioplastics is expected to increase from .64 million metric tons in 2010 to 3.7 million metric tons in 2016 (iv).

### Competitive Advantages
The primary short-term competitive advantage of this produce will be its biodegradability factor. Citizens, NGO's and others around the world are increasingly demanding more environmentally friendly products. In the long-term, rising oil prices combined with increasing efficiency in the product of this biodegradable plastic could lead to advantages in costs.

### Competitor Analysis
The largest competitor is the traditional plastics industry. This field is filled with both local and community-wide manufacturers and large well-funded chemical companies, such as Dow Jones and BASF. These companies have years of experience and large amounts of funding, however could be potential customers if they should license the technology.

### Technology Solution / Innovation
This plastic is important for two reasons; it is made from a non-petroleum source and it is biodegradable. By using a special strain the bacteria, palm oil can be fermented and converted into a bio-degradable plastic.

### Project Challenges
There are some technical challenges for bioplastics in general, though it is possible that palm-oil based bioplastic may be able to overcome these limitations.

Corn-based bio-plastics have been criticized for the amount of fossil fuels and inputs necessary to product the corn. Palm oil is generally viewed as more productive per acre, and may offer a major competitive advantage.

### Intellectual Property Rights
The various members of the project team hold patents for various aspects of producing the bio-plastics

### Project Status
Sirim have set up a pilot plant and have begun to conduct tests for the biodegradability .

### Financials
The project team plans to initiate this project by setting up a facility to produce 1,000 tons. Based on current prices and market conditions, the average cost of a tone of bioplastic should be about RM 5,650.

**Year 1:** 1000 Tons x RM 5650 = RM 5,650,000
**Year 2:** 1340 Tons x RM 5650 = RM 7,571,000 (v)
**Year 3:** 1795.6 Tons x RM 5650 = RM 10,145,140 (vi)

We project a 34.3 percent growth rate based upon the average projections for the bio-plastics market.

### Funding Requirement
The key items that will contribute to the start-up cost for this business are –
Infrastructure & M&E for PLA
Infrastructure & M&E for PHA
Lab Facilities & Operating Budget

Sources:
**(i)** http://www.eia.gov/tools/faqs/faq.cfm?id=34&t=6
**(ii) MITI Report 2010 P. 49-51.**
**(iii) MIDA: Malaysia2008/Performance of the Manufacturing and Services Sectors**
**(iv) Market Research Reports 2012, BCC Research**
**(v) The global plastics market is expected to grow by 34.3 percent,** we thus project the minimal growth of this project to be 34 percent, yoy.
**(vi) Market Research Reports 2012, BCC Research**

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# Money Making Opportunity

## Innovation Business Opportunity

RM **16** Million

Potential Yr3 Revenue

# Rice Husk Composite Material (SIRIM003)

**Similar characteristics as other hardwoods**

**Tough, durable and will require no protective coatings**

# Rice Husk Composite Material (SIRIM003)

## Project Overview
To use an advanced process to convert waste rice husks into a novel composite material that can then be used as a substitute for hardwoods to build furniture and similar products.

## Business Idea
To refine and scale-up a process to convert rice husks into a sustainable and high-quality composite material. The composite material will then be sold to manufacturers who will then refine it into finished goods, such as furniture.

## Business Model
A manufacturing plant could be set up to produce the risk-husk composite material which can then be sold to manufacturers and others within Malaysia and potentially around the world. The production of finished goods would most likely fall to other manufacturing companies, but could also be kept in-house.

## Business Opportunity
Increasing pressure on Malaysia and the world's forests are prompting a need for a sustainable wood alternative that can be used to build high-quality furniture and other similar products. The process developed at SIRIM will allow for the conversion of rice waste husks into a sustainable and high-quality alternative to wood.

## Market Analysis
According to UN COMTRADE, furniture exports of wooden office, kitchen, living room and bedroom furniture totaled some RM 4.5 billion.[i],[ii] Some estimates for Malaysia's total furniture market are as high as RM 7.8 billion in 2009 for the furniture industry as a whole.iii The global furniture market totaled more than USD 300 billion in 2008iii. From 1998 to 2009 the furniture industry in Malaysia demonstrated a 19.2 percent CAGRiii. Datuk Tan Chin Huat, director of the MIFF has stated that there is a need to use "other types of timber resource and composite materials,[iii]" due to increasing demand for traditional wood sources.

## Competitive Advantages
The rice husk composite materials look similar to hardwoods and can be shaped into similar products. The material promises to be tough, durable, and will require no need for protective coatings.

## Competitor Analysis
The main competitor will be hardwoods and rubber wood, though lumber themselves may be interested in manufacturing rice composite materials. In Malaysia, rubber wood, a sustainable wood source, will be a main competitor, however the country is already faced with shortages and there are fears of rising prices[iii]. The wood production industry in Malaysia features a mix of SME's and large companies.

## Technology Solution / Innovation
SIRIM's method binds rice husks together with special polymers to produce a sturdy composite material that can be manufactured to look like wood. The composite material is made of approximately 70 % rice husk and 30% thermoplastic. The composite material will be able to absorb paints/stains and the surface finish can be modified to meet different needs. Further, it should be resistant to insects and rot, and is easily recyclable. The composite material has undergone stringent testing at SIRIM to ensure a high-quality product.

## Project Challenges
Some of the possible project challenges that can be foreseen are: (a) the composite material could show serious flaws in comparison to hardwoods further down the line. (b) if this project creates signification demand for rice husks, costs could increase dramatically.

## Intellectual Property Rights
Information for patents has not been provided at this time, though the process would seem to warrant patent protection.

## Project Status
A pilot scale manufacturing facility has already been built at FRIM and test products have already been built and are viewable at SIRIM's facilities. SIRIM has formed a company to scale up operations and is now interested in talking to manufacturers and other parties interested in producing finished goods.

## Financials
As this is a new industry we have based the financial potentia on similar industries in Malaysia. There are 16 mills producing particle boards in Malaysia that on average generate nearly RM16 million in export revenue [iv]. The assumption is thet production of the Rice Husk Composite Material will be able to hit a similar level of production (for both import and export) by the 3rd year.

**Y1**- RM 5,000,000
**Y2-** RM 10,000,000
**Y3-** RM 16,000,000

### Funding Requirement
SIRIM already has a pilot manufacturing plant in place and has worked on the initial process for manufacturing, which should be scalable to full-size. This will reduce the short-term start-up costs, and revenue from sales will be able to contribute to expansion costs.

Source: **(i)** http://www.trademap.org/Country_SelProductCountry.aspx, **(ii) Assembled from office, bedroom, living room and other furniture statistics** as found at trademap.org iihttp://www.theedgemalaysia.com/in-the-financial-daily/164593-rhb-msia-a-small-player-in-furniture-mart.html, **(iii)** http://www.huathing.com.my/group/malaysian-furniture-industry-faces-shortage-of-rubberwood]

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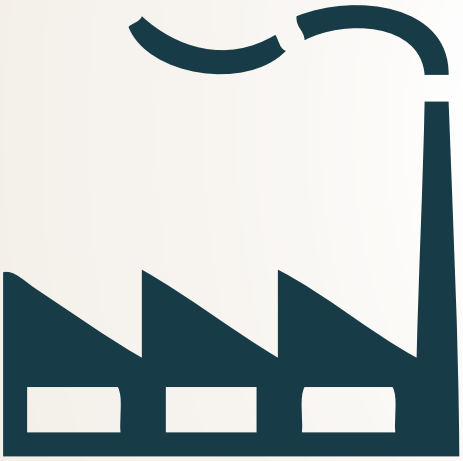
# Money Making Opportunity

## Innovation Business Opportunity

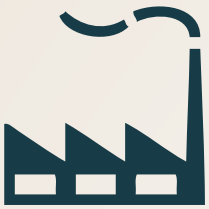
RM **9.2** Million

Potential Yr3 Revenue



# Carbon Fibre Production Capability (SIRIM004)

**Manufacturing of Carbon Fibre Raw Material Ability to Integrate it into New High-Performance Products**



# Carbon Fibre Production Capability (SIRIM004 )

## Project Overview
The research team at SIRIM has developed the know-how and expertise in the various processes of carbon fibre manufacturing. They have used this to manufacture prototype carbon fibre CNG tanks.

## Business Idea
To develop, produce and distribute a range of commercial products by leveraging the expertise and existing facilities at SIRIM for the manufacture of carbon fibre.

## Business Model
For the short term (up to 3 years) it is proposed that the business develop the carbon fibre based CNG tank product and sell them to distributors and CNG fitters locally and in the Asia-Pacific region. For the long term the business should develop higher-end carbon fibre based products targeting the automobile, aerospace and wind energy industries.

## Business Opportunity
The usage of carbon fibre is growing rapidly globally as a lightweight and strong alternative to metal for industries such as aeronautics, automotive, construction, and wind energy. In 2009, the Asia-Pacific region contributed only 9% to the global carbon fibre production (i) – there is an opportunity to develop this market to meet the regional demand.

## Market Analysis
The global demand on carbon fiber composites was estimated at roughly USD 10.8 billion in 2009. The market is estimated to reach USD 13.2 billion by 2012 and increase to USD 18.6 billion by 2015 following the annual growth rate of 7% or more. Strongest demand is expected in aircraft / aerospace and wind energy. (i) In 2009, among the 9.6 million natural gas vehicles in the world 5 million were from the Asia-Pacific region.

## Competitive Advantages
SIRIM has the know-how and specialist equipment required to both manufacture carbon fibre raw material and integrate these materials into new high performance products. The advantages of the carbon fibre CNG tanks developed by SIRIM are – high strength (resulting in safer CNG tanks) and low weight (thus optimizing fuel consumption).

## Competitor Analysis
There are many industrial cylinder trading company and they are involved in the direct importation and distribution of CNG tanks in Malaysia. In Thailand, CNG tank manufacturer Metal Mate is a major player and in 2011 signed an agreement with Toho Tenax, a Japanese carbon fibre manufacturer. Asian Composites Manufacturing Sdn. Bhd. is a joint venture between Boing, Hexcel, Sime Darby Berhad and Malaysia Helicopter Services to manufacture composite parts for the aerospace industry.

## Technology Solution / Innovation
There are three key stages in the carbon fibre manufacturing process – Chemical synthesis; Spinning and Carbonization; Scale Up and Application. Specialist equipment is needed for the Spinning and Carbonization process. The process starts with the production of carbon fibre precursor (for the most part Poly-Acrylonitrile or PAN). This precursor is then used in the production of carbon fibre via an oxidation / carbonization process.

## Project Challenges
The Carbon Fibre Value Chain has a high degree of vertical integration – it will be challenging to set up the whole value chain while competing with existing global companies operating in this field. For the CNG tank product the local market might not be big enough for long term growth (in 2009: there were 42,000 natural gas vehicles in Malaysia of the 4.95 million natural gas vehicles in Asia Pacific.

## Intellectual Property Rights
SIRIM have examined and built the know-how for the processing of carbon fibre and production of products based on it. They are looking for collaborators for innovations concerning the application of this technology for new product development to be patented.

## Project Status
SIRIM industry scientists have examined the key stages of the carbon fibre manufacturing process and built the know-how in this field. The first prototype products (CNG tanks) have been manufactured. They are currently looking for industry collaborations to develop a range of commercial applications.

## Financials
In the financial model it is assumed that in the first three years the business will produce and sell the carbon fibre CNG tanks. The model is built on the Malaysian market in Year 1 and 2 and assuming that the business enters the Thailand market in Year 3.

**Year 1** - (42,000) x (5%) x (RM 1,400) = RM 2.9 million
**Year 2** - (42,000) x (10%) x (RM 1,400) = RM 5.9 million
**Year 3** - RM 5.9 million + (140,000) x (2%) x (RM 1,200) = RM 9.2 million

## Funding Requirement
The startup process for the CNG tank product can be optimized by collaborating with existing major manufacturers and importers. Development of new products can be optimized by working with companies working in the domain of composite materials for the automobile and aerospace industries.

Source: **(i) Acmite Market Intelligence** - http://www.acmite.com/brochure/Brochure-Carbon-Fiber-Composite-Market-Report.pdf - [Last Accessed - 20 Mar 2012]; **(ii) Asia Pacific Natural Gas Vehicles Association** - http://www.angva.org/Clients/angva/images/assets/form/chongqing2009_2b_final.pdf - [Last Accessed - 20 Mar 2012];

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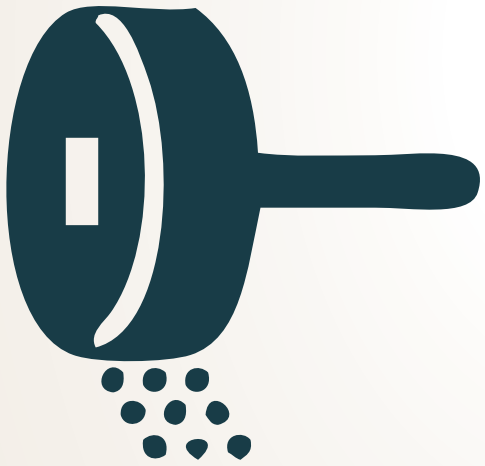
# Money Making Opportunity

## Innovation Business Opportunity

RM **2.7** Million

Potential Yr3 Revenue



# 8-Axis Tool & Cutter Grinder (SIRIM005)

**Used to Cut & Grind Precision Micro Tools**

**8-Axis Allows for Greater Complexity and Flexibility**

# 8-Axis Tool & Cutter Grinder (SIRIM005)

## Project Overview
This innovation is primarily to grind & cut micro tools, cutters, probes, pins to ± 2 micron accuracy with 8-Axis configurations for higher complexity of parts.

## Business Idea
To design, develop and produce a tool and cutter grinding machine that can perform 8 axis movements, to enable it to cut and grind many shapes and forms of tools.

## Business Model
Two business models are proposed: (a) to design, develop, produce and distribute the machines locally and regionally within South-East Asia as a low-cost alternative, and (b) license the product to original equipment manufacturers.

## Business Opportunity
Globally, there are only limited number of foreign manufacturers of tool and cutter grinding machine as it is a dedicated product for dedicated purposes. Locally in Malaysia, there is a general thrust to upgrade local expertise towards locally manufactured product and to reduce dependency on foreign technology.

## Market Analysis
In the US Department of Commerce report(i), the ten countries surveyed in 2009 collectively consumed USD 51.9 billion in machine tools, of which 24% (or, USD 12.7 billion) went to Japan, South Korea and Taiwan. Data for South-East Asia and Malaysia was not available.

In Malaysia, the market identified are the semiconductor and wafer-fabrication industries, the precision mold and die engineering industries, the engineering laboratories of universities, vocational colleges and corporate training labs.

## Competitive Advantages
This product is designed with twin spindle head thus reducing downtime between roughing and finishing. Manufacturing cost is also reduced by using local expertise, standard components, designed based on workstation concept for operator ease-of-use, semi-auto control and use of single clamp operation with 8-axis so that complex precision parts are easier to produce.

## Competitor Analysis
Global Trade Atlas reported that in 2002-2007(ii), the top ten exporters of machine tools exported a cumulative value of USD 72.8 billion, where in 2007, the total global exports were USD 17.2b, with Germany exporting USD 4.4b, Japan USD 3.85b, Taiwan USD 1.55b and USA USD 0.74b.

In Malaysia, some of the precision cutter and grinder tools used are Anca (7 axis) from Germany, Jungner (4 axis) from Sweden, Brown & Sharpe from USA. A typical 5-axis CNC Tool and Cutter Grinder is priced upwards of USD 129,000(iii).

## Technology Solution / Innovation
First of its kind developed in Malaysia, where manufacturing is sourced entirely from local expertise and locally produced components that are standard-design.

## Project Challenges
Some challenges identified by the project team include regulatory compliance to obtain the CE Marks, and standards on machinery (machine tool), completion of a commercially-ready unit that is cost-economical, and sourcing for locally produced quality components to ensure competitiveness.

## Intellectual Property Rights
Patent Pending (for roughing and finishing).

## Project Status
Completed R&D, and have functional prototype available. SIRIM is already collaborating with LD Micro Precision Sdn Bhd as a technology partner.

## Financials
As these precision cutting and grinding tools are targeted for industries that require precision work, it may be suitable for the 3805 local small-and-medium enterprises involved in machinery & engineering, professional, medical, scientific and measuring development, manufacturing-related and metal products(iv), the 20 local public universities, 4 foreign and 22 polytechnics approved in Malaysia(v).

Assuming we target 20% of the SME companies by Year 3, and 5% of the local universities, politechnics and vocational colleges in Malaysia by Year 3 at an average selling price of RM 300,000 per unit, while licensing the design to Original Equipment Manufacturers for export to neighbouring countries in South-East Asia from Year 2 onwards at 2% of recommended international retail price (say, at USD 120,000, or RM 350,000).

The estimated revenue are:

**Year 1** : RM 600,000
**Year 2** : RM 1,570,000
**Year 3** : RM 2,750,000

## Funding Requirement
Further effort is required to develop this functional prototype into a commercially-ready unit that uses local components, and comply with standards on machine tools.

Source: **i) Critical Technology Assessment: Five Axis Simultaneous Control Machine Tools, Bureau of Industry and Security, US Department of Commerce, July 2009, Page 12.** [Last Accessed: 22 March 2012] http://www.bis.doc.gov/defenseindustrialbaseprograms/osies/ defmarketresearchrpts/final_machine_ tool_report.pdf; **(ii) ibid. Page 15. (iii) Economical New CNC Tool and Cutter Grinder, ANCA press release.** [Last Accessed: 23 March 2012] http://news. thomasnet.com/fullstory/CNC-Tool-and-Cutter-Grinder-resharpens-tools-at-high-speed-568295 **(iv) SMECorp Malaysia's Official website** http://www.smecorp.gov.my/v4/node/7; **(v) Ministry of Higher Education (MOHE)** http://www.mohe.gov.my/educationmsia/index.**php?article=mohe**

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