

Strengthening innovation-driven inclusive and sustainable development

Asia-Pacific

Tech Monitor

Vol. 31 No. 4 Oct - Dec 2014

**Technology-based rural
entrepreneurship incubators**
Policy and institutional support mechanisms



Plus

- Technology News and Events
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Asian and Pacific Centre
for Transfer of Technology



UNITED NATIONS
ESCAP
Economic and Social Commission for Asia and the Pacific

The **Asian and Pacific Centre for Transfer of Technology** (APCTT), a subsidiary body of ESCAP, was established on 16 July 1977 with the objectives to: assist the members and associate members of ESCAP through strengthening their capabilities to develop and manage national innovation systems; develop, transfer, adapt and apply technology; improve the terms of transfer of technology; and identify and promote the development and transfer of technologies relevant to the region.

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- n Research and analysis of trends, conditions and opportunities;
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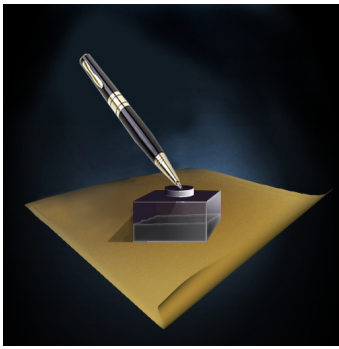
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Introductory note

Rural entrepreneurship and business incubators are considered to play an important role in the economic development of nations and their rural communities. The goal of national rural development policies, particularly in the developing and least developed countries, is to eradicate poverty, which tops the list of sustainable development goals (SDGs) in the post 2015 development agenda. The national policies primarily aim at eliminating rural poverty through promoting entrepreneurship, developing technical skills, and nurturing start-up businesses which, in turn, would evolve into sustainable businesses creating wealth and employment opportunities.

According to 2013 World Bank statistics, world's rural population constitutes about 47 percent of the total and about 70 percent of the world's poor live in rural areas depending on agriculture as the main source of income and employment. As per ESCAP's *Economic and Social Survey of Asia and the Pacific 2014*, the inequality is widespread in the Asia-Pacific region and continues to grow in many economies. ESCAP analysis of 40 countries in the region indicates that the poorest 20 percent of the population currently accounts for less than 10 percent of national income, with the poorest in some major developing economies.

Rural business incubators can take the form of comprehensive occupational entities, offering rural producers and workers with sufficient knowledge, experience, infrastructure, and means to become successful entrepreneurs. The incubators will provide a means of leveraging the resources available and invested therein and would encourage rural entrepreneurs to enhance their skills, start micro business ventures, diffuse technology through their enterprises, and generate employment and wealth to support the livelihoods of the poor. These activities can have far-reaching effects, in the modernization of primary production activities, up-gradation of traditional rural technology and practices, rural industrialization, and marketing and development of rural areas.

Studies have shown that success of rural business incubators largely depends on the ability to develop their own and collaborating with external networks which increase their efficiencies and performance while expanding the incubators' potential markets and resources. Eventually, they would also create a mechanism to assist in the identification, adaptation, and commercialization of technologies and products from public and private research institutions and universities. From a development perspective, the goal of business incubation should be to develop and commercialize new products, technologies, and services to improve rural economies and living standards.

In the rural areas of Asia-Pacific developing and least developed countries, entrepreneurs and business incubators face challenging circumstances to grow and become successful. These challenges need to be identified and adequately addressed by policymakers and development practitioners in order to improve performance of incubators, and thus to achieve higher returns on both public and private investments. Critical challenges may include: low-income population, lacking in critical infrastructure, fewer local resources, smaller pool of potential clients, limited availability of skilled manpower and service providers, limited access to educational institutions, lack of market linkages, etc. Sound policy and programmatic interventions can eliminate many of these limitations.

This issue of *Asia-Pacific Tech Monitor* discusses the policies, institutional support mechanisms, challenges and opportunities for the promotion of technology-based rural entrepreneurship, and business incubators in selected countries of the Asia-Pacific region.

Michael Williamson
Head, APCTT-ESCAP

Technology Market Scan

INTERNATIONAL

South-South technology transfer facility

A new South-South technology transfer facility for the small island developing states (SIDS) was launched in Apia, Samoa on August 30, 2014 to transfer appropriate technologies from provider to recipient SIDS, in an effort to improve SIDS' access to the global market. Utilizing a public-private partnership approach, technology providers and investors from both southern and northern countries will be matched with the relevant business opportunities in SIDS.

The United Nations Office for South-South Cooperation (UNOSSC) launched the facility in partnership with the United Nations Office of the High Representative for the Least Developed Countries, Landlocked Developing Countries, and Small Island Developing States (UN-OHRLS) during the private sector partnerships forum, a pre-conference event convened by the UN-OHRLS on the occasion of the third international conference on SIDS hosted by the government of Samoa.

The launching of this facility was formally announced on September 1, 2014 during the multi-stakeholder partnership dialogues session on "Sustainable Economic Development."

The facility, which will be implemented based on the model of UNOSSC's flagship platform, the South-South Global Assets and Technology Exchange (SS-GATE), was launched in a signing ceremony involving Ms. Heidi Schroderus-Fox, director of UN-OHRLS, representing Mr. Gyan Acharya, under-secretary-general and high representative for the LDCs, LLDCs, and SIDS; and Ms. Teresa Liu, chief of the division of development solutions and technology transfer of the UNOSSC, representing Mr. Yiping Zhou, director of the UNOSSC and the secretary-general's envoy on south-south cooperation. The signing was witnessed by Mr. Haoliang Xu, director of UNDP's regional bureau for Asia and the Pacific.

As an initial offering of the facility, UNOSSC hosted an online and on-site business

matchmaking space, which offered participants an opportunity to network and to communicate their needs and offers over the 2-day duration of the forum. Availing themselves of this innovative service were 48 enterprises from 15 countries, representing a range of sectors including tourism, agriculture, clean and renewable energies, telecommunications, and financial services. Three service agreements were signed, which will help connect participating companies to the wider SS-GATE network, currently spanning over 49 operational centers in 39 countries.

The establishment of a South-South technology transfer facility for the SIDS will help ensure that there is concrete follow-up to the commitments made during the conference, particularly in reference to the conference Outcome Document, which calls for strengthened technical assistance programs through expanded South-South and regional partnerships (Draft Outcome Document, Paragraph 109, Section E). As a response, the facility has already mobilized local, regional, and international partners, including the UNDP, who have expressed an interest in supporting the facility. A partnership MOU was signed between UNOSSC and the Pacific Island Private Sector Organization (PIPSO) to strengthen SS-GATE's regional presence in the Asia Pacific.

SS-GATE, which was launched by the UNOSSC in 2008, is a global platform that leverages South-South and Triangular cooperation to facilitate the exchange and transfer of technologies, innovative solutions, and assets between SMEs and other entities based primarily on developing countries. SS-GATE has received the general assembly's endorsement on multiple occasions, including during the High-level United Nations Conference on South-South Cooperation in Nairobi, Kenya, in 2009.

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<http://ssc.undp.org>

Virtual reality knowledge transfer solutions to improve industrial skills

The United Nations Industrial Development Organization (UNIDO) is partnering with EON Reality Inc., a leading company in virtual reality (VR)-based knowledge transfer for industry, education, and educational entertainment. UNIDO sees augmented and virtual reality-based knowledge transfer solutions as affordable and effective tools for reducing poverty, increasing production capacity, and developing industrial skills in developing countries.

EON and UNIDO's first joint pilot project is an augmented reality (AR) application, called Learning and Knowledge Development Facility (LKDF) Interact, which covers diesel engine operation for the Volvo Selam Vocational Training Center in Ethiopia. The Volvo Selam center is one of the partners of the LKDF project, which aims to support the establishment and upgrading of local industrial training academies in close partnership with the private sector. The concept behind LKDF Interact can be replicated in other UNIDO projects that focus on industrial skills development, especially projects in the heavy duty vehicle industry field.

"It is my firm belief that technology and innovation, and their successful transfer, are fundamental pillars of inclusive and sustainable industrial development. UNIDO has consistently been promoting awareness of new technologies, mechanisms to facilitate their transfer, and matchmaking between technology providers and those looking for new technologies. Without technology and innovation, industrialization will not happen, and without industrialization, development will not happen. Virtual reality technology is the next generation of expertise, which will be extremely useful for educators and will allow students to gain a deeper understanding on the topic at hand. The important factor

is that the technology has become affordable for the developing world," said Philippe Scholtes, managing director of UNIDO.

This is the first step in the collaboration between UNIDO's LKDF and EON Reality's Learn for Life Program, which brings augmented and virtual reality-based knowledge transfer to communities that need it the most. EON is currently engaged in several similar projects and is actively vetting locations to set up joint Interactive Digital Centers (IDCs) in Africa. These centers will support improved regional knowledge transfer through augmented and virtual reality as well as enabling the local population to develop the VR/AR content their communities need.

<http://www.unido.org>

ASIA-PACIFIC

ADB ranks Japan and Republic of Korea as Asia's most innovative

A new creative productivity index developed by the Asian Development Bank (ADB) and Economist Intelligence Unit (EIU) ranks Japan and the Republic of Korea as countries most efficient in the Asia and Pacific region at turning creative inputs into tangible innovation. Myanmar, Pakistan, and Cambodia, by contrast, are ranked as the least efficient innovators.

"As countries seek to innovate to avoid middle-income traps, all governments—especially those with limited resources—need to be sure that their investments boost both efficiency and productivity, benefiting their economies and people, and move to a knowledge-based economy," said Bindu N. Lohani, vice president for knowledge management and sustainable development at ADB.

Creative productivity is an important attribute for knowledge-based economic development and the new index gives policymakers a unique tool to assess how to best foster innovation and creativity. While measures will differ by country, policies that make it easier to set up businesses and create flexible labor markets would benefit everyone, as would greater investment in education, skills, information and communications technologies, and internet access.

The creative productivity index differs from existing innovation-related indices by focusing on how efficiently countries turn their creative inputs into innovation outputs rather than just the absolute level of creative inputs. This allows countries to seek the most effective — and affordable — innovation investments. It also captures elements of creativity that are more relevant in less developed countries, such as agricultural innovation.

The index uses 36 input indicators to measure the capacity and incentives for innovation, including how many global top 500 universities a country has, the urbanization rate, spending on research and development, protection of intellectual property rights, and corruption and bureaucracy. The eight output indicators to measure innovation include the number of patents filed, export sophistication, value added to agriculture, and the number of books and films produced.

On innovation inputs alone, Singapore topped the rankings with strong political institutions, protection of intellectual property, and contract enforcement. Among Asian countries, Hong Kong, China topped the list in terms of innovation outputs due to a high level of export sophistication and its prolific film production industry.

<http://www.asianscientist.com>

CHINA

R&D spending expands in 2013

China's spending on research and development (R&D) expanded in 2013, reaching 11.847 trillion yuan (about \$1.93 trillion), latest data from the National Bureau of Statistics (NBS) showed. R&D expenditures accounted for 2.08 percent of the country's gross domestic product (GDP) in 2013, compared to 1.98 percent in 2012, according to the NBS. R&D expenditure as a percentage of GDP is viewed as an important indicator to evaluate a country's investment in innovation.

China's spending on R&D has been rising rapidly since 1995 at an annual growth rate of 21.6 percent. R&D spending in 2013 was 33 times higher than that of 1995, the NBS data showed. In 1995, R&D expenditures accounted for only 0.57 percent of GDP.

<http://www.shanghaidaily.com>

High-tech imports, R&D encouraged

China will use tax breaks to encourage enterprises to upgrade their equipment and increase R&D efforts to improve the manufacturing industry. Companies that bought new R&D equipment and facilities after January 1 or possess minor fixed assets will have taxes reduced based on value, according to an executive meeting of the State Council, China's Cabinet, presided over by Premier Li Keqiang.

Imported high-tech equipment will also enjoy tax deductions in aviation, bio-medicine production, manufacturing of railway and ships, electronics production including computer and telecommunications, instrument production, and those used in making Information Technology (IT) products and software. The move aims to prompt technical improvement of companies, especially innovation of small and medium-sized enterprises, according to the meeting. The meeting also asked government organs to implement the new measures as soon as possible to arm "Made in China" with advanced technology and equipment, encouraging more competitive products with high added value.

Analysts believe that the measures will not only start a new round of innovation but also spur fixed asset investment, and in the bigger picture contribute to stabilizing economic growth. Zhu Jianfang, chief economist of CITIC Securities, said that the measures would lighten burdens of enterprises in the real term and prompt the upgrade of outdated equipment.

Combined tax deduction of A-share listed companies is expected to reach 233.3 billion yuan (\$38 billion) in the first year after the policy takes effect, equal to 7.8 percent of their total cash flow in 2013, according to the calculation of the Shanghai Stock Exchange (SSE).

<http://news.xinhuanet.com>

New policies to focus on small business growth

The State Intellectual Property Office (SIPO) released a range of new policies to support innovation and growth of micro businesses. The new policies, which

are designed to optimize the Intellectual Property(IP) development environment for small businesses, focus on improving public services and helping startups increase capabilities in innovation and using IP, according to SIPO.

"IP is an engine that powers the fast growth of small tech firms and earns them more profit margin," said He Hua, deputy commissioner of SIPO, at a press conference. A survey SIPO conducted in Chongqing found that small businesses with an IP edge generated profits seven times the amount of those without patents, He added.

About 11.7 million micro businesses operate in China. They generated some 60 percent of the country's GDP, contributed 65 percent of total invention patents and developed more than 80 percent of new products. "Yet most of them still stay at the low end of industrial chains and are badly in need of IP aid for their healthy and sustainable growth," He noted.

In China, the average life span of a small company is 3.7 years, which is much shorter than 8.2 years in the United States and 12 years in Japan. He said that a survey of 500 small German firms showed 20 percent lasted more than 100 years. With this in mind, the policymakers borrowed some successful practices from abroad to address issues such as difficulties filing patent applications and high costs in IP protection, the commissioner said.

SIPO will prioritize filings by small companies for their core patents and help them gain patent grants overseas, according to the new policies. IP authorities will increase financial aid earmarked for patent applications by small companies to help fund their industrialization. To help resolve the financing bottleneck, SIPO urged its branches across the country to partner with various financial organizations to channel more low-interest loans to small businesses and reduce patent insurance premiums.

Patent-collateralized loans surpassed 23.5 billion yuan (\$3.8 billion) in the first half of this year, a rise of 124 percent year-on-year. During the same period, more than 700 companies in 34 cities benefited from patent insurance.

The new policies also call for increased cooperation with research institutes and colleges and encourage state-owned enterprises to license idle patents to small businesses. Under the plans, an IP service network will extend from provinces and cities to townships and add liaisons at startup centers or small business incubators to enable easier access to professional services. Given that small companies tend to develop more utility models and industrial designs, two kinds of patents less complicated than invention patents, he said his office would add legal aid centers to advance mechanisms for rapid dispute settlements in small business clusters. Currently, there are 78 aid centers that serve small businesses across the country.

The new policies, which are part of the central government's efforts to back small businesses, provide a framework and direction, which will be followed by a series of specific initiatives and details soon, said Fan Jianyong, an official of SIPO's patent administration department.

In cooperation with the Ministry of Industry and Information Technology, SIPO promoted an IP strategy at 32 nationwide clusters of small- and medium-sized enterprises since 2009. The number of SMEs has grown about 20 percent annually in recent years, with SME patent filings hitting an average annual rise of 53.8 percent.

<http://www.chinaipr.gov.cn>

INDIA

R&D centers account for 33 percent of global services market

Research and Development (R&D) centers in India contributed \$18.3 billion, which is around one-third of the global R&D and services market. According to a study done by management advisory firm Zinnov, Indian engineering R&D(ER&D) services revenue will touch \$38 billion by 2020.

The study also pointed out to changing trends in the ER&D landscape that is undergoing rapid shifts with regard to the kind of services that can be outsourced. "With

Social, Mobile, Analytics, Cloud (SMAC), and Internet of Things (IoT), there is a fundamental shift in the way a company is looking at its outsourcing service provider," said Sundararaman Viswanathan, manager-consulting, Zinnov. He added that gone are those days when you just wanted to get some grunt R&D work outsourced to companies in India at cheaper rates. Industry watchers believe that while cost continues to be a factor, companies are more interested in outsourcing work that has a direct bearing on the business that they are in.

The study also ranked Wipro, TCS, and HCL as top ER&D providers. Wipro has a rich engineering services heritage and innovation in its DNA, industry leading lab infrastructure and eco-system connects and is a clear leader in Hi-Tech vertical, according to the report.

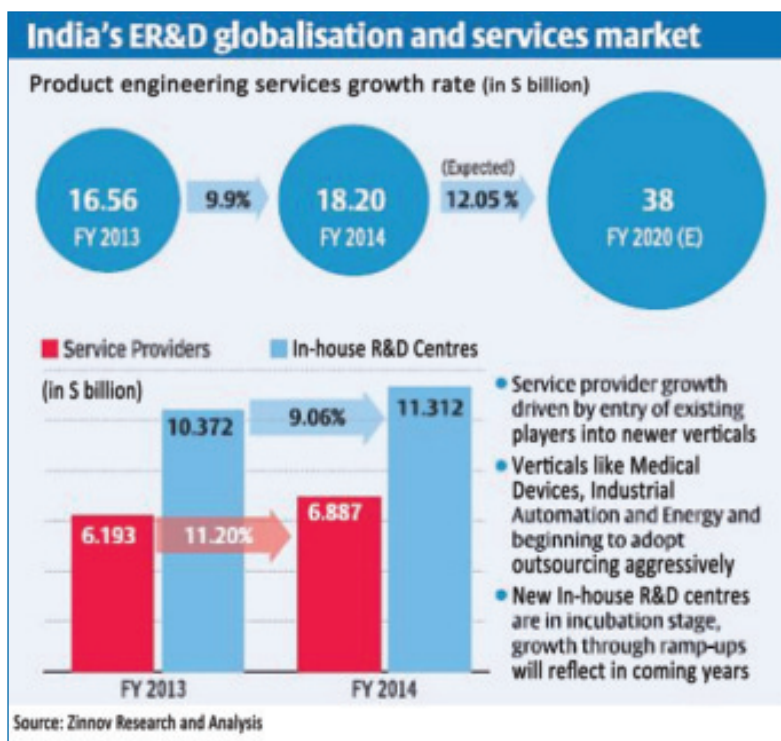
Similarly, top IT services exporter TCS has a highly diversified and mature R&D practice, which is demonstrated through its positioning in leadership zone across all verticals in which it operates. HCL with its positioning in the leadership zone across most of the verticals and its capability addition in medical devices and construction and heavy engineering continues to be a formidable ER&D player.

However, others such as Infosys and Tech Mahindra are closing the gap by diversifying into newer verticals by leveraging their embedded and software capabilities and exploring newer customer segments like first-time outsourcers and growth stage start-ups, according to Viswanathan.

<http://www.thehindubusinessline.com>

Venture capital fund for R&D in pharmaceuticals to be set up

The Department of Pharmaceuticals (DoP) has released the Detailed Project Report (DPR) for setting up Venture Capital (VC) Fund for R&D in pharmaceuticals that proposes to provide a government "push" for the development of a focused VC industry which would promote entrepreneurship in the pharma R&D sector and support the development of a self-sustaining environment for pharma R&D in the country. The terms of each pharma fund would be largely market-driven. The



government would, in the first instance, allocate a total amount of Rs. 500 crore to be invested between all the pharma funds set up in pursuance of this project.

Government criteria for investment would require that each pharma fund commits to investing at least such amount in Indian companies for their pharma R&D activities (Innovative Pharma Companies) as is, the higher of Rs. 150 crore; and four times the amount sought as investment from the government. Beyond the amount required to be invested in Innovative Pharma Companies, the government would not seek to pre-determine the nature of the investments that may be made by the pharma fund, in order to permit the fund managers to formulate and implement a business model and investment strategy that is elective and marketable. This DPR sets out in detail the design for the project and the manner in which each pharma fund will be established and managed, the identities and roles of key stakeholders, and estimated event schedules and time-lines.

In terms of the proposed project design, the government would be an investor whose contribution to the Trust would be managed by the fund manager in terms of the contribution agreement entered into between the

government, trustee, and fund manager. In order to be eligible for investment by the government, the terms of each fund would need to be subject to certain specifications of the government and, in return, be entitled to certain financial incentives.

The VC funds make equity or equity-linked investments in young growth-oriented firms. The VC industry developed as a financing solution for high-risk, potentially high-reward projects that, due to the lack of substantial tangible assets, expected years of negative earnings, and uncertain prospects, are unable to raise funding from more traditional sources such as banks or capital markets.

Pharma R&D projects are a typical example of such "high-risk, potentially high-reward" projects that struggle to raise funding in the absence of a well-developed local VC industry. The Feasibility Report argued that providing a government "push" for the development of a focused VC industry would promote entrepreneurship in the pharma R&D sector and support the development of a self-sustaining environment for pharma R&D in India. It also discussed several "public venture capital" models that have been adopted both in India and abroad to achieve this objective.

The proposed implementation model for the project draws on the positive features of these experiences to construct a blueprint for one or more "Pharma Funds" that are professionally managed, mobilize investments from both the government and private investors, and focus on investing in pharma R&D projects. The DoP has invited comments from the stakeholders on the DPR.

<http://www.pharmabiz.com>

PHILIPPINES

IP enforcement system

The Intellectual Property Office of the Philippines (IPOPHL) is putting in place an effective system for IP enforcement as well as for adjudication of cases to strengthen protection of such rights here. "We aim to make the IP system work better and faster for our IP right holders. The continuing push to improve IP enforcement and adjudication in the country is aligned with our bigger objective of having a demystified, democratized, and a development-oriented IP system," IPOPHL director general Ricardo Blancaflor said in a statement.

The IPOPHL has already put in place policies and measures to make it easier to enforce IP rights, including capacity-building programs in the judiciary that are rolled out in partnership with government and private stakeholders such as the Philippine Judicial Academy and the Supreme Court. The seminars and workshops are being implemented to enhance the skills of commercial court judges, prosecutors and investigators, and clerk of courts in handling IP cases.

Commercial courts for the speedy disposition of cases involving violations of IP rights have also been designated. The IPOPHL has likewise established mechanisms for alternative dispute resolution.

As part of efforts to strengthen Intellectual Property Rights (IPR) protection in the country, the IPOPHL is also forging partnerships with counterparts overseas to share best practices concerning copyright systems. Last month, the IPOPHL entered into a memorandum of understanding with the Korea Copyright Commission to share information on enforcement of copyrights. A similar partnership was also forged by the IPOPHL with Japan.

As of end-August, counterfeit items seized by the National Committee on Intellectual Property Rights (NCIPR) reached P8.03 billion, 45 percent higher than the P5.55 billion in the same period in 2013. Agencies that are part of the NCIPR are the National Bureau of Investigation, Bureau of Customs, Philippine National Police, Optical Media Board, and Food and Drug Administration. <http://www.philstar.com>

DOST pushes for patent increase

In order to boost the country's position in the global competitiveness index through increased local patent filings, Department of Science and Technology (DOST) Secretary Mario G. Montejo opens DOST for partnership with patent professionals. "We are targeting 100 patent filings this year," Montejo explained on DOST's move to tap patent professionals to beef up the Department's patent applications. "The partnership will also pave way for better assistance to local inventors," he added.

Such partnership is in consonance to Montejo's drive to fast-track Technology Application and Promotion Institute (TAPI)-assisted patent applications in the country and to cater to both DOST-assisted technologies as well as private inventors. Montejo himself was an award-winning inventor before his stint as a Cabinet secretary. Thus, DOST-TAPI formally partnered with the Association of PAQE Professionals, Inc. (APP) through a memorandum of agreement (MOA) signed on September 16.

Engr. Edgar I. Garcia, director of TAPI, is optimistic that TAPI, through the collaboration, will be able to meet its patenting targets and assist local inventors obtain patent grants. These areas need special attention as the country's patenting statistics show very few local filings by Filipino residents compared with foreign-based patent applications. TAPI is mandated by Executive Order 128 to promote technology commercialization of the DOST and by Republic Act 7459 to assist local inventors.

The MOA, signed by Garcia and Atty. Bayani B. Loste, APP president, states that APP members will serve as patent agents of TAPI-financed patent applications. APP

also committed to allocate at least 20 applications per month as the minimum absorptive capacity for TAPI. These applications will be filed at the Intellectual Property Office (IPOPHL) within 22 working days. Last 2013, DOST-TAPI assisted 12 patent filings. For 2014, Sec. Montejo and TAPI are targeting 100 applications, 31 of which have been filed at present.

<http://www.philippinestoday.net>

REPUBLIC OF KOREA

Smartphone patent applications

Republic of Korea's two largest makers of high-tech — Samsung Electronics and LG Electronics — have made the most patent applications in the world in the fields of mobile phones and semiconductors, a report announced on June 23. Samsung also secured the largest number of patent applications in the smart media sector.

In 2013, Samsung Electronics ranked top in the number of patent applications in the mobile phone, semiconductor, and smart media sectors, according to a report titled "2014 State of Innovation: Twelve Key Technology Areas and Their Status of Innovation," released by US-based news company Thompson Reuters. Samsung had 2,179 patent applications in mobile telephony, 1,362 patent applications in semiconductor materials and processes, and 245 in smart media areas. These three areas are considered to be the core of smartphone technology.

LG followed with 1,678 patent applications for mobile phones, followed by Qualcomm of the US with 1,383 patent applications. Sony, Panasonic, and SHARP, all of Japan, followed suit, with 1,071, 976, and 963 applications, respectively.

<http://www.korea.net>

Government R&D patents utilization

Although the government budget for R&D keeps increasing every year, with a corresponding increase in the number of patents, the quality level of these patents, including the proportion of outstanding patents, is very low. Furthermore, as the proportion of creative patents and the

usability of patents are also very low, the balance of intellectual property rights fees has been negative for several decades.

According to data of the Korean Intellectual Property Office released on October 7, the number of patents followed by government R&D businesses kept increasing from 14,131 cases in 2008 to 22,933 cases in 2012. Among the total number of patents applied for by Koreans, government R&D patents accounted for 11.1 percent in 2008, which increased to 15.5 percent in 2012.

Patent productivity (the number of patents per 1 billion won of R&D expenditure) has been 1.20 to 1.44 cases, four to five times higher than universities and public research institutions in Japan, the US, and Canada (0.2–0.48 cases) for the last 5 years.

However, the problems are the low quality performance of government R&D patents and a lack of superb patents. Especially, private and foreign-owned patents accounted for 4.5 percent and 27.3 percent of superior patents, respectively, based on the Patent Quality Index (PQI), but government R&D patents were only 3.6 percent. Among all patents in Republic of Korea, 23 percent were superior ones (based on SMART analysis), but only 16.4 percent were from government R&D.

Government R&D patents had low utilization as well. Professionals performed qualitative analysis on the government R&D patents in 2012, and they found out that only 1.4 percent of them were creative, and 0.6 percent had high inter-technology compatibility.

<http://www.businesskorea.co.kr>

Government to invest on science, technology, ICT R&D

This year the Ministry of Science, ICT and Future Planning will invest 3.9520 trillion won (US\$35.78 billion) in research and development (R&D) on areas of science and technology and Information Communications Technology (ICT). The MSIF announced on Jan. 4 that it has confirmed the "R&D Business Comprehensive Implementation Plan," which invests 2.9037 trillion won (US\$2.63 billion) in Science and Technology and 1.0484 trillion won (US\$949.12 million) in ICT. The investment scale this year, which excludes research and operating expenses of the National

Research Council of Science and Technology and research institutes under the direct control from its total R&D budget of 6.5138 trillion won (US\$5.9 billion), is to grow 7.9 percent compared to last year.

By sector, technology development accounts for the largest part of the budget with 2.2508 trillion won (US\$2.04 billion), following basic research with 744.3 billion won (US\$673.88 million), foundation construction with 640.2 billion won (US\$579.63 million), commercialization and standardization with 161.7 billion won (US\$146.4 million), and science and technology and ICT manpower training with 155 billion (US\$140.33 million).

By project, technology development in ICT will receive the highest funding at 772.3 billion won (US\$699.23 million), following basic research at 744.3 billion won (US\$673.88 million), source technology development at 562 billion won (US\$508.83 million), creation of international science business belt at 440.5 billion won (US\$398.82 million), space technology development at 373.8 billion won (US\$338.43 million), and nuclear power research development at 314.6 billion won (US\$284.83 million).

Also, the total of 228.1 billion won (US\$206.52 million) will be invested in research on nuclear fusion, while 143.9 billion won (US\$130.29 million) will be invested in foundation construction in the ICT, 118.7 billion won (US\$107.47 million) in creating cooperation between academia and industry, commercialization and technical commercialization, 55.8 billion won (US\$50.52 million) in science technology globalization, and 28.4 billion won (US\$25.71 million) in ICT standardization.

<http://www.businesskorea.co.kr>

Antitrust regulator puts excessive royalty demands on hold

In the future, Non-Practicing Entities (NPEs) won't be allowed to demand excessive patent royalties in Korea. Moreover, they will be unable to deny the application of FRAND principles or file unfair patent lawsuits. The Korea Fair Trade Commission (FTC) announced on Dec. 23 that it will implement revised guidelines for its review on the wrongful use of intellectual

property rights from Dec. 24. The guidelines are likely to affect patent disputes between Samsung Electronics and Apple. In particular, they are expected to somewhat dispel worries about the transformation of Nokia into an NPE resulting from the merger between Microsoft and Nokia.

The guidelines stipulate five types of abuse that NPEs perpetrate using their dominant position in the market, which includes excessive royalty demands, denial of FRAND principles, wrongful application of principles for standard-essential patents (SEPs), indiscriminate patent lawsuits, and business practices that target rival companies.

The country's anti-trust regulator defined SEPs as patents that need the owner's consent to produce or supply services or products using standard technology, specifying that patent violation lawsuits filed by SEP holders without prior negotiation are more likely to be unfair. In addition, it will be illegal to bundle unnecessary patents into needed ones.

<http://www.businesskorea.co.kr>

VIET NAM

Technology search and transfer until 2020 approved

The prime minister has approved an international technology search and transfer program that will run until 2020. Created in line with Decision No. 1069/QD-TTg, issued on July 4, the program aims at seeking, evaluating, consulting, and transferring globally advanced technology. It also aims at meeting the demand for developing new products and services to increase productivity and quality and to add value to products sold by Vietnamese enterprises.

Until 2020, Viet Nam will target transferring and applying 60 percent of the technology introduced to the country through a network of experts associated with the program. Viet Nam will prioritize advanced technology in line with the orientation in policy and development strategies toward national science and technology. The country's objectives are to create new products and services and meet demands to develop the economy and society.

The government will seek and support international technology transfers and adopt mechanisms to encourage enterprises and science and technology organizations to handle research and technology transfers. The program also plans to build a network of experts who will seek out new technology, create appropriate systems and policies, and procure data. The decision came into effect on July 4.

<http://bizhub.vn>

Technology acquisition

Next year, Republic of Korea will transfer 167 different kinds of technologies to Vietnamese enterprises in four main industrial sectors. The Ministry of Industry and Trade has published a list of 167 technologies that will be transferred: mechanical engineering (53), textiles – footwear (51), automobiles (35) and electrical – electronics (28). This program is part of the support-industry cooperation between the Ministry and the Ministry of Commerce, Industry and Energy of Republic of Korea.

Republic of Korea is one of the most important trading investment partners of Viet Nam. Over the past two decades, two-way trade turnover between the two countries has increased 55 times, from \$500 million in 1992 to \$27.3 billion in 2013. Last year, Republic of Korea was the third largest trading partner of Viet Nam; Viet Nam was the sixth largest export market of Republic of Korea.

One of the highlights of trade relations between the two countries is the structure of imports–exports that clearly complement each other. Republic of Korea mainly exports to Viet Nam machinery and equipment, and raw materials for textiles and footwear, and imports seafood, textiles, footwear, furniture, and agricultural products from Viet Nam.

The two countries are negotiating a free trade agreement (FTA), which is scheduled to be completed in 2014. If the FTA is signed, it will help promote two-way trade turnover between the two countries. In the January–September period of 2014, Republic of Korea poured the biggest amount of FDI capital into Viet Nam, with nearly \$3.6 billion.

<http://en.baomoi.com>

Technology Scan

Focus: Technologies for Rural Application

AFRICA KENYA

Software that assesses fruit quality and cuts fruit losses

A University of Nairobi (UON) post-graduate student has come up with a fruit-quality-assessing software that uses remote sensing to ascertain the extent of ripeness in tomatoes, oranges, mangoes, and other fruits. The software can be used to grade different fruits for their freshness and price them accordingly. "A blue light from a light emitting diode (LED) is shone through a fruit. In response, the fruit emits some light which is analyzed for fruit quality. This response comes from the skin of the fruit and has a direct relationship to the freshness of the fruit," stated David Muriuki Karibe, a master of science (MSc) physics student at the University of Nairobi. "For instance, some banana varieties will ripen but still retain the green color on their skins. Other varieties turn yellow on ripening. Rather than squeezing the fruit, which may itself lead to deterioration, the new technology will help measure the ripeness and freshness quickly and efficiently by randomly picking fruits." The research is a good news to fresh produce farmers, who lose over 45 percent of their produce to post-harvest losses that emanate from rotting, which is attributed to over-ripening, according to research conducted by the Kenya Agricultural Research Institute.

At the same time, the fruit market has increasingly become conscious to the freshness of fruit – demanding that they are harvested at the right time to improve their storage and quality. Accordingly, farmers would need to know the optimal time to harvest their mangoes, oranges, avocados, and tomatoes to stop losses that amount to millions of shillings. According to Mr. Karibe, a senior technologist in UON's physics department, the software is at prototype level awaiting mass roll out. So far however, the software development has cost Sh500,000 in purchasing the necessary hardware and intellectual input. Most of this funding has come from the university and personal savings. Mr. Karibe, however, laments that

local software developers lack the necessary backing from industry. "In developed nations, industry funds research projects at universities. Once a new product or software has been developed, industry takes up the product for the commercialization phase. In Kenya, the role of industry in research is missing leaving researchers and developers in the dark as they seek financiers for their ideas," he asserted during the recently concluded Nairobi International Trade Fair. In developed nations, industry spends a lot of money on research and development, which promotes innovation in local universities, according to Mr. Karibe. The software is suitable for all horticulture producers both large and small scale. Other users would be fruit vendors such as supermarkets and other outlets that deal with picky customers.

<http://www.standardmedia.co.ke>

ASIA-PACIFIC INDIA

Microbicidal technology for safe drinking water

Mumbai-based firm Livinguard Technologies Pvt. Ltd. has developed a filter designed to clean 100 L of water an hour. Not only does it remove the sand and odor from the water, but it also attacks the microbes in it. This microbicidal technology which uses treated textile was developed by Sanjeev Swamy between 2009 and 2011. He started Livinguard as a 100 percent subsidiary of Switzerland-based investment firm Green Impact Holdings in 2011 and a year later began manufacturing water filters. Since then, the company has teamed up with 16 non-governmental organizations (NGOs) and trust funds, including Swades Foundation in Maharashtra and the Jamnabai Trust for a project in Gujarat, to spread the use of these filters in rural India. Jayeshwar Gaikwad, a class II teacher, says the filter has made a big difference for the schoolchildren – for one, there is a steady supply of water. Then, there is also a marked improvement in attendance. "Food and water-borne illnesses, such as amoebiasis and diarrhea, were common among students and they would send mes-

sage through friends that they were taking the day off. That has stopped now," he says. Till a few months ago, Pagi and her schoolmates were among the 128 million Indians who do not have access to clean drinking water. According to a 2013 report by United Nations Children's Fund and Food and Agriculture Organization (FAO) of the United Nations, titled "Water In India: Situation And Prospects," around 37.7 million Indians are affected by water-borne diseases annually, and 1.5 million children die of diarrhea in a year. And, as per the Central Pollution Control Board's analysis of water quality monitoring results between 1995 and 2009, microbial contamination is the predominant form of pollution in surface water bodies such as the lotus-speckled pond where Pagi washes her plate. Livinguard does not have a distribution network and prefers to work through intermediaries such as NGOs and the corporate social responsibility arms of large corporations to reach schools, public health centers, even villagers' homes. In Jamsar, they teamed up with a local NGO Astitva, funded by Mumbai-based Ammada Trust, to provide two filtration systems – one to Pagi's school, another to the local primary health centre (PHC). "The results have been visible since Day 1," says Dr. Kiran Patel, one of the two medical officers posted at this PHC. "Every tap has potable water. Within the hospital too, we've cut our chances of suffering from salmonella or other bacterial infections that are prevalent in the village." Livinguard offers a discount of up to 35 percent to NGOs. For instance, the filter at the PHC cost Rs. 2 lakh, but the hospital got it for Rs. 1.3 lakh. Swamy adds that they regularly send samples of their filtered water to a government-approved water-testing laboratory to ensure all is well. "We've got no negative results so far," he says. Each filter has multiple cartridges to clean three impurities: turbidity (presence of sand, which says Swamy is the "biggest challenge"); chemicals such as arsenic, fluoride, heavy metals, and microbes. While activated carbon is used to attack chemical impurities and a special sand filter helps clean turbidity, their patent-pending textile technology is used to kill microbes. "When the bacteria touches the layers of fabric wrapped around a candle inside the Livinguard cartridge, a short circuit is created due to which a charge

is released that destroys the bacteria,"Swamy explains.

<http://www.livemint.com>

Solar energy powers village economy

Thanks to National Institute of Rural Development (NIRD), several inaccessible villages are enjoying solar home lighting system and even the rural economy is looking up with transfer of technology. From a stone cutter to a solar light maker, the transition is swift and fast. Chenamma no longer works in the hot sun to eke out a living. She now sits under a fan and deftly fixes wires, batteries, and screws for the mini solar LED light. She makes 50 solar lights a day, earning Rs. 280.

Chenamma is among the several villagers making a fast buck in spite of their illiteracy. Thanks to the technology revolution unleashed by the NIRD, several inaccessible villages in the state are enjoying solar home lighting system. Even the rural economy is looking up with transfer of technology.

The solar light manufacturing unit at the NIRD's Rural Technology Park (RTP) here is abuzz with activity as a variety of solar lights are being made in partnership with the Thrive Solar Energy Pvt. Ltd. Some of the villagers who have been trained at the Solar Training Institute, Tiloni, Rajasthan are now gainfully employed. They now assemble solar-powered lights and also maintain the solar streetlights installed in their villages. "We will be manufacturing LED lights also in the coming days," said Mohammed Khan, consultant, RTP.

The solar mini light and study light, which are 30 times brighter than kerosene lamps, are being offered at just Rs. 150 by NIRD. In the 10 Telangana villages adopted by it, solar streetlights are being installed for Rs. 3,500 – exploding the myth that solar energy is expensive. By investing Rs. 27,000, one can have two lights, a fan, and TV running with solar power. Under the Jawaharlal Nehru Solar Mission, Government of India provides 40 percent subsidy, banks offer 50 percent loan while the rest is borne by the beneficiaries. "The only problem is that banks are not readily coming forward to offer loans," admits Dr. P. Shivaram, project director, RTP.

Solar energy is one of the 20 cost-effective technologies being promoted by the RTP for



Chenamma, a stone cutter, making a solar light at the NIRD's RTP in Rajdendernagar. Photo: J.S. Iftekhar

improvement of the rural economy. Recently, it has also developed solar lights and freezers for fishermen who go for fishing during nights. Nearly, 100 solar lights were supplied to 50 fishermen of Gopalpur on Sea, Odhisa. Other innovative devices manufactured are solar dehydration unit, solar pest manager, and thermoelectric cooking appliance.

<http://www.thehindu.com>

Innovative potable water treatment system

Regions of India will soon receive cost- and energy-efficient drinking water with an innovative European water treatment technology stemmed from a €2.2 million (\$3.0 million) Europe/India collaborative research project.



Cutting-edge integrated European systems for water disinfection (Trustwater ECO-Trio) and filtration (Dryden Aqua AFM, background) for installation at a rural community pilot site in West Bengal, India (Credit: Hume Brophy)

Called ECO-India, the 3-year project is co-funded by the European Commission's Seventh Framework Programme (FP7) and the Indian Department of Science and Technology (DST). It will run until August 2015 and is focused on developing innovative and sustainable approaches for producing potable water at a community level. The first rural community deployment is set for West Bengal, India.

Coordinated by the Tyndall National Institute in Cork, Ireland, the €1.7 million (\$2.3 million) FP7 consortium represents a world-class interdisciplinary research team from three research institutes – Tyndall-UCC, Danmarks Tekniske Universitet (DTU), Helmholtz-Zentrum für Umweltforschung GmbH (UFZ) – and four small and medium enterprises (SMEs) (Trustwater, Adelphi, Dryden Aqua, and AGM).

The FP7 consortium will develop energy-efficient systems for advanced filtration and disinfection of drinking water supplies from surface-water ponds and groundwater tube wells, which suffer from arsenic contamination using Dryden Aqua and Trustwater technology. In addition, UFZ will lead the development of field-deployable arsenic sensors for screening tube-wells, while an online system developed by AGM will enable remote monitoring of water quality. Tyndall-UCC will focus on the development of novel capacitive modules for the removal

of ions from brackish surface water and heavy-metal ions (especially arsenic) from groundwater as well as development of novel sensors for monitoring dissolved oxygen. The overall system will be solar-powered with mains/battery backup. DTU will also lead a feasibility study for assessing energy harvesting via biogas from wastewater.

The European Union team partners with the €500,000 (\$685,300) DST-funded ECO-India consortium, coordinated by Professor Asis Mazumdar from Jadavpur University. The consortium also includes the Indian Institute of Technology Kharagpur as well as an SME Super Technicians. Collaborating with Jadavpur University and Adelphi GmbH (the collaboration managers for the project), the European systems will be installed alongside conventional water filtration systems in order to demonstrate their performance in a harsh rural environment and to assess their potential for sustainable, cost- and energy-efficient treatment of potable water.

<http://www.waterworld.com>

MALAYSIA

New agricultural technology

The Malaysian Agricultural Research and Development Institute (MARDI) has introduced a new agricultural technology called the Vertical Farming Technology to prevent soil erosion and chemical leaching. Its director Datuk Dr. Sharif Haron said the technology

was practical, cost-effective, and suitable for use in the agricultural sector in valleys and hilly areas such as in Cameron Highlands.

"This technology can reduce water pollution and damage to the environment and the public. The advantage of this technology is that the crops can be planted in high density and it is most suitable for entrepreneurs owning small plots of land. The greenhouse structure is suitable for hill slopes without having to cut the land surface. The construction method and design can reduce damage to the soil as well as erosion," he said.

Dr. Sharif also said the technology used cheap composite materials and the cost of making one set was only RM27. "The structure can take in 20 salad plants in one square metre of land with the selling price at RM80," he said. The product will be sold on a large-scale commercial basis shortly. Dr. Sharif said the idea for the technology came about in view of the soil erosion occurring in Cameron Highlands following the cutting of hills to turn the area into agricultural land and for development.

<http://www.waterworld.com>

NEPAL

Improved water mill electrification

An improved water mill (IWM) is an intermediate technology based on the principle of existing mills that improves performance generating up to 3 kW. The improvement of traditional water mill is done by improving various components of the traditional mill but the most significant is replacement of traditional wooden runner with hydraulically better-shaped metallic runner having cup-shaped blades.

Besides agro-processing, IWM electrification is a very important end-use that can be coupled with Long Shaft Improved Water Mill (LS IWM) system. Depending upon the water resources available, the electricity up to 5 kW can be generated from the IWM electrification system. For this purpose, an induction generator with controller device can be added to the LS IWM by means of pulley and belt transmission system. The electricity generated from IWM electrification system can



Helpful endeavor: Assistant research officer Muhammad Shukri Hassan demonstrating the use of the new technology in Cameron Highlands. (Credit: Bernama)

be used for basic lighting purpose, mobile charging operation of TV and radio, small cottage enterprises, etc. To promote IWM electrification system, government provides subsidy up to 5 kW system only.

The short shaft IWM is limited for grain grinding only. To optimize the capacity of Short Shaft Improved Water Mill (SS IWM), a new technology Axial Flux Permanent Magnet Alternator (AFPMA) has been developed from joint research of CRT/N, Gramin Urja Tatha Prabidhi Sewa Kendra, and Kathmandu University. AFPMA can be easily coupled with SS IWM and electricity can be produced. The technology has been able to produce power up to 1 kW and it is under research for the system to generate power up to 3 kW.

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PHILIPPINES

Post-harvest technology package

The Philippine Center for Postharvest Development and Mechanization (PhilMech) is preparing a package of technologies for adlai, an alternative to rice which government wants to propagate. Adlai is grown in large quantities in Mindanao as a staple. Scientifically known as *Coix lacryma-jobi L.*, adlai belongs to the *Poaceae* grass family to which crops such as rice, corn, and wheat also belong. It is cultivated as a cereal crop in tropics and subtropics, like in India, China, Republic of Korea, the Philippines, Thailand, and Malaysia.

The department of agriculture recently included adlai in its mainstream research and development program, as one of the country's best-kept secrets and a potent weapon against hunger in a "climate-changed world." PhilMech is currently

evaluating two milling systems for adlai. Existing rubber-roller type mills can process 12 cavans of unmilled adlai per hour with a 60 percent milling recovery. Research showed that threshing harvested adlai should be in the early hours of the day, and the optimum moisture content should be between 15 percent and 17 percent during the process. Milled adlai grains are found to be susceptible to insect infestation and fungal contamination.

PhilMech tests showed that a moisture content of around 10 percent for milled adlai grains that are stored in hermetic containers can protect the grains from insect infestation for up to 1.5 months. The hermetic bag also minimized the proliferation of fungal infection. PhilMech also conducted cooking tests for adlai, which showed that water requirement for cooking is not different from that of milled white rice.

When it came to eating the cooked adlai grains, however, blind tests conducted by PhilMech in Nueva Ecija showed consumers still preferred rice to adlai because of the unfamiliarity to the latter. However, adlai and rice mixed at a ratio of 25:75 was also favored by consumers who took part in the blind.

The Bureau of Agricultural Research is currently coordinating 32 adlai-related projects involving state colleges and universities, and other research and development institutions across the country. Location-specific technology development of the crop is being implemented in areas identified with potential for commercial production like in Midsalip, Zamboanga del Sur, where vast areas are planted with adlai to produce seeds for distribution throughout the country.

During planting trials, 11 adlai varieties were identified: gulian, kinampay (ginampay), pulot (or tapol), linay, mataslai, agle gestakyan, Nomiarc dwarf, jalayhay, and ag-gey. Three of these varieties – gulian, kinampay, and pulot – are endemic found to be endemic to the Philippines.

<http://www.businessmirror.com.ph>

Coco water technology

The agriculture department recently teamed up with the provincial government

of Camarines Sur and Central Bicol State University of Agriculture to test the commercial viability of community-level coco water production using the technology developed by the Philippine Center for Post-harvest Development and Mechanization.

Agriculture Secretary Proceso Alcala signed last week a memorandum of agreement with Camarines Sur Gov. Miguel Luis Villafuerte and CBSUA president Georgina Bordado to carry out the coco water processing technology pilot testing and business incubation project. Under the agreement, an extensive study which will be carried out for a period of 1 year under the soon-to-commence Philippine Rural Development Project will come up with product and machine protocols that will serve as basis for the technology's commercialization nationwide.

It hopes to initiate supply chain linkages between coco water consolidators and possible small-scale processors. The newly-designed equipment allows hygienic extraction, storage, and chilling of coco water. With a capacity of around 2,000 mature coconuts per day, equivalent to more or less 600 L of coco water daily, the set-up is compact and portable enough to be transported and installed anywhere in the country.

<http://manilastandardtoday.com>

EUROPE

GERMANY

Innovative decentralized drinking water purification

A German start-up enterprise – AUTARCON GmbH – has developed a solar-powered decentralized water treatment plant. It is especially suitable for remote areas in developing countries. The young start-up enterprise AUTARCON, Kassel, Germany, has invented a sturdily built water treatment plant that can provide clean drinking water without a major effort, at a low cost and powered by solar electricity. The SuMeWa unit was developed by two young scientists at the University of Kassel, Florian Benz and Alexander Goldmaier, who are now the managing directors of AUTARCON. The first plants have already been installed in Brazil, Gambia, Ghana,

India, Laos, Pakistan, Tanzania, and Thailand in the context of German Development Cooperation (GIZ).

AUTARCON has already received two awards for SuMeWa. It won the Solar Award at Intersolar Europe 2011, the world's largest solar industry trade fair. Jurors said the award had been given to AUTARCON because the system impressed them with its "simple mechanics, which for the most part can be maintained using a toothbrush and citric acid." They stressed that the system could be produced on a large scale and used in developing countries. Now it is on the shortlist of the Deutscher Innovationspreis.

Two photovoltaic modules with an output of 120 W convert sunlight into direct current that powers a water pump. The freshwater is pumped out of a well, river, or pond and filtered, and turbidities are removed. Then the natural chloride in the water is turned into chlorine gas in an electrolytic process also powered by solar electricity. The chlorine remains in the drinking water, keeping it free of bacteria. This is why the water that has been treated can also be stored in a tank for a longer period or fed into water mains. When the sun is shining, the Die SuMeWa water treatment plant can provide 400 L of drinking water an hour. If a battery is used additionally, solar power can also be stored, enabling the plant to supply drinking water round the clock.

<http://www.rural21.com>

NORTH AMERICA USA

Waste cleanup for rural areas

Washington State University (WSU) researchers have developed a unique method to use microbes buried in pond sediment to power waste cleanup in rural areas.

The first microbe-powered, self-sustaining wastewater treatment system could lead to an inexpensive and quick way to clean up waste from large farming operations and rural sewage treatment plants while reducing pollution. Professor Haluk Beyenal and graduate student Timothy Ewing in the Voiland College of Engineering and Architecture discuss the system in the online edition of *Journal of Power Sources* and have filed for a patent.

Traditionally, waste from dairy farms in rural areas is placed in a series of ponds to be eaten by bacteria, generating carbon dioxide and methane pollution, until the waste is safely treated. In urban areas with larger infrastructure, electrically powered aerators mix water in the ponds, allowing for the waste to be cleaned faster and with fewer harmful emissions.

The WSU researchers developed a microbial fuel cell that does the work of the aerator, using only the power of microbes in the sewage lagoons to generate electricity. The researchers created favorable conditions for growth of microbes that are able to naturally generate electrons as part of their metabolic processes. The microbes were able to successfully power aerators

in the lab for more than a year, and the researchers are hoping to test a full-scale pilot for eventual commercialization.

The researchers believe that the microbial fuel cell technology is on the cusp of providing useful power solutions for communities. The work was funded by two National Science Foundation CAREER awards, the U.S. Office of Naval Research and Washington State University's Agricultural Research Center.

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Sanitation with food-grade materials

Fresh produce has been associated with microbial outbreaks around the world, thought to be caused in part by improper sanitation of fresh produce. Current disinfection methods rely on harsh chemicals which may alter the flavor of the fresh food or potentially cause an allergic reaction for some consumers. Furthermore, the chemicals employed in sanitation may have a significant environmental impact. Researchers at the University of California, Davis and Drexel University have developed a unique method for disinfecting produce. Unlike other methods of produce sanitation, this method combines treatment with ultraviolet (UV) light and a specialized wash solution to remove microbes from the entire surface of any fresh produce without leaving a toxic residue or impacting food quality and taste. Drexel is currently looking for partners for the further development of this technology.

Drexel University food scientist Dr. Rohan Tikekar, in collaboration with Dr. Nitin, of the University of California-Davis Department of Food Science and Technology, have recently proposed a novel solution to these critical limitations of UV processing: enhancement of UV-induced microbial inactivation rate within a solid food matrix via synergistic effects of a novel, food-grade photosensitizer, fructose, and UV light to improve the microbial inactivation rate.



Microbes in a bucket

The benefits of these methods are not only the enhancement of the uniformity of microbial lethality, since fructose solution is in contact with the entire surface of produce but also the inactivation of internalized microorganisms since free radicals can penetrate through the intercellular spaces of fresh produce. However, further benefits over current methods include that oxidative stress from fructose is induced only upon UV exposure, in contrast to conventional oxidants such as hydrogen peroxide and hypochlorite salts, the residual fructose will not cause oxidative reactions in produce enhancing the product quality. Moreover, since these methods require only up to 2 percent fructose (w/v), which is only slightly higher than recognition threshold of 1 percent produce sanitized via these methods will also have a less offensive flavor and taste profile than current sanitation methods can result in. These methods showed a penetration depth of the antimicrobial effects of the activated photosensitizers up to 500 microns (0.05 cm) in agarose gel model system. As a further benefit, the free radicals generated by the photosensitizers of the present invention can also be destroying pesticides making them no longer harmful to humans by oxidizing them.

Drexel is currently seeking partners for the further development and commercialization of this technology.

<http://www.ibridgenetwork.org>

Solar-powered toilet

A revolutionary University of Colorado (CU) Boulder toilet fueled by the sun that is being developed to help some of the 2.5 billion people around the world lacking safe and sustainable sanitation will be unveiled in India this month. The self-contained, waterless toilet, designed and built using a \$777,000 grant from the Bill & Melinda Gates Foundation, has the capability of heating human waste to a high enough temperature to sterilize human waste and create biochar, a highly porous charcoal, said project principal investigator Karl Linden, professor of environmental engineering. The biochar has a one-two punch in that it can be used to both increase crop yields and sequester carbon dioxide, a greenhouse gas.

The project is part of the Gates Foundation's "Reinvent the Toilet Challenge," an effort to develop a next-generation toilet that can be used to disinfect liquid and solid waste while generating useful end products, both in developing and developed nations, said Linden. Since the 2012 grant, Linden and his CU-Boulder team have received an additional \$1 million from the Gates Foundation for the project, which includes a team of more than a dozen faculty, research professionals, and students, many working full time on the effort.

Linden's team is one of 16 around the world funded by the Gates "Reinvent the Toilet Challenge" since 2011. All have shipped their inventions to Delhi, where they will be on display March 22 for scientists, engineers, and dignitaries. Other institutional winners of the grants range from Caltech to Delft University of Technology in the Netherlands and the National University of Singapore.

The CU-Boulder invention consists of eight parabolic mirrors that focus concentrated sunlight to a spot no larger than a postage stamp on a quartz-glass rod connected to eight bundles of fiber-optic cables, each consisting of thousands of intertwined, fused fibers, said Linden. The energy generated by the sun and transferred to the fiber-optic cable system – similar in some ways to a data transmission line – can heat up the reaction chamber to over 600°F to treat the

waste material, disinfect pathogens in both feces and urine, and produce char.

Tests have shown that each of the eight fiber-optic cables can produce between 80 and 90 W of energy, meaning the whole system can deliver up to 700 W of energy into the reaction chamber, said Linden. In late December, tests at CU-Boulder showed the solar energy directed into the reaction chamber could easily boil water and effectively carbonize solid waste.

The CU-Boulder team is now applying for phase two of the Gates Foundation Reinvent the Toilet grant to develop a field-worthy system to deploy in a developing country based on their current design and assess other technologies that may enhance the toilet system, including the use of high-temperature fluids that can collect, retain, and deliver heat.

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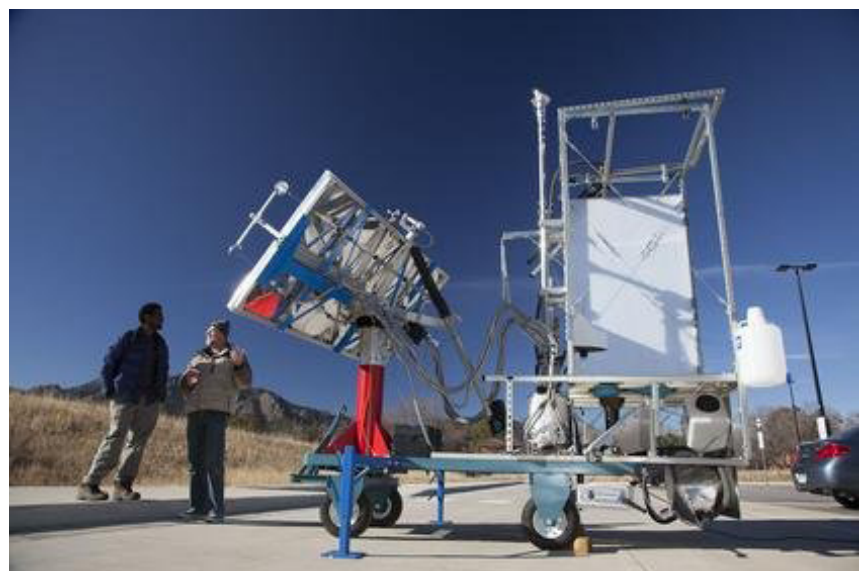
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Novel solar-thermal toilet developed by a team led by CU-Boulder Professor Karl Linden as part of the Bill & Melinda Gates Foundation. (Credit: University of Colorado)

SMALL AND MEDIUM SCALE ENTERPRISES DEVELOPMENT IN RURAL AREAS THROUGH BUSINESS INCUBATORS

A CASE OF SRI LANKA

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Abstract

The main objective of any techno or business incubator (BI) is enhancing of innovative capabilities of technology-based enterprises in rural areas. In many countries, major part of population still live in rural areas, including Sri Lanka; therefore, this newly emerging technology-based enterprises can be the main driving force in rural economy for economic growth and sustainable development. But in a country like Sri Lanka specifically rural techno incubators are non-existent but few techno incubators exist in some urban and semi-urban areas which are easily accessible for rural entrepreneurs as well. In this context, this paper examines the role of BIs or techno incubators in enhancing entrepreneurial skills with special emphasis on rural communities. Especially, new initiatives such as Nanasala (Rural Information & Communication Technology (ICT) centers) also indirectly enhancing rural peoples' entrepreneurial capabilities by giving many latest information about product and process technology development and many other important business information in many business fields. However, the worldwide experiences prove that the BIs are a successful mechanism for nurturing of business start-ups irrespective of location in urban or rural. But operation parameters, objectives, and qualitative and quantitative statistics of incubators show great variation from country to country and from type to type. Sri Lanka too has a long-felt need of finding a solution for the failure of its rural young businesses and promoting them to more value-added techno businesses. But existing BI programs are not successful in Sri Lanka compared to most other developing countries. Perhaps, no institution has undertaken valid attempts in this regard. Therefore, it is a timely requirement to find suitable methods of protecting and promoting techno-based small and medium business start-ups since their contribution to overall economy in many aspects are significant.

only about 2,000 companies survive for more than 5 years (Department of Company Registrar, 2005). It is common that the majority of companies do not last even more than 1 year due to many problems. In this context, business incubators (BIs) are recommended by many small and medium scale enterprises (SMEs), experts, and organizations (Culp and Shapira, 1997; Dasanayaka, 2011; Fry, 1987; Lalkaka and Bishop, 1996; OECD, 1997, 1999), to find solutions to this problem. After a brief introduction to history of BIs in Sri Lanka, this paper analyzes strengths and weaknesses of existing BIs in Sri Lanka; then, it gives guidelines to develop a new BI model which is appropriate for nurturing the techno-based business start-ups in rural Sri Lanka. Finally, some concluding remarks and policy implications are also presented.

History of business incubators in Sri Lanka

The concept of BIs¹ originated in Sri Lanka in 1993, after consultative meetings between the Sri Lankan Industry Ministry and Japan International Corporation Agency (JICA). These meetings concluded that Sri Lanka should study BI models of other countries and JICA could provide Japanese experience on BIs to Sri Lanka. Subsequently, JICA prepared a Master Plan for Industrialization and Investment Promotion in 1990 and it recommended the set-up of the Small and Medium Scale Enterprises Development Corporation, with a view to develop

Introduction

Generally, in Sri Lanka, a majority of new companies fail during the initial years, as is the case in many developing countries. Around 15 new companies are registered at the office of the Registrar of

Companies on any working day (that adds up to nearly 4,000 companies per year). The sole proprietorship companies and partnerships registered at the Divisional Secretariat level are around 6,000 per year. Out of these 10,000 business start-ups,

¹The concept of Business Incubators (BI) appeared in SMEs literature in 1960s and after 1980s; it has been rapidly adopted by many developing countries. Business incubation has evolved in the last 40 years from experiences with the earlier industrial estates, parks, districts, and small enterprise service centers. The "first generation" incubators in the 1960s were essentially offering affordable space and shared facilities to carefully selected entrepreneurial groups. In the 1980s, the "second generation" need was recognized for supplementing the work space with mentoring, skills enhancement, and networking services to access professional support and seed capital, for tenants within the facility and affiliates outside. In the 2000s, the "third generation" model is more like an international enterprise center, providing a platform for convergence of equity capital and management consulting services, with the added dimension of looking outwards. But today, fourth generation of incubators include more niche types such as techno, service, and agro with more specific locations and

SMEs in Sri Lanka. In 2000, JICA prepared another interim report which directly recommended the set-up of two BIs. The first was an Electro Incubator Centre to promote electronic and electrical SMEs in Sri Lanka. The second was a Software BI Centre, with the goal of developing information technology (IT) -related SMEs in Sri Lanka. The Sri Lankan government established the Nawabima BI, very close to the Moratuwa University (best technical University in Sri Lanka) in the Industrial Development Board (IDB) premises. In mid-2001, United Nations Industrial and Development Organization (UNIDO) provided assistance to the Nawabima BI to prepare its strategic plan. In the same year, UNIDO assisted in the set-up of another BI in Ruhuna (southern part of Sri Lanka), which is considered as the origin of most of the Sri Lankan entrepreneurs. But so far, no attempts have been made to set up techno BIs specifically targeting rural SMEs even though their immense contribution to overall economy goes beyond numbers.

Business incubators in Sri Lanka

Nawabima Business incubator affiliated to the Industrial Development Board of Sri Lanka

The Nawabima Business Incubator (NBI), established in year 2001 and affiliated to the IDB of Sri Lanka, has the following vision: To be a vibrant, catalytic hub for developing SMEs and business start-ups in the local business environment. Its mission is to provide an environment conducive for the sustainable development of selected incubatees during the early stages of the business cycle, to create both direct and indirect employment opportunities and to contribute to the overall economic development of the area.

The objective of establishing the NBI is to facilitate development of local entrepreneurship, help entrepreneurs to develop

the market, develop entrepreneurial skills within the incubatee community, develop sustainable enterprises and industries, be a stakeholder for SME policy development, and assist local economic revitalization. The NBI also had the characteristics of a conventional BI. It aimed to facilitate the creation of innovative companies and to reduce the cost of business start-up. It offered professional premises for hire on very flexible terms. It consisted of more than 18 office and workshop spaces of between 400 and 600 sq ft. It also aimed to provide an efficient administrative infrastructure for its tenants. The NBI could provide a complete administrative structure with the support of local, foreign, and organizational expertise.

Other services offered by the NBI include: tailored management consultancy (during the planning stage of the NBI include its founders formulated a panel of consultants to address the various professional areas such as marketing, business management, and accountancy), access to partner networks — incubatees of NBI are allowed to be members of the database of industries maintained by the IDB of Sri Lanka and contact with other innovative enterprises. This facility is also provided through the network of IDB. NBI aimed to help new and existing enterprises which have ambitions to develop an innovative project; such innovations can happen on different levels: technology, marketing, methods of management or production, products, and services levels. It aimed to provide the client enterprise with a long-term competitive advantage and growth prospects. In addition to the provision of infrastructure, equipment sharing and various business services are provided by the NBI at the start of business. These could be considered as strengths and opportunities of the NBI: Space-equipment (18 units between 400 and 600 sq ft, access of 24 hours a day and 7 days a week), fully equipped meeting rooms, telephone switchboard, common fax and photo cop-

ying facilities, rest room/canteen, reception services, trilingual secretariat (Sinhala, English, and Tamil), visitors reception desk, personalized telephone answering facility, mail dispatch; Location: easy access via a main city, located within walking distance to the Galle Road at Katubedda, leading toward the highly enterprising segment of the country. Also, it was located in close proximity to Colombo, Sri Lanka's administrative and commercial capital. Although admissions of incubatees were limited in the early stages to a few leather product manufacturers, NBI introduced a formal selection criteria of incubatees who were considered in the following manner: The quality of the proposal, prospects for development, degree of innovation and competence, and sound financial position of the project promoter.

Accommodation is governed by a lease contract approximately for 2–3 years; the enterprise thus leaves once it can support itself. Renting arrangements include 3 months' deposit; for enterprises not intending to set up operations in the business center straight away, the NBI offers a domiciliation scheme, by which it acts as the registered office of the enterprise with optional telephone answering service. The services of the NBI (rent charges, maintenance, common services) are charged as an all-inclusive package deal (only personal costs — telephone, photocopy machines, booking of meeting rooms) are charged separately. Tailored consultancy package introduced by NBI: NBI has formulated this by considering all the aspects linked to the launch of an innovative project. Each project is given a follow-up tailored to its specific needs. Components of the management cycle are as follows: project evaluation (first assessment, project validation, general assessment of the enterprise, and help in the realization of the market study), business plan (preparation of the business plan, analysis of the strategic choices, and drawing up of the financial plan), partner finding (identifica-

segments. Today, there are many types of incubators such as business, technology, marketing, sector, industry, and region-specific incubators existing around the world. The ultimate target of these incubators is to develop SMEs and entrepreneurship skills to full potential and in a self-sustaining manner. For more details about literature of BI, see Culp and Shapira (1997), ECEDG (2001), Fry (1987), Smilor (1987), Lalkaka and Bishop (1996), Lalkaka (1997, 2003), and OECD (1997, 1999). For latest information on New Zealand's BIs, see www.nzte.govt.nz/section/11735.aspx. To get some idea about the origin of Sri Lankan BIs, see Dasanayaka and Sardana (2008), Pieris (2002), and UNIDO (1992, 1997).

tion of financial, commercial, and industrial partners: banks, venture capitals, sub-contracts) and start-up (setting up of management control tools. Revision of the business plan is based on the first performance, progress check, strategic review, specialized monitoring, and management accounting).

Currently, operations of the NBI have been temporarily stopped due to conflicts regarding the governing authority of the incubator. Sometimes, the program is never revived. In fact, the program was not properly launched. Very few incubatees were absorbed and in the broader sense, most of them could not be categorized as incubatees. NBI is a critical example for failure of public sector-owned business development services (BDSs) ventures launched in Sri Lanka. It had a good vision; the incubator manager was given foreign training. All the steps, including consultancy panel, formulation of business strategies, and physical set-up of the incubator were successful. But lack of proper business model/mechanism to successfully operate the BI is the main factor for failure, and the problem remains unanswered. It is unclear as to what is the most appropriate public body to carry out such a function. The NBI was originally launched by the Ministry of Enterprise Development and Constitutional Affairs. Thereafter, the government was changed as well as the ministry. No specific owner could be defined for the NBI. In this context, the NBI could not be a source of study for BI practice in Sri Lanka. It is only an attempt to establish a BI due to the recommendation of foreign consultants; however, there was no proper mechanism to operate it or to reach rural business community.

Conceptnursery.com Sri Lanka Technical Incubator (Pvt.) Ltd.

Believing that the entrepreneurial spirit is a key component to local economic development, ConceptNursery, Sri Lanka's first technology incubator set up its operations in year 2000 to incubate technology centric innovative ideas. The company focuses on young entrepreneurs to start-up their own IT companies. This would not only stimulate the growth of the Sri Lankan IT

industry, but also simultaneously encourage local entrepreneurial capitalism and attract investments from both institutional and venture capital sources, be it domestic or international. The primary goal is to identify, recruit, and build new companies involved in cutting-edge technologies. These companies would in turn support the development of a highly skilled IT workforce, conduct advanced research and development (R&D) in web and wireless technologies, and enhance the economic development of Sri Lanka through the creation of wealth and opportunities. This is an initiative backed and financed by four principal investors, synonymous with the IT and financial industry in Sri Lanka: Sri Lanka Institute of Information Technology (SLIIT), People's Venture Investment Company (Pvt.) Ltd., Media Solutions (Pvt.) Ltd., and Prudential Holdings (Pte) Ltd. The Package offered by ConceptNursery includes infrastructure – Resident clients at ConceptNursery will receive a fully furnished office space that includes a unique address and the following facilities such as individual telephone number and internet connection, access to the incubator's fax machine, photocopy, e-mail server and web server, usage of conference room, pantry, lobby, and mail delivery.

Business guidance by ConceptNursery's incubation process mainly concentrates on providing the necessary assistance for clients, which will help to accelerate the process of learning how to build their business and successfully grow it. These services are business advice and guidance, assistance in marketing, technology, finance and strategy formulation, development of a business plan, networking with other information technology and related businesses, introduction to delegations, business opportunities and key business contacts, opportunities for interns to work on specific projects as well as advice on all aspects of running a business. Strategic support provided mainly drawing on various resources, delivering them to its clients and helping them to gain the needed technical, managerial, and physical resource support. Besides this, guidance networking with other incubators worldwide and with global companies, access

to consulting services on business strategies, advice on business launch, growth and harvest of business, creating opportunities for marketing through Board of Investment, Export Development Board, Industrial Associations, and Chambers of Commerce, and opportunities for linking up with related industries.

The candidates need to submit an effective business proposal with innovative ideas and a business plan, marketability of the product and commercialization opportunities of the concept must be very clear, the skills, knowledge, expertise and commitment of the individual or team, and resources needed to embark on the project. The special features of this incubator are:

- *Virtual incubator model:* In this model, clients operate from any part of the country and get access to all monitoring support provided by the incubator. Regional incubation programs and other interesting events are listed in the calendar. This model is at the experimental level at the ConceptNursery. However, there could be a demand for the services of this virtual incubator with expanding the Internet services through ADSL and CDMA technologies.
- *The entrepreneur news portal:* This portal allows ConceptNursery to aggregate and disseminate news related to entrepreneurship and emerging technologies. One of the biggest problems for budding entrepreneurs in Sri Lanka is that they lack exposure and access to information. The entrepreneur portal cuts the clutter on the Internet and allows visitors to access news and information related to the incubator's areas of interest. The entrepreneur portal is an outreach activity of ConceptNursery, primarily intended to attract potential tenants and partners.
- *Tenant portal:* This portal is dedicated for ConceptNursery tenants, both resident and virtual. The tenants can manage their own "showroom" on the "net" with this. The portal integrates personal information management (PIM) and a web-based project monitoring tool. New applicants can apply

online. The virtual residents can use the online resource request system to access and reserve various resources available from ConceptNursery.

- *Graduates of ConceptNursery:* By the end of year 2013, 14 companies had graduated from the ConceptNursery, and six companies were operating as incubatees. Sri Logic and Zmessenger are two successful graduates of the incubator. They are operating as leading companies in the Sri Lankan IT market.

Current status of ConceptNursery: ConceptNursery has been developed, based purely on a foreign model. Its strategies aim to absorb many individualistic entrepreneurs in the IT sector. They are mainly English-speaking urban youths. ConceptNursery is the most successful case of the three BI initiatives in Sri Lanka. Its objectives are more clear, that is, promotion of IT entrepreneurs in Sri Lanka and the region. Venture capital companies have invested in ConceptNursery and different investors have different motives for this. There were no conflicts regarding the ownership and functionality of the incubator. However, according to information, the expected returns for the investment in both graduated companies are not up to the level. Even though the formation and functionality of ConceptNursery are adequate, there is no clear indication on its contribution to the national economy. Additionally, the future of ConceptNursery could not be ascertained, due to the isolated nature of ConceptNursery. Its vision and model do not represent the national requirements of Sri Lanka.

Ruhuna business incubator

Ruhuna business incubator is the third BI established in Sri Lanka. It was initiated in July 2002 and the first incubatee (businessmen) batch was hosted in February 2003. Actually, the Ruhuna BI is located in a high potential area for entrepreneurship in the country. The location was at the Matara District in Kamburupitiya can be considered as rural location. The project used the abandoned buildings of the Kamburupitiya Village Reawakening (Gam Udawa) program.

Hence, there was separate isolated office/business space for each incubatee. Two BIs were operating under one roof, using common facilities such as main office, incubator center, and conference room. The program was funded by the UNIDO collaboratively with Matara District Chamber of Commerce, Japan Lanka Development Corporation (JLDC), and Sarvodaya Enterprise and Economic Development Service (SEEDS). The Matara Chamber of Commerce was formed with the guidance and funding of the UNIDO. This Chamber was the management body for the Ruhuna BI. Experienced professionals were also involved in the formulation and establishment of the Ruhuna BI, monitored by a group of reputed business organizations with enterprise development experience in the local and international contexts. After the setting up of the physical and documentary infrastructure, incubatees were invited through media advertisement. A considerable number of applications were received. In order to select the most appropriate incubatee batch, several awareness programs were conducted. As per the pre-scheduled program, the first group of incubatees was selected in following composition: one wall hanger manufacturer, two poly tunnel growers, one candy manufacturer, one recycled paper manufacturer, one solar cell manufacturer, and one hydroponics manufacturer. The Ruhuna BI was managed by a qualified incubator manager and two incubator assistants. An advisory board monitored the progress of the incubator and provided the necessary consultancy services.

Progress and current situation of the Ruhuna BI:

The Ruhuna BI has adopted a simple model compared to the Nawabima and ConceptNursery BI models. It was more suited for the Sri Lankan socio-economic scenario. However, this program also failed due to the following reasons: lack of awareness of potential entrepreneurs on the BI, no procedure to incubate correct people, the location is far from business cities, survival is difficult, difficulty in monitoring the functions by the advisory

board since most of the members of the advisory board were stationed in Colombo, people's attitude of expecting all services free of charge, and lack of motivation of all stakeholders of the incubator. Even though ownership is clear, the motivation of the funding agency and incubator management were not addressed. One of the most important components of the Ruhuna BI is the integration of its functions with other BDS sectors (e.g., subcontracting and partnership exchange [SPX]). However, that was not effectively implemented. There is potential to integrate the Ruhuna BI and SPX, since both organizations are funded and looked after mainly by UNIDO, in association with the Ministry of Industrial Development and Constitutional Affairs, which established Sri Lanka's first SPX. It was launched by the Ministry of Constitutional Affairs and Industrial Development on May 24, 2001. The SPX is hosted by the small and medium enterprises developers (SMEDs), a project of the Federation of Chambers of Commerce and Industry of Sri Lanka and Friedrich Naumann Stiftung, Sri Lanka. SPX is a center for industrial subcontracting and partnership between main-contractors, suppliers, and subcontractors. The SPX also facilitates matchmaking between main contractors and subcontractors on specific requirements. Presently, the center covers five industrial sectors, namely, engineering/machinery, electrical/electronics, plastics, rubber and coconut fiber (coir). The center is linked to 62 international subcontracting centers set up by UNIDO in 31 countries, facilitating local industrialists to get information on subcontracting, and other related areas. Initially, Sri Lanka was linked to the Indian Network, which comprises nine centers. The SPX which is a component of the UNIDO — Sri Lanka Integrated Industrial Development Support Program, now has a membership of 480 companies registered in the Rubber, Plastics, Engineering (Foundry, Mold-making, General Engineering), and Electronics sectors. Facilities offered by UNIDO — SPX include: providing business information, matchmaking of business demand and supply, studying and finding solutions to problems affecting subcontracting,

assisting and arranging agreements, assisting to upgrade technological managerial capacity, and quality certification such as ISO 9000, ISO 14000, and SA 8000, arranging trade fairs, buyer seller meets, etc., and organizing seminars and workshops. SPX has produced three important studies, namely, *Study on the Handicraft Sector*, *Greening the Supply Chain of Coir and Rubber*, and *Legal & Economic Constraints to Subcontracting*. The findings of these studies will be presented to the business community and the recommendations will be forwarded to the government. The SPX is an effective tool for the business community and industrialists to be competitive in the global market. Successful integration with SPX network and proposed BIs would be an effective program to enhance the marketing network of the SME business start-ups.

Construction Solution Center (Pvt.) Ltd.

The Construction Solution Center (CSC) is a recently launched construction service exchange which is equipped with several features of an incubator. The main objective of this center is to undertake turnkey construction projects and assign emerging subcontractors, whilst supporting them, formulating and strategically developing their capacities. The main objectives are: to provide entire range of construction solutions under one roof, to provide infrastructure to facilitate the transfer of technology related to construction industries through seminars, workshops, and various training programs. It also aims to nurture emerging construction companies (construction incubation). The main services of the this incubator are assistance in purchasing a land for property development, land surveying work, designing homes by architects/draftsman, preparing cost estimates, structural engineering solutions, ground and foundation engineering solutions, soil testing, chemical solutions, water proofing, mixtures, insecticides, etc., house construction contract facilities at various stages, supply of labor and other skilled

workers, carpentry work, roofs and hand rails, house painting and renovation services, building services, bank loans and financial services, notary public and land registry and other legal systems, raw material for house construction work, hiring equipment, shuttering and scaffolding, training and workshops, human resource supply, and astrology assistance in house construction. Other facilities and services offered by the center include: main office and public information database; bank loans and financial services (agent, public notary, and land registry legal systems — agent and project management consultancy); common services [30 perch land for building material supplies, five permanent office spaces for various construction companies (incubatees), 20 outdoor stalls for monthly rent, seminar room for meetings, workshops, external training, etc., telephone connections comprising three lines, Internet connection (ADSL), furnished/non-furnished office and computers for hire, car park for 20 vehicles, security system, publicity and propaganda from main office, coordination office with photocopy and fax facilities and plotting and computer aided design (CAD) services]. The progress and situation analysis could not be done in relation to CSC since it has not completed setting the functionalities of the center. Perhaps, the organizers have decided to delay the launching of the program due to anticipated uncertainties.

Table 1 illustrates the summarized status of four BIs or similar programs launched in Sri Lanka. Since the functionality of these organizations has not been compiled or initiated fully, it is difficult to carry out a detailed SWOT analysis.

According to Table 1, most of the isolated attempts to establish BIs in Sri Lanka were not successful due to non-existence of proper business model, business philosophy, and/or coordination to integrate all the stakeholders in this area. A situational analysis shows that:

- There is no national policy or government intervention with the Apex body in this area.

- Most of the BIs face the problem of not identifying proper measures for motivating the incubator and the incubatee.
- Industry and sector specific Incubators may be more successful.
- The fully government owned models are apparently not successful (Nawabima BI).
- Fully non-government organization (NGO) or international bodies' backed BI models are also not successful (Ruhuna BI).
- Government and private sector or bank affiliated ventures would be successful (e.g., ConceptNursery, SLIIT and other venture capital firms, Hatton National Bank's GemiPubuduwa).

Table 2 presents is the interview results with the selected stakeholders (e.g. failed and successful entrepreneurs, business development consultants, and incubatees) in BIs. The questionnaire was filled during the informal discussions, in some occasions through telephone conversations. For this exercise, 150 individuals (see first row of Table 2 for numbers from each category) were selected and interviewed. In overall, most of the new business start-ups do not have any idea about these incubators or incubation process can do for them.

According to Table 2, there are different views on the ownership of the BIs. Generally, the conventional BI consultants think that the ownership of BIs should be with the government hands. However, the term "Business Incubation" is new or unknown to most of the budding business community (Dasanayaka *et al.*, 2011). But most accept that there is a necessity to set up an effective mechanism to guide and encourage SME business start-ups. As such, different terminologies for the term "Business Incubator" should be identified. The fact is that a considerable percentage (40 percent) of successful entrepreneurs claimed that they do not feel such a mechanism is necessary for business. Perhaps, they may be quite smart and confident on own values and experiences. Most of the successful entrepreneurs believe that the priority service of a BI program must be the management con-

Table 1: Situation analysis of existing business incubators of Sri Lanka

Item	Ruhuna BI	NAWABIMA	ConceptNursery	CSC
Year started	2000	2002	2000	2004
Initial capital	15 M SL Rs.	5 M SL Rs.	App: 20 M SL Rs.	1.5 M SL Rs.
Funding agency	UNIDO	Government of Sri Lanka	Four venture capitals SLIIT	Private investor
Governing/managing bodies	Ruhuna Chamber of Commerce	IDB, Ministry of Enterprise Development	Sri Lanka, Technical Incubator (Pte.) Ltd.	Techno League (Pvt.) Ltd.
Consultants	Rustam Lalkaka Chula De Silva Dr. Kuruppu	Chula De Silva IDB	Nshantha Weerasekara Vasi Nesaiah H.D. Gunaratna Manjula Senevitratna	Bandula Karunaratna Madawa Perera
Target market	- SME - Agro-business	- SME - Manufacturing sector	High tech and IT	Construction industries
Business model	Weak	Weak	Strong	Under formulation
Motives of incubator	Not clear	Not clear	- To acquire graduated companies - To employ students SLIIT)	To earn a profit and undertake turnkey projects
Motives of incubatee	- Expected free facilities - Minimized initial capital	- Expected free facilities - Minimized initial capital	- Minimized initial capital - Business guidance - Reputation, location	- Minimized initial capital - Clear business opportunity
Current status and future	- Initial objectives not achieved - Under process of restructuring	Closed down due to political uncertainties	Sustainability of the incubator is challenged	- Business model to be re-evaluated - Business postponed
Problems encountered	Motivation of incubatees and funding agencies are not identified	Problems related to the ownership of BI	Failed to identify an appropriate model for Sri Lanka	Conflicts between the objectives of the center and those of investor

Source: Author.

sultancy service. On the other hand, most failed SMEs think the main requirement for business success would be the financial, technical, and marketing supports (Dasanayaka and Sardana, 2010). The outcome is the fact that majority do not think basic facilities like office space and telephone facilities are the main services a BI should provide. All the participants stated that integration or networking of businesses with large-scale sector is a useful mechanism for business survival and growth.

Other SME business development initiatives in Sri Lanka

According to current records, there are around 100 various BDS organizations registered in Sri Lanka to provide various services to SMEs. The contributions of BDS

in nurturing and providing management support for SMEs were highlighted at the national BDS providers conference held in June 2004 in Colombo. The conference was organized by the Start and Improve Your Business Association of Sri Lanka (SIYBA). The association comprises 37 partner organizations, of which 17 are NGOs, nine government organizations, two chambers of commerce, and nine private consultancy companies. All these organizations are engaged in providing supportive services to business start-ups. They provide consultancy and relevant services in the following areas: business formation, project proposal writing, training, product development, marketing support and quality control, etc. The SIYBA aims to enhance the capacity of their associate organizations

to provide better services to business start-ups. Their services differ from the services of a BI, because they do not follow a typical model such as does an incubator. But there is a possibility to network all these BDS providers and to form a virtual BI. Certain strong governing organizations should act as the controller and developer of the virtual BIs. SIYBA can also act as the governing body of this network. According to the available records of SIYBA, there is a good demand for training programs from rural SME start-ups. The newly elected president and his government introduced many initiatives such as new SME Bank and Authority and various soft financing schemes to uplift the SME sector. But evaluating the success rate of these initiatives needs more time.

Table 2: The results of the interviews with selected stakeholders of business incubators

Category	Successful entrepreneurs (50)	Failed entrepreneurs (25)	Business development consultants (25)	Incubatees (50)
Knowledge on BI	Only have some idea about BIs (20%)	Only have some idea about BIs (10%)	Know and studied on BIs (100%)	Know and associated with BI
Necessity of BI to promote businesses	Yes (60%) No (40%)	Yes (100%)	Yes (100%)	Yes (100%)
Required BI model	- Independent BI model (20%) - Integrated BI model (80%)	- Independent BI model (40%) - Integrated BI model (60%)	- Independent BI model (20%) - Integrated BI model (20%)	- Integrated BI model (50%) - No Idea about BI models (10%) - Independent BI model (40%)
Ownership of the BI	- Public (20%) - Private (80%)	- Public (40%) - Private (60%)	- Public (60%) - Private (40%)	- Public (50%) - Private (50%)
Order of priority services of a BI	- Business management guidance (60%) - Finance (20%) - Physical facilities (10%) - Marketing and human resources support (10%)	- Finance (50%) - Physical facilities (30%) - Business management guidance (20%)	- Business management guidance (50%) - Finance (30%) - Physical facilities (20%)	- Business management guidance (40%) - Finance (30%) - Physical facilities (30%)

Source: Author.

The development of an appropriate business incubator model for Sri Lanka

The proposed BI model should consist of the following characteristics:

- The model should be industry-specific with some techno flavor.
- The model need not be facility-bound.
- There should be a cluster of incubators integrating to share knowledge, opportunities and to assure the sustainability of each incubator with proper management.
- While the Sector Specific National Business Incubators (SSNBIs) are managed as national organizations, all other NGOs or donor community-driven BDS centers have to be restructured as BIs. Since BI is a strange term to Sri Lankans, these should be termed as "small business development centers" (SBDCs).
- Ultimately, all SSNBIs and SBDCs should be integrated and monitored by the Central Business Incubation Authority.
- A consortium of banks such as SME bank and HNB could invest and manage the proposed BIs.
- All the registered new businesses should be subjected to, monitored, and assessed by the national BI, in

order to absorb relevant statistics for national policy formulation and implementation.

The main elements of this model are the following.

Trigger/motives of the stakeholders of the national business incubator

The national BI should be triggered by the national policy requirements and the interest of the Central Bank and the funding agencies. The national BI would be the data evaluation and processing center with regard to almost all the business start-ups of the country, since the existence of a healthy SME sector would assure a steady and sustainable economic growth of the country.

Motives of the sector-specific national incubators

The SSNBIs are owned by the SME Bank or consortium of banks. The motive for SSNBIs comes from the investors/banks. Particularly, if we consider the SME bank, its prime objective is to provide loans to SME businesses. Hence, such investors would have the following motives:

- There is a possibility to launch loan programs successfully the SBDC.

- There is an effective mechanism to loan recovery.
- Loan recovery percentage would be high.

Motives of the sector-specific national incubators

- Incubatee is forwarded to the relevant incubator through the Department of Business Registration. Hence, there is an official reputation for the program.
- Incubatee is guaranteed financial support through the incumbent bank.
- Since the SBDC is a national institution, there is an effortless accreditation to all the graduates of the center (this opportunity has to be promoted by the BI).

Services offered by the BI

- Developing the entrepreneurial culture among business start-ups;
- Product/project assessment;
- Management assistance;
- Business networking and integrating support; and
- Assistance in seed financing.

There is a clear need in business start-ups for venture assessment, management assistance, and venture capital procurement. There is no high demand for

facilities and services that a traditional BI offers. Also, in line with improvements in the infrastructure of the country, this trend can be increased. Actually, there is a model for SME Business Development Service Providers (SBDSPs); these SBDSPs are only equipped to do venture assessment and provide management assistance. They are in a position to assist with loan proposals, etc. But SBDSPs could not be identified as a satisfactory mode for product development and venture capital financing. The essential function of a SBDC would then be promotional.

Selection criteria

Actually, there are no special selection criteria. At the moment, for business registration, all new business start-ups would be directed to the National Business Incubation Authority (NBIA). According to the desire of business owners, they would be directed to the relevant SSNBI or SBDC. The enrollment of a BI would not be a requirement for all the business start-ups. But the business concept and progress of all the small business start-ups would be evaluated and monitored by the NBIA. At the time of enrollment, the entrepreneurial level of the incubatee would be assessed and he/she would be supported with entrepreneurial guidance or assisted to trigger his/her entrepreneurship. Particularly, if the entrepreneur is identified as a follower, he/she will be encouraged to merge with a business partner with high entrepreneurial potential. The business concept/project proposal would be assessed and improved as a viable business plan.

Graduation

The maximum period for the business to nurture would be 5 years. A company would be considered as graduated according to several standards as follows:

- Sustainable business, financially stable, and ready to face challenges for another year. Such SMEs will be termed as graduates from the SBDC and continue with the evaluation of progress, business support, and network membership.
- Business start-up proves the viability of his/her business concept and competency for growth — those businesses

would be encouraged to find joint venture partners.

Strengths of new model

The main strength of this model is that it focuses the problems of emerging entrepreneurs closely. In addition to this, this model clearly shows that the government supports help to reach a wide range of business start-ups at the same time.

Weaknesses of the new model

Without affiliating to national authorities like SME Bank, or national BI, the functionality of the SSNBIS and SBDC would be uncertain. It is difficult to find qualified people to operate the incubators professionally. In some cases, motivation measures for the managers and its incubatees are not clearly defined.

Opportunities

Successful operation of the national BI program would focus the attention of policymakers and new business start-ups to the business incubation area. The experience and R&D competence of the program gained over the time could be utilized to minimize the business failure rate. Successful operation of the program would trigger the venture capitalists.

Threats

The program is based on national policies. Government change or political uncertainty could disturb the implementation and execution of the program. Response of business start-ups is unpredictable. The impact by prevailing dynamics of the business sector could adversely affect the existence of the NBIA.

Conclusions and policy implications

The situational analysis on three BIs established in Sri Lanka shows clear indication of invalidity of such models to Sri Lanka and their lesser techno contents. The BDS sector is mainly dominated by NGOs and their target is to acquire more and more foreign funds for their organizations without paying much attention to real ground situation.

The “GemiPubuduwa: SME loan scheme” launched by the Hatton National Bank shows a feasibility to upgrade into a sustainable, virtual BI model despite weaknesses of the model and limitation of business development of entrepreneurs. Most of the newly industrialized countries have launched macro-level enterprise promotion policies and technology incubation programs. Their main objective is to transit developing enterprise societies into knowledge-based societies. Incubator models adopted by them are beyond the capabilities of economic conditions that Sri Lanka is presently experiencing. But they have developed their strategy when they were in the poor economic condition. According to the experience record of three BIs established in Sri Lanka, there had been no good demand for their tangible services. According to the ideologies of many entrepreneurs, office space or communication is not the major problem at the stage of starting of a business. Office at a main city is important after achieving a certain level of performance. Usually, new office buildings and spaces are demanded by businessmen seeking extensions of their current business or starting new companies using the surplus of wealth generated by their early businesses. As such, the new model is introduced against the conventional BI model based on the findings of this study. However, the BI model for Sri Lanka should be a national level establishment. It has to be an integrated BDS center, networked with information databases.

There is a timely requirement to introduce an effective program to minimize the closure of many SME business start-ups during the first 5 years after inception. The conventional or traditional BI model is not appropriate for Sri Lanka based on the experience of three launchings as well as the latest construction sector initiative. On the other hand, internationally too, there is an emerging criticism in relation to conventional business incubation practice and more product and process technology-based incubators are coming up (Dasanayaka, 2012). The appropriate model of business incubation in Sri Lanka would be with the following characteristics:

- There should be a clear ownership and operation mechanism of the BI.
- BI should not be facility-bound. It should inject seed funding carefully into the business while supporting management and market networking.
- There is no high demand for the physical facilities that conventional BIs offer but the management consultancy is required by majority of entrepreneurs.
- Proper mechanism should be defined to motivate the BI and the incubatee.
- All BIs should be integrated with important enterprise development institutions, fiscal and legal authorities and various industry and trade chambers, R&D bodies and universities, etc.
- For the formation of favorable environment of business incubation, it is necessary to establish SME Banks, NBIA, and a main apex body for SMEs' promotion and development.

Policy implications

This study revealed weaknesses on national policies for a healthy business nurturing environment for rural SMEs. Any isolated attempt of business incubation would not be successful until national interest on the subject is enhanced with more technology essence. Therefore, the following recommendations have to be considered at policy levels:

- Almost all the new business registrations should be monitored by the legal and fiscal authorities at least until 5 years from their registration.
- Activities and details of all BDS providers and role of NGOs and other private and public sector on business development activities must be monitored by a national apex body.
- National policies of newly industrialized countries and selected Asian countries on SMEs should be carefully studied before formulating business incubation policies.
- Most of the business incubation programs could have failed due to the government ministerial changes. There should be 10 or 15-year national programs which should not be changed with government and ministerial changes. Also, the ministries and affiliated institutions with respect to SMEs development should not be changed from time to time. There also should not be too many ministries involved in SMEs development and promotion.
- It is recommended to institutionalize an authority to assess the progress of business start-ups during the initial 5 years, whether they obtain the services of a BI or not. The progress record maintained by the Company Registrar's Office is not efficient and effective.
- Information on business start-ups and statistical reviews are not commonly available in Sri Lanka. Even in the Central Bank or any other statistical authority, there is no trace of how many businesses are registered within a particular year and their progress review, etc. Also, it should give attention to reveal the contribution of new business start-ups to the gross domestic production (GDP) and their percentages of failure, sector-wise. That would be guidance for new business start-ups.
- Sufficient case studies in the Sri Lankan context should be made available with easy access to the business start-ups.
- When a new construction company is registered by the Institute of Construction Training and Development (ICTAD), the Institute organizes introduction meetings and training seminars for them. Also, annual evaluation and grading are done according to the contractor's progress in business. It is very useful to the new start-ups of the construction industry. Similar awareness and progress review could be done for the new company start-ups by the company registrar and the relevant divisional secretary.
- Almost all the BIs, company registration bodies, BDS, chambers of commerce, and other enterprise development

bodies should be integrated by means of a national authority with strong operational model. Adequate reputation and attention should be focused on this new institution. The proposed national BI scheme should be launched collaboratively with this institution. Finally, learning outcomes from research on local entrepreneurship and socio-economic conditions would be useful to formulate business incubation policies for Sri Lanka.

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e-Agriculture

e-Agriculture is a global Community of Practice, where people from all over the world exchange information, ideas, and resources related to the use of information and communication technologies (ICT) for sustainable agriculture and rural development. With over 12,000 members from 170 countries and territories, the e-Agriculture Community is made up of individual stakeholders such as information and communication specialists, researchers, farmers, students, policy makers, business people, development practitioners, and others.

e-Agriculture serves as a catalyst for institutions and individuals in agriculture and rural development to share knowledge, learn from others, and improve decision making about the vital role of ICTs to empower rural communities, improve rural livelihoods, and build sustainable agriculture and food security. e-Agriculture is all about knowledge exchange between UN agencies, governments, universities, research organizations, NGOs, farmers' organizations, private sector, and the wider community.

E-agriculture is one of the action lines identified in the Geneva Plan of Action of World Summit on the Information Society (WSIS). The Food and Agriculture Organization of the United Nations (FAO) was assigned the responsibility of organizing follow-up activities related to e-agriculture. FAO conducted an extensive survey on the subject of the action line, and then together with the Founding Partners, launched the e-Agriculture Community of Practice in 2007 as part of this follow-up. The launch of e-Agriculture involved the participation of key institutions from around the world that focus on the effective use of ICT in Sustainable Agriculture and Rural Development.

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INTEGRATING SCIENCE-BASED TOOLS AND APPROACHES FOR RURAL DEVELOPMENT

THE CASE OF RURAL DEVELOPMENT PROJECT IN THE PHILIPPINES

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Abstract

The implementation of a rural development program at national level has been designed to establish the government's platform for a modern, climate-smart, and market-oriented agri-fishery sector while institutionalizing reforms for improved operations in the agriculture sector. The implementation lessons and best practices from the development program implemented in Mindanao have achieved outstanding performance in espousing accountability, transparency, and good governance. These best practices are being adopted and expanded in the rolling out of national program for rural development through introduction and establishment of project innovations that espouse climate change (CC) resilience, commodity value chain, and modernized agricultural practices through employing science-based tools and approaches. The vulnerability and suitability assessment (VSA), expanded VSA (e-VSA), and applied geotagging technology are noble and first-of-its-kind initiatives of project implementation in agriculture in the Philippines. The collaboration of geospatial tools has technologically upgraded the agriculture sector's manner of decision-making in terms of identifying investments and programming resource allocation in agriculture.

growth and climate-smart agriculture. The central goal of the AFMP is to raise rural incomes, create employment, and improve the competitiveness of the agriculture and fisheries sector through a value-chain, market-oriented, and integrated service delivery approach. The AFMP is the translation of the national goals, agenda and policies into strategic programs, and projects in agriculture context. As such, it should be the continuing basis and consistent context for the agriculture sector's investment programming, annual plan and budget proposals, and fund allocation across operating units and functions. The national AFMP that looks into nationally relevant agricultural commodities and products is being cascaded locally and is translated into regional AFMPs that create and implement agricultural programs responsive to area-specific needs. The effectiveness and value of the local AFMPs is advocated as the authoritative plan and is promoted for adoption by all stakeholders, particularly the local government units, as the common basis for local planning. This manifests a devolved planning and programming of investments approach that takes a shift from the usual modality of "top-down" business practices of the DA. More importantly, the AFMP has also initiated a shift from resource-based to technology-based industry. On another note, the Philippine Development Plan (PDP) 2011–2016 sets forth the overall direction and framework of the country's agriculture and fisheries development within this 6-year span. It aims to align strategies of all sectors toward attaining inclusive economic growth, massive job creation, and poverty reduction. It focuses on achieving a competitive and sustainable agriculture and fisheries sector characterized by improved food security and increased rural incomes, enhanced sector

Policy framework context

The Philippine agriculture sector has been marked by the continuing challenges of urbanization and modernization occurring in the country. In its thrust of uplifting its implementation design in order to respond to these indispensable challenges of development, the Philippine agriculture sector has prompted to formulate and adopt strategies that showcase its overall strategic framework toward agriculture modernization and development aimed to be both locally and globally competitive. This framework is governed

by relevant policies and guidelines that collectively provide a holistic approach toward attaining the goals of food security and self-sufficiency, income enhancement and profitable market surplus, modernized and sustainable agriculture and fisheries practices, natural resource management, climate change (CC) resilience, and local development. The Agriculture and Fisheries Modernization Act (AFMA) of 1997 mandates the Philippine's Department of Agriculture (DA) to formulate the Agriculture and Fisheries Modernization Plan (AFMP) that provides the implementation road map to achieve inclusive

resilience to CC risks, and enhanced policy environment and governance. In support to the PDP 2011–2016 and AFMP strategic goals, the agriculture sector has adopted the Agrikulturang Pinoy (Agri-Pinoy) program as an approach that complements the overriding national agenda of poverty alleviation, particularly in rural areas where majority of the country's poor live and depend upon agriculture and fisheries livelihoods. The Agri-Pinoy now advances the principles of inclusive growth, food staple sufficiency, natural resource management, and area-based development. It includes strategies to (1) institutionalize regionally-based, spatial planning; (2) develop a systems approach for both planning and resource allocation; (3) provide the critical infrastructure needed by priority value chains; and (4) building a more resilient production base to accommodate fluctuations in global markets and effects of CC (i.e., through climate-smart agriculture). The Agri-Pinoy sector strategy strongly articulates the significant shift from “top-down” practices to “bottom-up” kind of engagement while instituting and revolutionizing into a modernized way of agricultural practices and innovations for rural development. Although the shift in engagement strategy, agricultural planning considers the combined “top-to-bottom” and “bottom-up” approaches to planning and programming that run parallel with the achievement of modernization strategies of the AFMP. This two-pronged approach will help ensure that the sector's budgetary resources will be prudently allocated to priority programs, projects, and activities that are supportive of the PDP 2011–2016 goals and strategies for the agriculture and fisheries sector. Top-to-bottom planning defines the national goals, policies, and directions for the sector. Bottom-up planning involves the participation of the communities thereby ensuring plan ownership by the stakeholders. It also empowers the local government units, to respond to the felt needs of their constituencies by proposing specific interventions and areas of investments from both the local government and from the agriculture sector.

Introduction of ICT in project monitoring and supervision

The agriculture sector remarkably commenced institutional and operational reforms when the World Bank-assisted Mindanao Rural Development Program (MRDP) was implemented in the southern islands of the country since 2000. The implementation of the development program in Mindanao has been confronted with many challenges ranging from perceived corruption, site inaccessibility, difficult monitoring and evaluation activities, and the rest. Despite transparency measures being adopted and established in implementation, the prevailing bottlenecks on the capacity and governance in project implementation by the local government units has remained a challenge. Moreover, the prevailing peace initiatives particularly in conflict-affected areas in Mindanao as well as those hard-to-reach subproject sites need due attention for a continued monitoring and supervision of the better economic opportunities provided by the project without compromising the integrity of its established transparency. In a span of almost 14 years (2000–2014), the project has its share of multi-varied implementation issues while continuing to carry out its goals to provide development opportunities and effect positive change in this side of rural community in the country. In 2010, the problem on project monitoring and supervision was highlighted during the World Bank Supervision Mission that exposed issues on implementing rural infrastructure projects, particularly excess contract costs against the indicative cost, absence of construction activity on site, and overstated physical accomplishments. These infrastructures supposedly provide linkage from production areas to market as well as boost up production yields of agricultural farms and provide support to post-harvest facilities. Further, implementation weaknesses were underscored that included the absence of a structured monitoring system to identify the locations of the widely dispersed subprojects, poor documentation of technical proposals (i.e., feasibility study and detailed engineering

designs), deficient construction/supervision implementation arrangements, the lack of document to confirm whether there were no discrepancies between the actual elevations and those indicated in the plans, and many other technical deficiencies and irregularities. Consequently, this resulted to cancellation in the implementation of three subprojects, and then instituted measures toward strengthening the feasibility study processes, detailed engineering designs, and implementation capacity of the regional offices and the local government units. With these overwhelming operational and institutional issues, the project was pressingly prompted to develop an innovative strategy to strengthen its transparency mechanism and in monitoring, validation and evaluation of project implementation. As a result, the project sought out-of-the-box, new-age idea, and forward-thinking resolution to these challenges of rural development implementation.

In 2011, the MRDP launched the innovative strategy in enhancing project monitoring, supervision, and validation using the applied geotagging technology (AGT) or simply geotagging. The geotagging tool provides a facility that is low cost, competent, and technologically advanced in addressing Monitoring & Evaluating (M&E) constraints and bottlenecks. Geotagging, also called geolocation, is the practice of associating a digital resource (e.g., photos, videos, website, SMS) with a physical location. Location information is typically given in terms of latitude and longitude coordinates, which can pinpoint any place on earth with a high degree of precision. The AGT is a web-based or Internet application compiled to digitally complement project implementation on the ground. It combines engineering review tools and supervision experiences with location based on digital technologies (i.e., GIS, GPS, geotagging) resulting in a project that can be viewed in its actual location and its physical progress and seeing the total developmental impact of the subproject as a whole in relation to its access, links, and influence areas. In rural development application, this data embedded in the facility known as Google Earth is

usually a photograph consists of latitude and longitude coordinates, accurate dates, elevation, terrain, estimated land area and distance covered of a project, among others. All the software and web hosting (Windows, Macintosh, Linux, and Android) are free (open source) and readily available for users. Its digital format is accessible from the MRDP website (www.damrdp.net) viewable by Google Earth for Windows, Macintosh, and Linux for desktop and Android, iOS for tablets. The geotagging tool piloted its application in rural infrastructures that composed the significant bulk of budget portfolio, and eventually covered the whole set of investments that include the micro-enterprises and environmental conservation projects. This has found to have primarily addressed the perennial problem on monitoring and supervision of the substantial and location-specific subprojects that are dispersed over a wide range of locations across Mindanao, particularly those located within conflict-affected areas. The immediate features of the tool have been tested in an actual case in one of the projects located in Tarragona, Davao Oriental in Mindanao. The proposed BAMACA farm-to-market road (FMR) was found to overlap with the MAGANDA FMR by around 400 m in Figure 1. The overlapping section, which was not reflected in the Program of Works of the procurement documents of the said project was validated through geotagging activities.

Another case is the proposed regraveling of 9.0 km TUDELA-SINACABAN FMR by the Provincial Government of Misamis Occidental in Mindanao as shown in Figure 2.

Geotag photos showed that some portions of the entire stretch were found to overlap with the 3.0 km provincial road and to duplicate the 1.2 km FMR of the Infrastructure for Rural Productivity Enhancement Sector Project (InfRES). The InfRES is an Asian Development Bank (ADB) funded infrastructure project implemented also by DA. These data were not reflected in the submitted procurement documents of the said subproject. Through the geotag photos, necessary adjustments were undertaken on the length of the proposed FMR, which was corrected and reduced

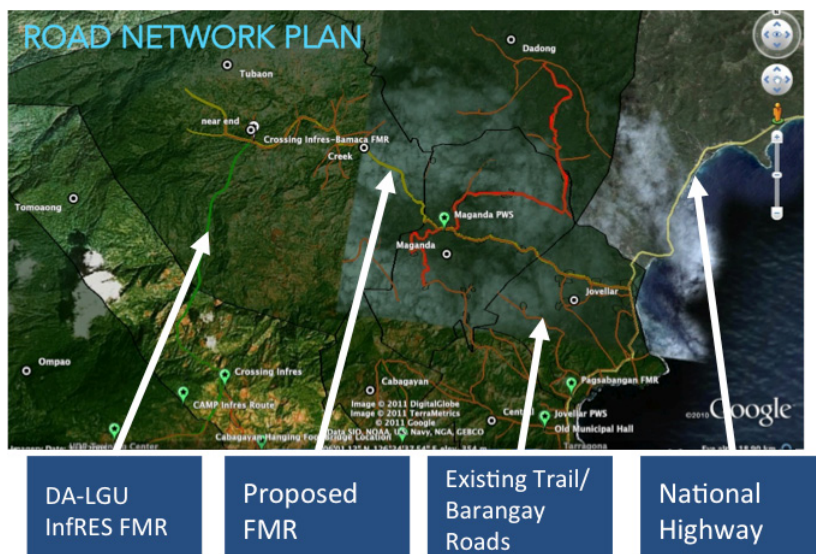


Figure 1: This geotag photo shows the connectivity of the two proposed road sections and the 400-m overlap

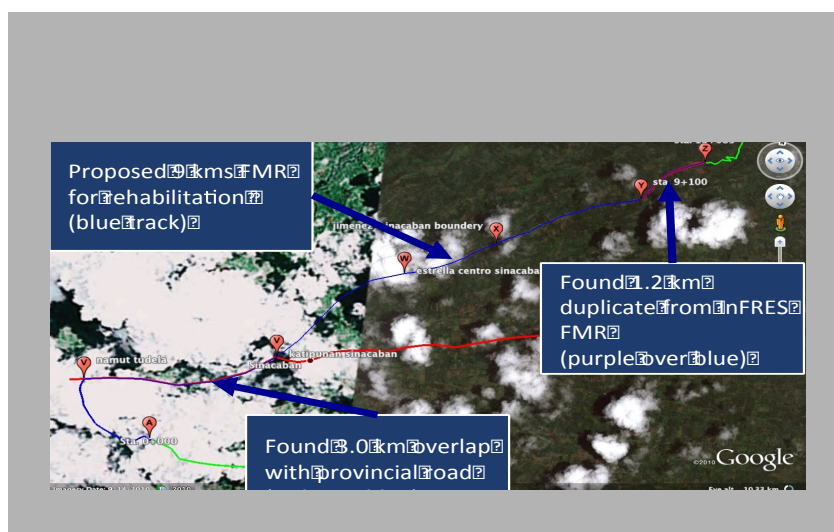


Figure 2: This geotag photo shows the proposed 9.0 km Tudela-Sinacaban FMR in the province of Misamis Occidental showing its relationship with other existing infrastructures, agricultural production areas, and other influence areas

to 6.46 km excluding the overlapped and duplicated portions. Citing another case is the proposed 9.0 km concreting of FMR in Zamboanga City, which was reported to have a predominantly rolling topography, with only about 700 m discrete plain terrain. Upon validation using geotag photos, it was found out that the entire stretch is characterized by a plain terrain (<12 percent gradient), which only qualifies for graveling instead of concreting in accordance to World Bank procurement

guidelines. In this case, the project documents of the FMR were found to contain fictitious table survey way off from the actual condition and terrain of the FMR. The tool is perceived as an effective instrument to combat fraudulent actions by fabricating project designs and plans not conforming to the actual condition in the field resulting in incongruent information as evidenced by the validation from geotag information. The continuing applications and innovations on the tool has

facilitated the establishment and specification of geotagging's minimum set of requirement (i.e., geotagging device, software, applications) as well as the standard procedures and guidelines in conducting geotagging works from data gathering in the field, annotating geotag data, data processing and banking, and online presentation of geotag outputs housed/linked in the project's official website, including the needed capacity building of personnel involved in geotagging works. The textualization of the geotagging technology manual is another challenge, considering the wide range of project types and the corresponding and distinct features of each type of project for implementation. While the rural infrastructure (FMRs, bridges, potable water system, irrigation and postharvest facilities) has been the initial focus to establish a standard system for geotagging, the geotagging requirement for micro-enterprise and livelihood projects has already been developed and established in order to document the existence and operations that cater to

the special considerations of each of the various features of the projects (i.e., animal dispersal and production, farm crop production, agricultural machineries for land preparation, crop establishment, and post-harvesting) implemented by the community beneficiaries. The geotagging schedule of each type of project facilitates showing of visual progress of project implementation controlled by the geotag photos depicting the overall development impact of the project and its comparative relationship with its surrounding influence areas.

The technology that is Google Earth-based tracking of projects has transformed the process of validation and monitoring of civil works and agri-fishery facilities. The collaboration of geotag photos provides online spreadsheet and graphical progress of the projects at various levels resulting in a web-based mapping system. The system also illustrates the status of project progress exhibiting the extent of their physical accomplishment that relates to the corresponding financial disburse-

ment of the project. The geotag data that is available online in real time supports request and facilitates the prompt release of payments to projects corresponding to the actual physical (Figure 3).

Hence, it has paved for virtual monitoring of the real condition of the project sites without really conducting actual site visits. The development of geotagging tool has become the instrumental facility that is competent and technologically advanced in primarily addressing monitoring and evaluation activities, including elimination of fabrication of bogus and fraudulent project plans and designs, duplication, and splitting of project proposals. Since its formal introduction in 2011, various audiences such as the World Bank, government agencies, private sectors, community beneficiaries and other interested stakeholders signified their interest to learn and adopt the technology in their respective project implementation. The geotagging tool has upgraded the benchmark of implementing projects with greater transparency, accountability, and participation. The World Bank has also dubbed it as a revolutionary and inexpensive approach of using Information and Communication Technology (ICT) applications. It has been recognized by the president of the Philippines as a significant tool for a transparent and publicly accountable government and was awarded a good practice award by the National Economic Development Authority in 2012. Moreover, the tool is becoming recognized internationally with the international paper contributions from the World Bank, while the tool also receives invitations for presentation from countries like India and Malaysia. Seeing the institutional and operational transformations that has picked up the implementation performance at the midterm of the rural development project in Mindanao, this has prompted the DA to take the initiative to roll out and adopt the technology in the whole agriculture sector as well as harmonizing the rules of engagement with partner local government units and other stakeholders that have been successfully espoused and established in Mindanao.

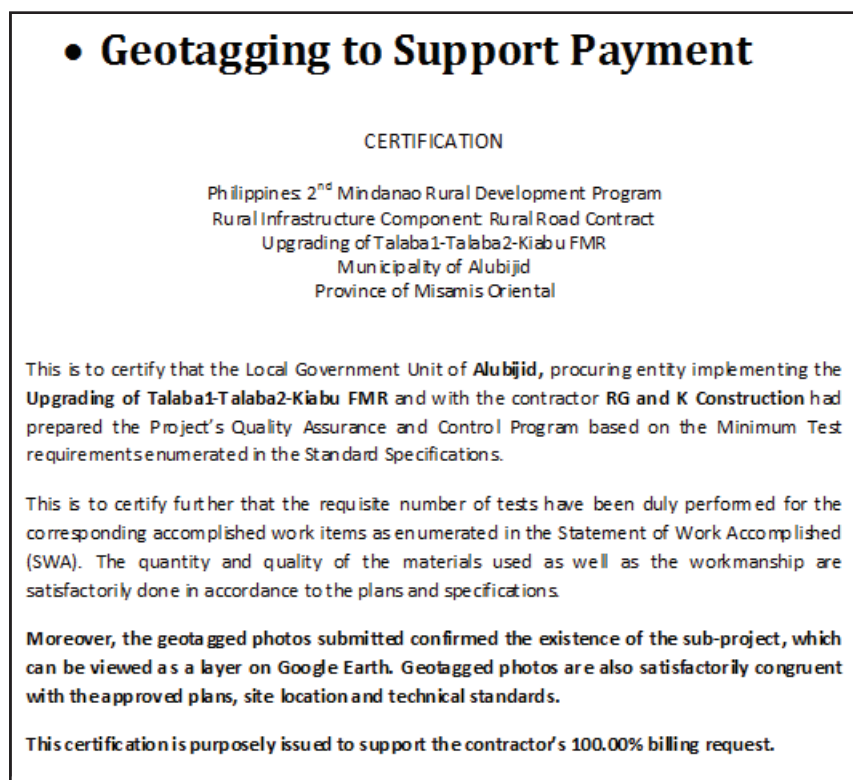


Figure 3: Sample certification as proof of quality compliance and support document for payment

Science-based tools for agricultural commodity development

The design of rolling-out a development project into a Philippine Rural Development Project (PRDP) throughout the country has been the offshoot of the best practices, implementation lessons, and successful engagement with the local government units by the rural development project in Mindanao. These best practices showcase the principles of accountability, transparency, and good governance in rural development. The significant spike in doing monitoring and evaluation using ICT has added greater credibility in doing business in a more technologically advanced approach. Built on these development reforms, these best practices are being adopted and expanded in PRDP along with introduction of further refinements and innovations that include CC resilience and commodity value chain through employing science-based tools in the design and setting up of enabling policy and strategic environment that provide operational platform for agricultural modernization and rural development. The need to make the sector sustainable and resilient has been a long-standing concern in the face of expanding land and water degradation and the realities of CC. The AFMP framework and guidelines call for the identification of innovative measures to respond to CC and mainstream CC adaptation and risk reduction in the various agriculture sector interventions by using improved tools for assessing CC vulnerability. The use of transparent, evidence-based, and innovative tools and approaches have been developed and tested by the agriculture sector including the vulnerability and suitability assessment (VSA), expanded VSA (e-VSA), value chain analysis (VCA) tools, rapid market assessments, and use of geotagging with geomapping. These tools shall help ensure technical validity, greater transparency and rationale in the planning and prioritization of infrastructure and enterprise development investments and across a wide range of public investments. Agro-industrial based enterprise development is one of the key contribu-

tory components of PRDP for agricultural development and toward achieving inclusive growth, job creation and increased farm and fishery productivity and incomes building on the existing policy framework. This constitutes engaging broad sections of the sector in the production of marketable surplus through investments in strategic segments of priority commodity value chains prioritized under the Regional Agriculture and Fishery Modernization Plan (RAFMP) and the Provincial Commodity Investment Plans (PCIPs), the latter being a strategic plan that rationalizes interventions within the various segments of the value chain of commodities significant to the development and realization of the local and national goals of the sector. It adopts the farm-to-table service delivery strategy being pursued under the Agri-Pinoy framework.

Commodity prioritization and planning tools and mechanisms

Prioritization of commodities with national importance is supported by the high value crops development program (HVCDP), which also includes fisheries and livestock to the list of commodities

for prioritization. The commodity prioritization tool is employed and shall be used in preparing the priority commodity list that shall be subjected to the VCA. One refinement introduced as an assessment tool to generate the data for prioritization of commodities is the use of combined VSA and the participatory resource appraisal–resource and social assessment (PRA–RSA). The VSA is a tool developed by DA's Bureau of Soils and Water Management (BSWM) as a guide to determine the vulnerability of a particular area that could affect the production and suitability of a particular commodity. The VSA particularly ranks areas (e.g., municipalities, provinces and regions) based on spatial multi-criteria analysis of agro-climatic data (i.e., land suitability, extreme climate events, and crop type), technically known as agro-edaphic suitability (AES), to determine its suitability to a given commodity. (Figure 4). It supports the creation of a VSA map based on the ranking of municipalities for prioritization.

In 2013, the DA has further expanded the VSA tool and launched the e-VSA project that takes into account socio-economic data, hence generating a new composite index from a combined analysis of VSA and socio-economic

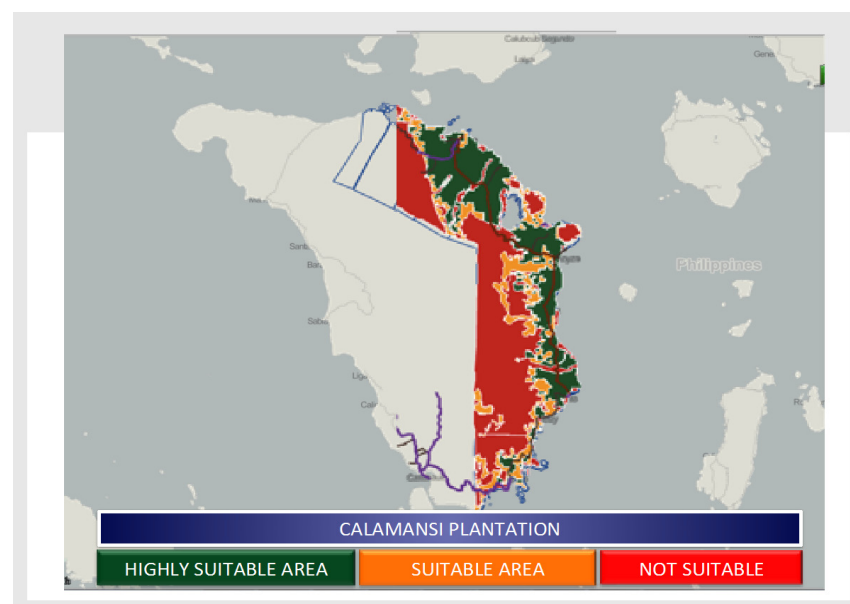


Figure 4: Calamansi (Philippine Lemon) suitability map of the province of Oriental Mindoro, Philippines.

parameters (e.g., poverty index, population, income, production area, number of farmers, among others) for enhanced planning and programming of allocation, resources, and investments. The areas being ranked are identified using the geocode that indicates the Standard Philippine Geographic Code of a locality. On the other hand, the commodity/ies that involve production areas under the global environment facility (GEF) sites where critical natural resource management interventions are deemed essential to enhance and sustain resource base of identified value chains, the PRA-RSA will be used as analysis framework. Participatory resource appraisal is based on a multidisciplinary approach to investigating rural communities in developing countries. It was developed as a way to gather and analyze information with limited time and resources that involves various techniques including secondary data review, semi-structured interviews, direct observation, conceptual models, and workshops. The rapid market appraisal (RMA), on the other hand, is an iterative and interactive research methodology, which is used to better understand complex market systems in a short time (Adapted from Young, 1994). It is a methodology that facilitates the identification of proper interventions or support programs to improve efficiency or strengthen the marketing system in a manner that would bring the broadest benefits to the most number of participants in the system. The focus of the RMA shall be on market size, market growth potential, ease of entry, and potential for value addition. A secondary data on the market may suffice when using the prioritization tool, while a deeper analysis of the market may be done during the conduct of the VCA of the priority commodity. VCA of prioritized commodities involves commodity experts, relevant national agencies (e.g., agrarian reform, environment and natural resources and trade and industry), state universities and colleges, top crop-producing local government units, and private sector representatives conducting the value chain study. A value chain is defined as the full

range of activities, which are required to bring a product or service from conception, through the different phases of production (involving a combination of physical transformation and the input of various producer services), delivery to final customers, and final disposal after use. The VCA report shall manifest a comprehensive report that identifies the key horizontal and vertical industry processes and key players, the needed investments and interventions, and market and business opportunities along the value chain with consideration to the result of the VSA and e-VSA and in-depth analysis of market appraisals and potential resource enhancement initiatives. The VCA report shall serve as basis of the proponent provincial local government units, being the point of entry of interventions, to identify potential agro-industrial enterprises that could be elevated into level 3 enterprises for full market integration, along with the implementation of appropriate rural infrastructure support that promotes a holistic development and marketable surplus enhancement of the priority agricultural crops. The rural infrastructures and enterprises investments are explicitly specified in the PCIP. The PCIP is a strategic plan that rationalizes the various interventions for the development/enhancement of priority commodities. With prudent and deliberate implementation, the VCA through the implementation of the PCIP shall essentially determine the value created in a product or service resulting from the determined set of value-adding processes and the participation of actors of the sector (i.e., farmers/fishers, private sector). Like any other plan, the preparation of PCIP shall be governed by the framework provided in the formulation of the AFMA in the context of the priority commodity. The integration of the science-based tools (VSA and e-VSA) and the technical assessment tools (RMA, PRA-RSA, and VCA) become the all-encompassing project analysis tool that facilitate a scientific project management decision-making approach in planning interventions, programming investments, and impartial allocation of resources for the development of the commodity.

Visualizing resource programming and potential investments

Transforming the data and result of the planning and prioritization of commodity investments using the science-based tools and approaches into explicit online maps better help planners and the management perceive and understand the relative importance and contribution to the overall development impact of commodity investments to its existing access, linkages, surrounding built-up structures, and influence areas. The use of geospatial tools through the application of geomapping and geocommons as mapping tools lay out the result of the prioritization mechanism into an online interactive map for better visual presentation of areas viable for investment. Geomapping as a spatial technique is used to represent geographical data (i.e., agricultural patterns, crop production, land suitability) into interactive visual mapping that displays data on a map hence, aids in targeting and prioritizing development interventions. In the context of prioritization, the tool is essential for the VCA to determine whether priority agricultural commodities are within the areas of value chain where investments are found to be feasible. The geocommons is a geospatial data management, visualization, and analysis platform providing collaborative, browser-based data analysis tools that can be used by both technical and non-technical users. Geocommons is also collaborated in the design to further maximize online analysis of data from the VSA, e-VSA and VCA, and other available data that will be converted into graphical representations and maps to determine strategic locations where intended project investments are to be established. These online maps are further enhanced through application of geospatial object color scheme and specifications on Google Earth that is standardized and customized to create a distinct feature and recognition to the overlaying geospatial objects ready for online viewing and presentation.

Integration and operationalization of science-based tools

To ensure the continuity and broadening of scope of the good practices started in the development project in Mindanao, the agriculture sector through the PRDP has initiated the full integration of the scientific planning, programming and allocation, and decision-making in the whole project implementation process. This particularly encompasses project conceptualization, safeguards requirement, project appraisal and validation, proposal preparation, procurement process, actual implementation, M&E, contract management, and operations and maintenance. The data from implementation are being translated into various platforms of documentations from actual fieldwork, print, and online and web-based system. Enhanced planning process and prioritization of commodity investments using science-based tools allocate resources to those interventions that have been identified through the VCA and included in the PCIPs. The use of various assessment tools such as the RMA, VSA, e-VSA, and PRA-RSA shall be done at the national and regional levels with the participation of the concerned provincial local government units or the municipal local government units, as applicable, to generate the commodity priority list. VCA and study shall be prepared for the priority commodities, the result of which shall be the basis for the preparation of the PCIP and interventions to be provided sup-

port. The priority interventions identified in the PCIP shall serve as basis in the identification of possible product segments or enterprises as prioritized by the proponent provincial local government that shall undergo business plan preparation as well as to pass through eligibility criteria in the selection of interested proponent group from the private sector that comes from the directory of industry players (e.g. producer groups, agri-processors, consolidators, exporters, etc.) identified in the value chain and included in the PCIP. Moreover, geotagging now becomes an integral requirement in the procurement process, as all approved projects ready for bidding are required to be geotagged. These geotag data are uploaded as part of the bidding documents primarily for interested contractors to initially and virtually see and study the actual location and condition of the project site. The web-based platform of procurement system is one of the key features in the PRDP website (www.daprdp.net) that facilitates online and real-time monitoring of the procurement process as well as flagging of relevant timelines at the various stages of implementation. Compliance to geotagging during actual project implementation facilitates the regular submission of geotag data at prescribed schedule such that the collaboration of these geotag data sequences that are regularly uploaded provides an online visual progress of the projects, viewed at the different scales (i.e., municipal, provincial, and national levels), provide the before-during-after activities of the project implementa-

tion, thus creating a web-based mapping and monitoring system. Moreover, geotagging of projects becomes a requirement to all implementing contractors to facilitate request for billing, compliance to personnel requirement, equipment, and processing facilities, among others. At the outset of the application of geotagging technology, it has never been in hiatus, in fact, its latest evolution is the development of an android mobile operating system (OS) dubbed as the "PRDP Geotagging Camera Application" that has increased the data authenticity and security. The ball has kept on rolling for the overwhelming request of technology transfer from the various national and local government agencies, local government units, private sectors, and civil society organizations who are mindful of the programs and interventions of the government. They are in the offing for training for the adoption of the technology. In summary, the science-based geospatial tools have provided avenues for strategic planning for implementing agricultural development intervention, transparent and informed project implementation, effective monitoring and supervision, identification and communication of implementation gaps and overlaps, and public feedback mechanism.

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- ✓ Young, Simon (1994), Rapid Market Appraisal (RMA): A Tool for Market Systems Research in Agricultural Development, Malakand Fruit and Vegetable Development Project (MFVDP), Interco-operation ■

Women's Entrepreneurship Development

The ILO's Women's Entrepreneurship Development programme (ILO-WED) works on enhancing economic opportunities for women by carrying out affirmative actions in support of women starting, formalizing and growing their enterprises, and by mainstreaming gender equality issues into the ILO's work in enterprise development. The ILO-WED approach is threefold, working with governments, employers' organizations, trade unions, and local community-based organizations to: create an enabling environment for WED that generates quality jobs; build institutional capacity in WED; and development of tools and support services for women entrepreneurs. It does so both through targeted approaches and gender mainstreaming, with a clear objective to contribute towards gender equality and women's economic empowerment.

ILO-WED works in partnership with constituents, relevant institutions, community organizations and other UN agencies. Currently, the ILO has projects across Africa, Asia and the Middle East. Special attention has been given to Developing Entrepreneurship among Women with Disabilities and mainstreaming disability into the ILO-WED work.

For more information, access:

<http://www.ilo.org/empent/areas/womens-entrepreneurship-development-wed/>

STRENGTHENING RURAL ENTERPRISE DEVELOPMENT IN THE PHILIPPINES

THE BROOKE'S POINT KITCHEN INCUBATION MODEL

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Abstract

The micro, small, and medium Entrepreneurs (MSMEs) have become a game-changer in the economic status of the Philippines nowadays. Not only are they contributing to the country's income as a whole, but they are also addressing the problem of unemployment. Through the help and partnership of various government agencies in the Philippines, the MSMEs are guided into becoming full-fledged entrepreneurs. Assisting and developing MSMEs is one of the Philippine government's solutions to poverty reduction and it has been proven effective as evidenced by their economic contribution.

The Brooke's Point Kitchen Incubator (BPKI) in Brooke's Point, Palawan, Philippines is one of the initiatives of the Department of Science and Technology-MIMAROPA (DOST-MIMAROPA) to provide assistance and support to start-up entrepreneurs who do not have the capital and the technology to put up a processed food business. The BPKI serves as a breeding ground for developing entrepreneurs and has brought positive impacts to its clients in terms of technology transfer, packaging and labeling, marketing, and promotion.

country as indicated in Figure 1. This fact is made more evident by the presence of home-scale and village enterprises in almost every community in the country. These enterprises sell every kind of product imaginable, and reach even the most remote of places. The National Capital Region (NCR) still has the most number of business establishments amounting to 210,576. It is followed by CALABARZON with 144,811 and Central Luzon with 105,331. The top five locations namely, NCR, CALABARZON, Central Luzon, Central Visayas, and Western Visayas together account for 61.65 percent of the total number of MSMEs in the country.

The MIMAROPA region

Cutting across a relatively new region in the Philippines called the MIMAROPA, it is immediately apparent that the MSMEs also serve a vital economic role (Table 1). Of the total number of establishments in this region (27,432), 94.32 percent or 25,876 are micro, 5.4 percent or 1,505 are small, and less than 1 percent or 29 are medium. However in this region, manufacturing take a back seat to wholesale and retail trade; and repair of motor vehicles. Manufacturing only accounted for 14.19 percent (3,893) as against 47.44% (13,015) for wholesale and retail trade and repair of motor vehicle.

In terms of employment in this region, micro and small enterprises account for 89.29 percent of the total employment size of 100,509 (Table 2). The sectors providing the most employment are wholesale and retail trade; repair of motor vehicle (37,956) accounting for 37.76 percent, accommodation and food service (16,140) or 16.05 percent, and manufacturing (12,287) accounting for 12.22 percent.

Indeed strengthening the MSMEs as a strategy to hasten rural economic growth deserve a second look. While there are issues that has to be addressed at the

Introduction

Current SME development landscape in the Philippines

In the Philippines micro, small, and medium industries (MSMEs) serve as the economic backbone. They are the engine of wealth creation, thus generating income and gainful employment. They also serve as mechanism to disperse industries away from the traditionally populated industrial areas and play a crucial role in the government's program to reduce poverty especially in the countryside.

It is undeniable that the economic landscape in the country is dominated by MSMEs. As of 2012, 99.58 percent of the 944,897 business enterprises operating in the Philippines are MSMEs. Of the

total number of MSMEs (940,886), 89.78 percent are micro enterprises, 9.78 percent are small enterprises, and 0.44 percent are medium enterprises. In terms of employment, MSMEs generated a total of 4,930,851 jobs, as against 2,658,740 generated by large enterprises. Of these, 2,316,664 jobs or 47 percent were generated by micro enterprises, 2,061,090 or 41.8 percent by small enterprises and 553,097 or 11.2 percent by medium enterprises. In terms of value added, the MSME sector contributed 35.7 percent of the total with manufacturing contributing 6.87 percent, larger than the contribution of retail trade and repair (6.58 percent) or financial intermediation (6 percent).

Unlike large scale industries, which are usually found in the urban centers, MSMEs are widely dispersed across the

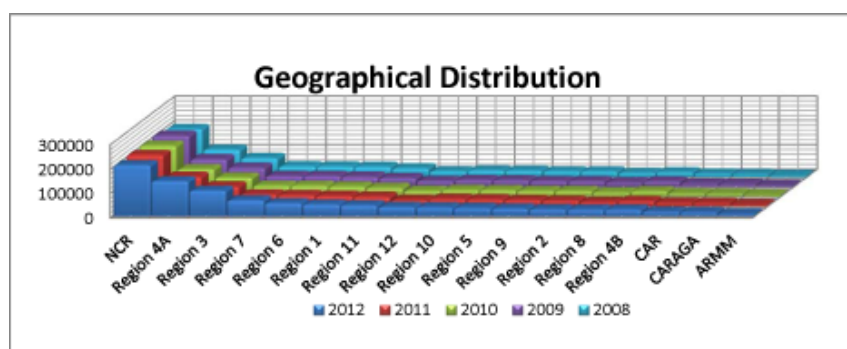


Figure 1: Geographical distribution of MSME's by regions

Source: <http://www.dti.gov.ph/dti/index.php/msme/msme-statistics>

Table 1: List of industries in the MIMAROPA region

Region/Industry	Total	Employment Size (MSME)			
		Number of Establishments			
		Micro	Small	Medium	Large
MIMAROPA	27,432	25,876	1,505	29	22
A - Agriculture, Forestry and Fishing	579	436	135	4	4
B - Mining and Quarrying	67	44	20	s ¹	3
C - Manufacturing	3,893	3,767	126	s ¹	s ¹
D - Electricity, Gas, Steam and Air condition supply	79	33	43	s ¹	3
E - Water supply, Sewerage, Waste management and remediation	63	38	25	s ¹	s ¹
F - Construction	63	41	22	s ¹	-
G - Wholesale and retail trade; Repair of motor vehicles and motor cycles	13,015	12,556	452	4	3
H - Transportation and storage	264	228	36	-	-
I - Accommodation and Food service activities	3,971	3,720	239	9	3
J - Information and Communication	850	832	18	s ¹	-
K - Finance and Insurance activities	681	565	116	s ¹	-
L - Real estate activities	397	387	10	-	-
M - Professional, Scientific, and Technical Activities	382	374	8	-	-
N - Administrative and Support Service activities	518	496	22	s ¹	s ¹
O - Education	348	186	158	4	s ²
P - Human health and Social work activities	481	451	30	s ¹	s ¹
Q - Arts, Entertainment and Recreation	555	515	40	-	-
R - Other service activities	1,226	1,207	19	-	-

Note: S⁰- firms with employment size from 1-9 ("micro")

S¹- firms with employment size from 10-99 ("small")

S²- firms with employment size from 100-199 ("Medium")

Source: <http://www.dti.gov.ph/dti/index.php/msme/msme-statistics>

macro level, MSME development in the regions should get the priority and support necessary to increase further its economic contribution and even make growth more inclusive than it is now. According to Habito, every 1 percent growth in Gross Domestic Product (GDP) leads to greater poverty reduction (Habito, 2010).

There are a number of traditional issues facing MSME development namely, finance, technology, availability of inputs, access to markets, and other overarching issues such as among others, cumbersome government registration procedures and requirements for start-ups, weak support for MSMEs at the local government unit level (LGU), lack of MSME organization at the grassroots level, poor entrepreneurial and management skill.

Most MSMEs have low level of technology that results in poor productivity, high wastage, and poor or inconsistent product quality. Among the problems in technology transfer as cited by Habito was insufficient information on innovative technologies, lack of capacity to evaluate alternative technologies, inadequate know-how on more advanced technologies, inadequate technology transfer mechanism, and difficulty of availing government assistance (Habito, 2010).

Transforming start-up entrepreneurs

To help address such problems for the start-up MSMEs, the Department of Science and Technology MIMAROPA Region (DOST-MIMAROPA) adopted the concept of business incubation wherein start-up MSMEs can seek guidance and use an appropriate facility to process their products until they mature into a full-fledged entrepreneur. The Brooke's Point Kitchen Incubator (BPKI) is the first in the region (Lim and Narcoda 2012) and works around three elements: the client, support institutions, and the facility to serve its purpose to start-up MSMEs (Figure 2).

Client

The central focus of the whole incubation process is the client, the start-up entrepreneur who is shepherded to become a full-fledged entrepreneur. The goal of the incubation process is to provide the client with an ecosystem that will reduce the risk of failure as the business grows and adapts to the market and economic realities.

Support institutions

The ecosystem that is required by clients to fast-track their development is provided by a number of institutions whose programs directly impacts the development of small food business. These include an academic institution, the Western Philippines University (WPU); a private entity, the Honey Fruit Gourmet Foods; a local government unit (LGU), the Municipality of Brooke's Point; and two national agencies — the Department of Trade and Industry (DTI) and the Department of Science and Technology (DOST).

The WPU specializes in training of MSMEs as it has faculty members who are experts in processed food. Its curricular offering include food technology courses which make it a rich source of technical information regarding food development issues — something that clients under incubation needs. Under this program, experts from WPU are requested from time to time to train the client.

The honey fruit gourmet food specializes in processed product development and food industry development issues. Honey fruit initially gave valuable inputs on how to proceed with the incubation program especially on client handling and management, product and package quality, trends in processed food, and market niche development focusing on development of specialty foods for the tourist market.

The local government of Brooke's Point serves as the main actor in running the program. It was also responsible for the upgrading of the building to make it compliant to the basic Good Manufacturing Practices (GMPs) and sanitation requirements. The management staff it provided also handled client management, coordinated training and support activities that include promotion of products, linkage with suppliers of raw materials, and linkage with potential buyers. The local government also provided the funds to subsidize expenses for electricity, water, and initial purchase of packaging materials.

The DTI provides information on market and trade issues related to processed food. They also provided training to enhance business skill and competency. Specifically, it provided training on merchandising, effective pricing, bookkeep-

Table 2: Total employment generated by MSME's in the MIMAROPA region

Region/Industry	Total	Total Employment			
		Micro	Small	Medium	Large
MIMAROPA	100,509	61,826	27,925	3,921	6,837
Marinduque	7,106	5,371	1,645	s ¹	s ¹
Occidental Mindoro	18,148	11,720	5,325	1,103	s ²
Oriental Mindoro	24,827	16,446	7,092	484	805
Palawan	44,145	23,514	12,636	2,699	5,296
Romblon	6,373	4,775	1,598	-	-

Source: <http://www.dti.gov.ph/dti/index.php/msme/msme-statistics>



Figure 2: The Brooke's Point Kitchen Incubator

ing, and accounting. DTI also regularly invited clients to local product presentations and trade-related events.

The DOST provided the critical inputs to enable start-ups to adopt technology and innovation and become competitive and mature. These inputs include a set of mechanical equipment that is typically required for processed food. Since technology transfer is not limited to provision of equipment, DOST also trained the clients selectively on process and product improvement, GMPs, and food safety and sanitation. DOST also oriented and trained the management staff on the basic methods of running the incubator — from client management to record keeping and basic equipment operation.

Facility

Physical production of processed food takes place in the facility of the incubator. It consists of a renovated building and a

number of equipment determined on the basis of client need. The layout of the renovated building is presented in Figure 3.

A separate section is provided for the raw material preparation, cooking, processing, packaging, and storage. The facility and the equipment therein have to be compliant to GMPs and basic sanitation guidelines to make sure that products coming out would be accepted by distributors and consumers alike.

With the facility and equipment meeting the basic criteria of compliance, it is assumed that products of good quality will reach a wide range of customers, either local or domestic, and therefore clients will be encouraged to use and take advantage of the incubator.

The shared use model for the facility was also presumed to allow efficient use of space and equipment. Each client determines how long he or she needs to use the space and what equipment to use,

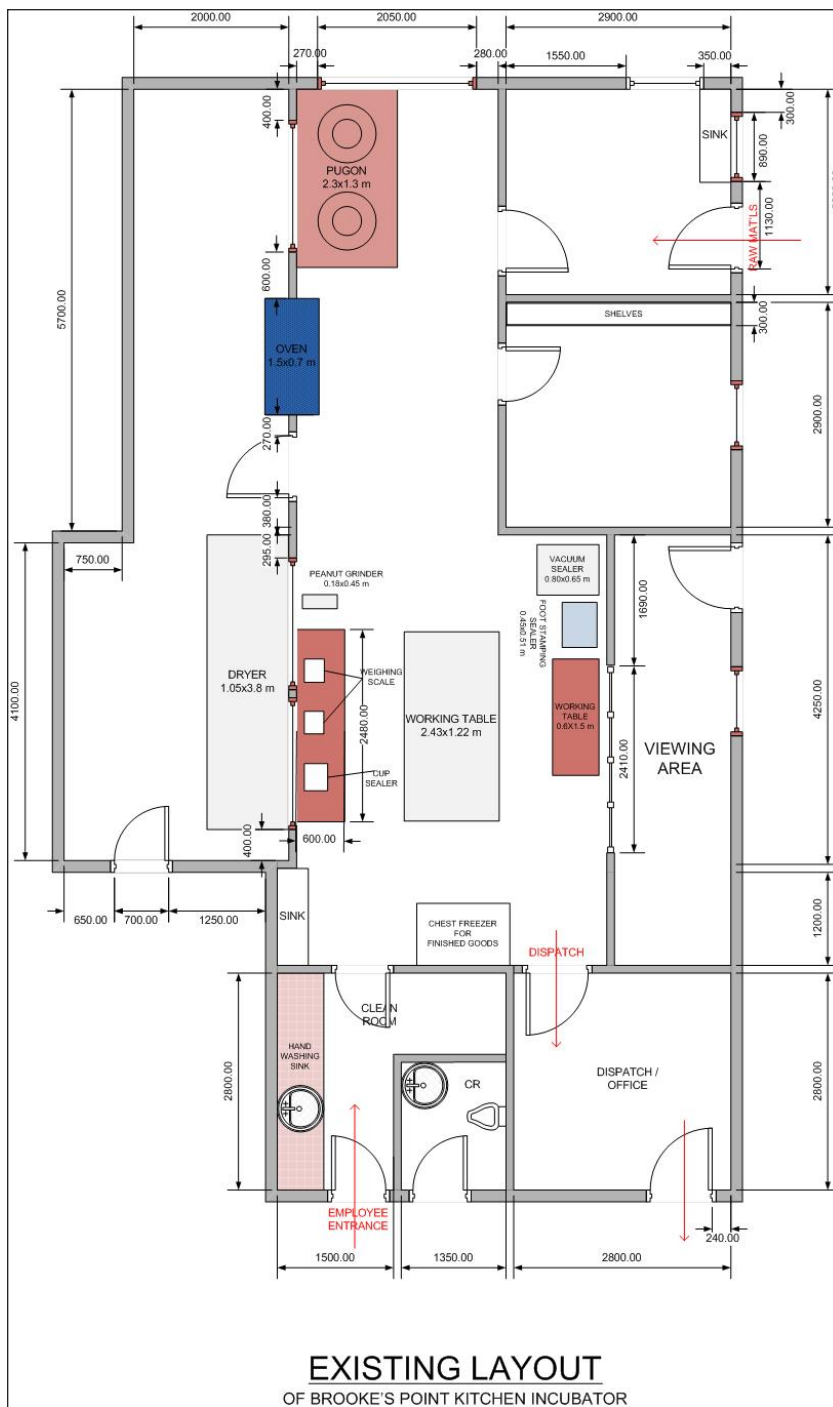


Figure 3: Existing layout of the Brooke's Point Kitchen Incubator

so proper scheduling would allow different clients, each with different set of products, to use the facility. The client then will have to pay only for the time that the space and the equipment are used. The proportionate cost for the equipment and space will then translate to lower but realistic production cost for the client. The facility also doubles

as training space because of the availability of tools and equipment needed to teach clients new production techniques and as venue for product development. In this context, product development means fine-tuning the product formulation and doing small production runs enough for evaluation and test market.

Services

Production facility

Location

Brooke's Point is a municipality located in south-eastern Palawan, a province of the Philippines, at latitude 8°47' and latitude 117°49'. It is approximately 192 km from the provincial capital Puerto Princesa City. It has a total land area of 85,064.90 hectares. It is bounded to the north by the municipality of Sofronio Espanola, to the south by the municipality of Bataraza, and the west by the municipality of Rizal. The town was named after Sir John Brooke, a rajah of Sarawak and founder of the Brooke Dynasty. It is believed that he once traded with and gained the trust of the people in the area that when American scouts came, they named it Brooke's Point.

Structure

The production building that house the BPKI, located inside the municipal government compound, served as the nutrition office until it was renovated and used for the incubator project. It has a floor area of 89.4 sq m.

The structure is made of concrete with GI roofing. It complies with some of the GMP requirements. Screens are installed on some areas to minimize contamination of the products. The building is well ventilated and uses natural lighting through its large windows. There is enough space for storage of direct materials, packaging components, office, ovens, and other machines. The production area is also big enough for ease of movement for people and products.

Layout

The facility is provided with an office space and display area where clients can showcase their products. Aside from the main production space where the equipment are located, it has a hand washing and changing area at the employee entrance, a section for storage, raw material preparation area, and comfort room.

The production facility is provided with the following equipment:

- Coconut grater — used to grate coconut meat to get fine pieces suitable for pressing and extraction of milk (Figure 4). The nuts, brought dehusked into the raw material preparation room, are cut and grated with this machine. The

grated meat is then put into a stainless presser and squeezed to get the milk.

- Coconut meat presser — a manually operated device consisting of perforated cylinder and plunger that is connected to the end of a power screw. The meat in the cylinder is squeezed with pressure as the screw is turned, the coconut milk collected with a spigot that drains into a container.
- Rice-soy grinder — a motorized device used to grind rice or soya to get finer particles needed for various food preparation.
- Chest freezer — used for storage of perishable finished product.
- Foot stamp sealer — used to seal products in plastic packaging and operated with the foot pushing a pedal linked to a pair of sealing surface (Figure 5).
- Bakery oven — a 6-baking sheet capacity oven that is useful not just for breads and pastries, but for roasting nuts as well.
- Power cooker mixer — an LPG-powered stove with a cooking pan (wok) and provided with a mechanical stirrer. This device is best used for products that require mixing while being heated.
- Emulsifier — a mechanical device used for grinding nuts or dried leaves.
- Vacuum sealer — used to pack high value product that need to be in an oxygen starved environment (Figure 6).
- Mechanical drier — an LPG-fueled drier with capacity of 24 trays suitable for drying of fruits and vegetables.
- Table top stove.
- Cassava grater — a motorized device used to reduce fresh cassava tubers to fine size.

Training

The clients are provided with training as a means to improve their skills, transfer



Figure 4: Coconut grater

knowledge, and technology or improve production technique. The clients can request trainings either individually or as a group. The BPKI staff accepts training requests from clients and pass it on to appropriate training agencies like DOST, which, usually, with the LGU of Brooke's Point, DTI, and WPU, undertake the training.

Skills training usually involved teaching the client how to process raw material into useful and saleable finished products. Using the available equipment, trainers usually demonstrate the procedures, and later ask the participants to join or do the processing themselves.

Participants are encouraged to continue producing the product of their choice immediately after the training. In this way, they can get a feel of the market demand, fine-tune their cost analysis, and plan out their marketing strategy. The whole exercise then, after the training, gives them the exposure to the real-world condition, an experience necessary to become a full-fledged entrepreneur.

Business and technical consultation

It is understood that incubation should provide the ecosystem that transforms start-ups to become micro or small entrepreneurs;



Figure 5: Foot stamp sealer



Figure 6: Vacuum sealer

one way to this is to provide clients with opportunity to interact with experience and knowledgeable resource persons; so they do not have to go through the lengthy and wasteful trial and error process. The client can directly ask the resource persons for answers to technical and managerial constraints and in so doing make adjustments as they encounter problems along the way.

Highlights

Products

There are number of processed food products made at the BPKI as indicated in Figure 7. These are usually made from local raw materials such as coconut, cassava, peanuts, banana, rice, and vegetables. A detailed list of products from individual clients is presented in Tables 3 and 4.

Packaging

Transformation of the incubator clients are expected to manifest in the improvement of the quality of their product. It was observed that the packaging of products of some clients has improved. The core client that produces peanut butter is now using a clear PET bottle with an induction sealed closure. By doing so, leaks are avoided resulting in a product that is attractively displayed on grocery stores. Other clients had begun to use PE of appropriate size and thickness, sealed with the foot stamp sealer at the incubator. Products packaged in this manner include: pastillas, banana chips, chocolate cookies, peanut cookies, tablea, pickled vegetable, and turmeric powder.

The other products such as squash maja, rice cake (suman), and banana muffin are still packaged in the conventional way using the cheap plastic cellophane that is not moisture resistant. However, clients engaged on the said products are increasingly becoming aware of the benefits of using better package and packaging technique in prolonging a product's shelf-life. Hopefully, as they watch the advanced users, they will appreciate the long-term pay-off of using better packaging materials and technique.

Impact

The reckoning of the economic benefit of the incubator can be done in two perspectives. One is looking at the income of the facility



Figure 7: Product matrix of the Brooke's Point Kitchen Incubator

Table 3: A partial list of clients and their corresponding volume of production at Brooke's Point Kitchen Incubator

No.	Name of product	Name of firm	Product output
1	Peanut butter	Alonda's Food Product	300 Bots./wk
2	Cassava cake		8 boxes/day (3)
3	Maja blanca		2 trays/day (3)
4	Crispy dilis		50 packs/wk
5	Special Bagoong		20 bots./wk
6	Cassava cake	Menchie's Product	8 boxes/day
7	Buko pie	Myrna's Delicacies	10 trays/day
8	Biko rice cake	Belen's Food Products	6 trays/day
9	Squash maja		6 trays/day
10	Banana chips		20 packs/day
11	Malunggay powder		10 packs every 3 days
12	Bukayo	Ate Inday's	60 pcs. /day
13	Peanut and cashew nuts		50 packs/day

Number of products	26
Number of clients	11 (8 Anchor, 3 Casual)
Total revenue per month	366,000 PHP (8,900 USD)

Figure 8: Aggregate gross income of clients up to December 2013

out of the fees paid by the clients. Another is to aggregate the gross income of the client and consider the amount as the gross value contribution to the local economy.

The income of the facility is not very impressive considering that the real costs are borne by the local government unit. Clients only have to pay for a minimal amount to cover the cost of utilities, clean-up, minor repair, and maintenance.

The aggregate income out of using the facility gave a much more accurate picture of the economic benefit of the facility. The estimated aggregated income of clients is P366,000 PhP (\$8,900) per month up to December 2013 (Figure 8). In 2014, from April to August, the aggregate gross income was presented in Figure 9.

Training

From the year 2012 to 2014, there were five trainings conducted for the clients and staff of the BPKI (Table 5). All of these involve training on Good Manufacturing Practice (GMPs), Food Safety, and Product Development and Improvement. For the first year of the Kitchen Incubator, there was a training on GMPs and Hazard Analysis and Critical Control Points (HACCP) to harness the clients with the knowledge on proper dealing of raw materials that they will process into various food products. To develop the clients' knowledge in processing different food products, there were also trainings conducted to widen their choices of food products which they will process afterwards. From the year 2012 to 2013, there were trainings such as product research and development, food processing and preservation (Figure 10), and training on fruit preservation to address the product development and improvement needed by the clients.

From these trainings, the clients learned how to process foods such as banana chips, jams, and pickles. Due to change in management of the Kitchen Incubator, there was another GMP and Kitchen Incubator Management training that was conducted for the year 2014 to orient new Kitchen Incubator staff and clients on the basics of GMP.

Recommendations

- In the planning stage, particular attention should be paid to the layout of the

incubation facility. A small reception area near the office would be absolutely necessary to keep visitors from entering the production area without permission. It would be better if the reception area has observation windows so visitors can observe without going inside the restricted production area. An office near the production area would allow efficient operation and client management.

- A good layout should also include proper positioning of the equipment and tools to allow for efficient movement of worker and material within the production area.
- All aspect of sanitation and GMPs should be considered in the layout. This includes provision of hand washing stations, proper positioning of comfort rooms, and location of washing station for utensils. A good layout should also include storage areas for raw material, equipment, utensils, packaging materials, and finished goods. It is understood that finished goods will be taken out immediately by clients, but a provision for an adequate storage space would be appreciated by clients who need to temporarily store their finished goods.
- Raw materials are brought in as needed but for commonly used items such as flour, sugar, and ingredients needed in small quantities, provisions may be made for their storage. Usually clients can take the amount that they need of these raw materials, upon permission by the staff. Raw materials unique to each client are usually brought in by the clients themselves, but a temporary holding area for raw materials right next to the raw material preparation area is excellent.
- Technology transfer for the management and operation of the incubation facility is absolutely critical.
- It is highly recommended that an incubation facility has its own set of management staff that is permanent and not co-terminus with the head of the local government unit. In the Philippines, each local government unit in a municipality is headed by a mayor, elected every 3 years. Under the mechanism for the operation of the incubator, it is the local government that assumes the responsi-

Table 4: The rest of clients and the corresponding volume of production at Brooke's Point Kitchen Incubator

No.	Name of Product	Name of Firm	Product output
14	Coconut cookies	Ate Noma's	144 pcs./day
15	Cinnamon bread	Delicacies	144 pcs./day
16	Baked biko	Liza's Delicacies	6 trays/day (2)
17	Moringga powder		10 packs/week
18	Pastillas	Fats Pastries and Delicacies	50 packs/day
19	Yema		50 packs/day
20	Leche flan		25 Every 3 days
21	Ube jam	LoiCris Food Products	12 bots./week
22	Ube jalaya		30 pcs./week
23	Fruit coctail	BPKIFPA Products	50 bots./mo
24	Fruit jam/jelly		50 bots./mo
25	Glazed fruit/candies		50 packs/mo
26	Tea	Palawan's Best	250 bags/wk

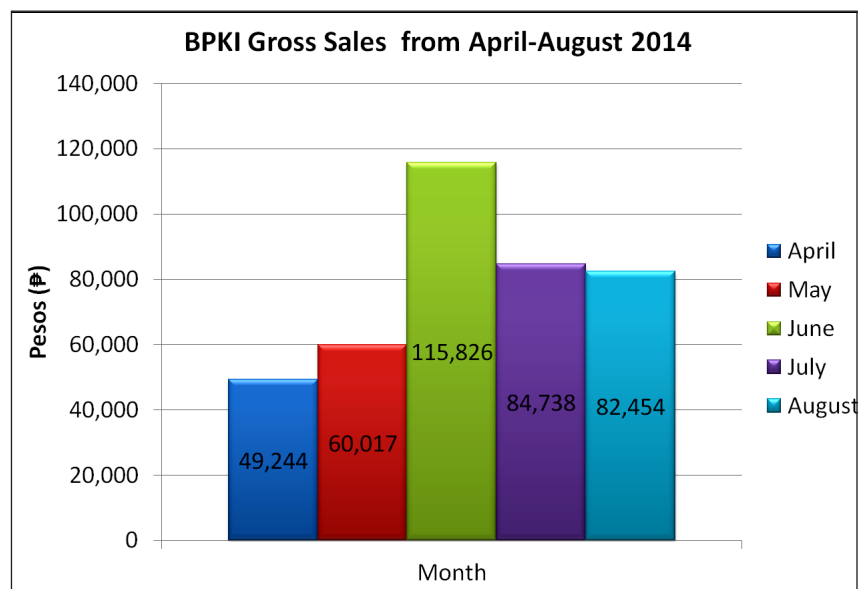


Figure 9: Aggregate gross income of clients from April to August 2014

Table 5: List of trainings conducted in Brooke's Point Kitchen Incubator

Trainings Conducted in Brooke's Point		
Year	Municipality	Title of training
2012	Brooke's Point	Training on GMP and HACCP
2012	Brooke's Point	Product research and development
2013	Brooke's Point	Training on food processing and preservation
2013	Brooke's Point	Training on fruit preservation
2014	Brooke's Point	GMP and Kitchen Incubator management training



Figure 10: Training on food processing and preservation

bility of designating the staff and operating the facility. However, since the mayor has a term of 3 years, the management staff could be replaced if a new mayor gets elected. In the case of the BPKI, the transition to a new set of management staff, who, despite a fresh round of orientations and training would require sometime to absorb and internalize the technology of running the facility.

- The operation of a kitchen incubation facility has to be subsidized. Specifically in this project, the overhead cost of management is borne by the local government unit. It provides for the salary of the staff while a regular senior employee had been designated as the manager. Aside from compensating the staff, the local government also pays the utilities and provides the funds to upgrade the building used as incubator.

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RURAL FEMALE ENTREPRENEURSHIP IN THE EASTERN HIMALAYAN REGION OF SOUTH ASIA

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Abstract

The Eastern Himalayan region of South Asia comprising Bangladesh, Bhutan, India, and Nepal entails low ranking in generation of rural female entrepreneurship (RFE) owing to multiple factors having geographic, historical, socio-economic and political reasons. The wisdom of promoting RFE as a viable and effective tool of rural poverty reduction has not gained salience with the policymakers of the region. Focus in this article is on the theoretical paradigms of RFE to be followed by brief appraisal of female entrepreneurship policies, institutional mechanisms, and obstacles confronting female entrepreneurs in each country. While enumerating various obstacles, the analysis also offers some viable suggestions to generate new opportunities for female entrepreneurs with specific emphasis on intergovernmental cooperation by pooling resources.

Introduction

In geographical terms, the Eastern Himalayan region refers to the region lying between 82.70°E and 100.31°E longitude and 21.95°N to 29.45°N latitude, encompassing a total area of 524,190 sq. km.

The region extends from the Kaligandaki Valley in central Nepal to northwest Yunnan in China, also incorporating Bhutan, the northeastern states and north Bengal hills in India, southeastern Tibet, and parts of northern Myanmar (Figure 1). However,



Source: www.cepf.net/news/top_stories/Pages/himalayas_journal8.aspx

Figure 1: The Eastern Himalayan region of South Asia

for the purpose of present study, we are focusing on the Eastern Himalayan region of South Asia which inter alia includes countries of Bangladesh, Bhutan, India, and Nepal. Accordingly, the focus of the present article is on Rural Entrepreneurship in the Himalayan Region of South Asia.

Rural female entrepreneurship

There prevails almost general agreement between experts like Frazier et al. (2012), and Fuller-Love et al. (2006), and others, that one of the most vital components of local economic development strategy is rural entrepreneurship. In general, the notion of entrepreneurship is a term describing individuals that recognize the opportunities in order to satisfy needs and who gather resources to meet them (Jones, 1999). For the purpose of this paper, reliance is placed on the definition of entrepreneurship proposed by Wennekers and Thurik (1999, p. 46):

“Entrepreneurship is the manifest ability and willingness of individuals, on their own, in teams, within and outside existing organizations, to: (1) perceive and create new economic opportunities (new products, new production methods, new organizational schemes and new product-market combinations), and to (2) introduce their ideas in the market, in the face of uncertainty and other obstacles, by making decisions on location, form and the use of resources and institutions.”

This definition is exhaustive enough to envisage a multidimensional concept of entrepreneurship by demonstrating that entrepreneurship involves particular creative human behavior in context of specific external factors.

Entrepreneurs have come to play a crucial role in the promotion of rural development and Saxena (2012) has underlined that the rural development is linked to entrepreneurship more than ever before. Entrepreneurship is widely regarded by

many experts as a development strategy. Rural entrepreneurship means the same as rural industrialization. Rural entrepreneurship can be regarded as an attempt to create the management for risk-taking appropriate to opportunity as well as to mobilize human, material, and financial resources in order to fulfill the project in rural areas (Saxena, 2012).

Rural areas are disadvantaged in some ways compared to the urban areas; there is a huge difference in the economic performance between these regions (Smallbone, 2009).

Stathopoulou *et al.* (2004) have opined that the process of entrepreneurship in countryside is the same as in urban centers. However, the rural milieu imposes specific challenges and opportunities that ultimately change the outcome of entrepreneurial efforts. The success of the entrepreneur in the rural area is determined by specific environmental circumstances as well as characteristics of the entrepreneur. The following factors distinguish circumstances for entrepreneurs in rural areas.

Physical environment

Geographical location and availability of natural resources are vital aspects of rural entrepreneurship. Distance from denser populated centers is a drawback, since it means smaller market size, poor accessibility to customers, suppliers, and institutions (Stathopoulou *et al.*, 2004). On the other hand, accessible rural areas are rather advantageous for businesses (Keeble and Tyler, 1995). Availability of natural resources can afford new business opportunities for both manufacturing and recreation. Besides, rural areas endowed with remarkable amenities may prompt entrepreneurs to start businesses there, even though it may not be a rational option from an economical point of view (Johnson and Rasker, 1995).

Social environment

Kjeldsen and Svensen (2011) opine that relationships and trust among people created by developed social capital facilitate regional business cooperation and networking that can benefit entrepreneurs. Besides, prospects of additions in revenue also spur the local administration to intro-

duce policies directed toward promoting entrepreneurship. Rural entrepreneurs can benefit from using unique local characteristics to differentiate and market their products/services. Kneafsey *et al.* (2001) believe that "culture economy" is a profitable force of development for rural regions.

Economic environment

Economic environment entails appropriate infrastructure and availability of business networks for thriving of rural entrepreneurship. Stathopoulou *et al.* (2004) have aptly pointed out that adequate infrastructure is highly desirable and helpful to rural entrepreneurs because remoteness and high transportation costs make countryside businesses less competitive and attractive to customers, suppliers, and employees.

Young (2010) concludes that local networks are crucial to development of rural firms. These networks can together reach larger markets, increase resilience, and give ability for every member to take more risks. Even internationally oriented rural businesses rely heavily on their local networks. In addition, friendship and family relations provide supportive atmosphere inside rural firms. It is generally acknowledged that information and communication technologies (ICTs) open unprecedented opportunities for SMEs in rural locations. Information is easily collectable, market boundaries are broadened, cooperation is assisted, and resources are easily reachable with the help of ICT. All these combat disadvantages imposed on rural areas by distance and small market size (Stathopoulou *et al.*, 2004).

RFE in Bangladesh

Bangladesh is a densely populated country endowed with scarce resources where society is highly stratified (World Bank, 2003). Services and opportunities are determined by gender class and location. About 84 percent of 140 million people of Bangladesh live in rural areas and women make up nearly half of the population (Afrin *et al.*, 2008). Moreover, the study by REOPA-CST (UNDP, 2010) indicates that in Bangladesh, with 50 percent rural poverty rates are chronically poor people, even though having huge potential of this pro-

portion; especially the women who suffer from continuous food insecurity, cannot own any cultivable land or assets, are often found to be illiterate, and may also suffer serious illness or disabilities.

It has been further argued in the same study that one of the main causes of rural poverty in Bangladesh is extreme climate; a large proportion of the country is low-lying and vulnerable to flooding which causes damage to crops, homes, and livelihoods (IFAD, 2010). Besides, the burgeoning population growth and the pressure of environment disasters such as soil erosion and flooding aggravate the situation for poor village people including poor women.

These circumstances usually emerge when they become the heads of their households such as widows or wives of men who have migrated in search of employment. Women suffer discrimination because of their gender. Also, they have limited earning opportunities and their nutritional intake is often inadequate. Among extremely poor people, there are a disproportionate number of households headed by women (UNDP, 2007).

Recent researches on rural women entrepreneurs' status reflect their unequal position in the society in Bangladesh. The entrepreneurship status of the population during 1999 shows that out of 46.8 percent self-employed citizen, women make up only 8.3 percent. According to a report by USAID (2011), only 24 percent of women participate in the labor force compared to 84 percent of men. Female participation is also concentrated in lower-level jobs, and wages are about only half of the male wage rate.

Correspondingly, according to Bangladesh's Sixth Five Year Plan — FY2011–FY2015, the government of Bangladesh makes a clear commitment to equality between women and men in its recently-approved "Poverty Reduction Strategy Paper" (PRSP). It sets out several strategic goals:

- Enhance women's participation in decision-making;
- Promote gender equality and empowerment of women (also a Millennium Development Goal); and

- Ensure women's full participation in mainstream economic activities (USAID, 2011).

There are a number of key challenges faced by rural women entrepreneurs in Bangladesh, which adversely impact women empowerment in entrepreneurship development in rural Bangladesh. These inter alia include: lower literacy rate of women, inadequate government effort and lack of institutional framework, adverse socio-religious customs and traditions, lack of consciousness among men and women, failure of women to respond to modernization, and failure to provide adequate safety and security to women (Bhuyan and Abdulla, 2007).

RFE in Bhutan

The Kingdom of Bhutan is situated in the Eastern Himalayas, between the Tibetan plateau of China in the north and the Indian states of Assam and West Bengal to the south and east, and Sikkim to the west.

The poverty prevalence in Bhutan's rural areas stands at 30.9 percent (and in some areas as high as 52.9 percent). Bulk of Bhutan's population is concentrated in the broad river valleys. Bhutan's economy is dependent on the traditional sector comprising farming, animal husbandry, and forestry, accounting for roughly 40 percent of GDP. However, the share of modern sector, comprising manufacturing, mining, hydropower generation, and construction, grew to about 30 percent of GDP during 2002. Tourism may become a lucrative service sector business and one of the important sources of hard currency albeit its negative impact on culture and the environment is contained.

The goal making "people prosperous and happy" has pervaded into the development policy of Bhutan since the beginning of the Five Year Plans (FYPs) in the 1960s. In late 1980s, the king of Bhutan formally introduced his vision for Bhutan by enunciating the concept of happiness by declaring: "Gross National Happiness is more important than Gross National Product", whereby happiness takes precedence over economic prosperity in the national development (Priesner, 1999). The con-

cept of gross national happiness (GNH) is human centered, as it places the individual at the center of all development efforts and recognizes that material, spiritual, and emotional needs of the individuals must be fulfilled. So the development efforts have been directed toward fulfilling these needs rather than material needs only.

GNH rests on "four pillars" of development principles: sustainable and equitable economic development, conservation of the environment, preservation and promotion of culture, and good governance. The development efforts need meticulous orchestration of these principles, intended to bring harmonious development in the future, balancing environmental sustainability, social well-being, and spiritual richness of the Bhutanese society.

The notion of RFE in Bhutan is also affected by the concept of GNH or Gross National Product (GNP). The participation of Bhutanese women in the industrial sector is almost minimal because industries are not highly developed in the country. Women in rural areas are mostly engaged in weaving, knitting, embroidery and cane-basketry, etc., which are categorized as home-based cottage industries.

Agriculture is the major activity on which the rural population is dependent. Except in Lhotshampa group, land is owned by women in both Ngalops and Sharchops who follow matriarchal family system. Women inherit agricultural land and associated properties. They have a more central role in the family. They have access to livestock also. The control of income is in the hands of the women and henceforth the decision-making powers concerning household expenditure.

Marketing patterns seem to influence the control of income within the household. Women seem to frequent market with poultry, butter, cheese, and vegetables and the income generated from these products is generally kept and used by women for their own expenditure as well as to run the household. Men or women who sell milk to local markets generally have control of the income for their own use. The households selling milk to cooperatives tend to use their income for family rather than for their personal use (Rajput, 2011).

The Bhutan Government's Department of Agriculture has established several training projects for women in various districts. The regular farmer training programs also try to involve women trainees in Khangma of Tashigang district of Bhutan. Several training courses for women focus on child health care, improved method of food processing and preservation, kitchen gardening, knitting, tailoring, and weaving. Subjects such as personal hygiene and environmental sanitation are also introduced during these short-term training courses (Rajput, 2011).

RFE in Nepal

Women constitute half of the total population in Nepal. Women, in particular in rural areas, lack choices and opportunities to improve their living standards. They are restricted by poverty, cultural stereotypes, and poor access to education and health care services. These strong socio-cultural restrictions perpetuate gender discriminations and their inferior status over time. Girls constitute 49 percent of the children below 18 years in Nepal. Adolescents and youth (11–25 year range) comprise roughly 33 percent of the population (CBS, 2012). Across the country, women are deprived from equal access to education and the girl's literacy rate is 42.8 percent as compared to boys' literacy rate (68 per cent; Plan Nepal, 2010).

Gender disparities are obvious in the employment sector as well. Only 48.9 percent of the Nepalese women are considered as economically active, while men's rate is 67.6 percent. Additionally, share of women in paid employment in non-agriculture sector is only 17.5 percent (CBS, 2012). The low female rates are explained by the fact that women in Nepal are engaged in self-employment and domestic unpaid work.

Low profitability accruing from agriculture and the lack of land are the two main reasons for women's engagement in the non-farm sector in Nepal. The non-farm businesses enable women to manage cash on a daily-basis and to consistently participate in household economic life. This is in line with available literature, which states that one of the main factors influencing

rural household decisions regarding the extent of their involvement in Rural Non-Farm Economy (RNFE) are the incentives offered such as the relative profitability and risk of farm and RNF activities (Ellis, 1998; Hazell and Reardon, 2010).

Lack of land ownership spurs rural women in Nepal to seek other and more profitable economic opportunities by shifting work toward the non-farm sector. The female informal businesses, which tend to be initially more livelihood oriented instead of growth oriented, are seemingly in accordance with literature on female entrepreneurial development initiatives (ILO, 2007).

Generally, women entrepreneurs in Nepal, like female entrepreneurs elsewhere, are influenced by the need of low initial investments both in infrastructures and managerial matters: they start activities that are preferentially home-based businesses and where it is possible to make use of personal items, overcoming the need to invest in working tools and physical units.

Evidently, apart from being livelihood oriented, non-farm businesses managed by female entrepreneurs in Nepal often remain confined to low-productivity and low-growth market sections, in which gender plays a major role when analyzing opportunities and constraints. This trend is compatible with several studies on female entrepreneurship, which show that gender and social status restrict access to the most lucrative non-farm activities as women lack the information, technical skills, and financial capital required to effectively manage the business (Davis, 2003; Hill, 2011; Jamali, 2009; Reardon, 2009).

Vast array of factors, perceptions, and attitudes wield impact on the ability to strengthen an economic activity. Many women entrepreneurs in Nepal experiencing an increase in business profits over time are involved in a specific activity for a period between 1 and 5 years. These successful women are self-confident and they are driven by a strong wish to be economically more independent. Similar trends have been reinforced literature on female entrepreneurship (Bushell, 2008; ILO, 2007; Islam, 2011).

The study also suggests that family and friends networks are the most significant sources of social support for non-farm women entrepreneurs as, in general, they are women's main source of information and help when business-related problems, doubts, or knowledge are at stake. Women make use of these close networks in order to get recommendations, information, and/or share experiences about their own businesses. This emphasizes the idea of Bebbington (1999) when mentioning that particular attention has to be paid to the importance of social capital as an asset through which people are able to widen their access to resources and other actors.

The rural female entrepreneurs in Nepal are faced with problems such as lack of adequate skills to strengthen knowledge and improve management of their business, gender-specific deficits, limited outreach, lack of access to business information, and supportive professional networks.

RFE in India

Women entrepreneurship is a phenomenon of recent origin in India which started gaining salience in the late 1970s. Over the years, more and more women are venturing as entrepreneurs in all kinds of business and economic activities. Though at the initial stage, women entrepreneurship developed only at urban areas, in recent times, it has extended its wings to rural and semi-urban areas too.

Unlike the 1970s when women concentrated much on traditional activities only, women entrepreneurs now have diverted toward non-traditional activities and have responded favorably to changing situations. The government and non-government organizations (NGOs) are giving more prominence in promoting self-employment among women and building up women entrepreneurship (Verma, 2005).

The Rural Entrepreneurship Development Programmes (REDPs) in India have been institutionalized by the Entrepreneurship Development Institute of India, Ahmedabad. The civil society institutions are seen as agents who help state agencies in implementing the programs. The component is the role state expects. The

NGOs are expected to undertake motivation, training, and the follow-up programs (Desai, 1991). The REDPs are designed to support a person or group wishing to start a business. It inculcates in the entrepreneur the necessary entrepreneurial traits that develop the personnel, financial, technical, managerial, and marketing capabilities and skills. The government acts as a catalytic force of the emergence of new entrepreneurs through provision of infrastructural and other facilities. India has diversified multiagency institutional credit structure comprising of commercial banks, cooperative banks, and regional rural banks for the development of micro entrepreneurs (Sathiabama, 2010).

Financial assistance is provided under REDPs to reputed NGOs and professional agencies for conducting REDPs covering skill up gradation, market-oriented training programs, and training of and by master-craftswomen. It is stipulated that 30 percent women should be the beneficiaries in rural development programs run by the government.

Various programs are in existence to promote RFE in India. The Integrated Rural Development Programme (IRDP) is a major credit linked self-employment program for poverty alleviation. Development of Women and Children in Rural Areas (DWCRAs), a sub-component of IRDP, aims at organizing women in socio-economic activity groups with the dual objective of strengthening them. The Training of Rural Youth for Self Employment (TRYSEM), a supporting component of the IRDP, is a scheme to equip rural youth with the necessary technical and entrepreneurial skills through a training institution or a master craftsman, so as to enable them to take up income-generating activities. Out of the total number of beneficiaries under the scheme, at least 40 percent should be women (India Annual Reference, 2013).

The government of India has set up Women's Development Corporations (WDCs) to promote self-employment among women and to mainstream them into the development process. The aim of these corporations is to provide technical, managerial, marketing, and financial information for the weaker sections of women,

so that they can generate a sustained income for themselves. The main functions of the corporations are to facilitate the availability of credit through banks and other financial institutions.

Undoubtedly, the government of India has launched many developmental programs for increasing entrepreneurship; nevertheless, the rural women entrepreneurship has not been able to achieve much. Hence, there exists a gap between what they possibly can and actual performing with the existing facilities. This implies that the women entrepreneurs are not able to exploit the resources at a fullest level which might be due to knowledge, social, and psychological problems.

The main problems faced by women entrepreneurs in India are financial problems, over dependence on intermediaries, scarcity of raw materials, intense competition, high cost of production, low mobility, family ties and responsibilities, economical and social status, adverse effects of risk learning, lack of learning, lack of education and skill acquisition, and low need for achievement.

Due to their family responsibilities, women have less time. They have to look after both their children and business. Most of the women have lack of mobility and do not undergo additional training and they are handicapped by their inability to move from one place to another to their work. The problem in rural and remote areas is different from others. The number of problems encountered is entrepreneurial, general, knowledge, social, and psychological.

Conclusion

The promotion of RFE in the countries of the Eastern Himalayan region of South Asia is confronted with some common problems such as lack of access to finance and financial institutions, absence of access to markets, dearth of adequate training facilities, paucity of access to networks, non-involvement of women entrepreneurs in policymaking process, lack of infrastructure, inaccessibility to technology, absence of strategic support services, and non-availability of land to establish micro-enterprises.

These and other ancillary problems are still major barriers preventing women from realizing their full potential as entrepreneurs in rural areas in the Eastern Himalayan region of South Asia. The lack of financial capital is widely recognized by women as the main problem to starting a business and/or to strengthening ongoing microenterprises. Undoubtedly, women have access to loans and/or to personal resources; nevertheless, some businesses require greater investments and larger physical structures. Besides, when planning broader schemes of financial support, it is important to do so in tandem with consistent business tools such as market research and business planning, so that the success rate of these microenterprises can be higher.

There is a need for promoting and expanding non-farm economic activities, so that women entrepreneurs who lack resources in agriculture can harness their energy in non-farm economic activities with the financial and technical support from the government. Facilities should be put in place to provide women with greater support from cooperatives regarding knowledge about suppliers, book-keeping, and profitability as well as for regular training programs to be held on the subjects of management and profitability, marketing, and fashion design.

Apart from upgrading access to financial capital, improving human capital available to women entrepreneurs seems to be key aspects. Women entrepreneurs generally lack access to business-related information, knowledge, and training. This happens either because women have no access to membership in business associations, no access to an effective professional network or because women were not informed about ongoing business-related programs provided by cooperatives or other agencies. However, the external environment also contributes to influence the rural economy and scenario. Therefore, rural women entrepreneurs also need public assets and strengthened access and knowledge about the legal framework.

Keeping in the fact that rural non-farm activities are multiple and becoming widespread across rural landscapes, there is dire need for developing these activi-

ties through local agricultural linkages. Therefore, it is essential to provide training programs and education on non-farm activities that are not disconnected from the external rural environment. These programs could be provided on veterinary services, for example, and training related to supply of agricultural inputs such as fertilizers, tools, and less traditional techniques.

Social networks play important role in making knowledge available and micro-enterprise development possible. Accordingly, successful women entrepreneurs can assist in supporting the establishment of mentoring networks in order to facilitate the development of young and inexperienced female entrepreneurs.

There is a need for establishing an intergovernmental agency comprising representatives of the governments of Bangladesh, Bhutan, India, and Nepal to work out a comprehensive regional plan for the promotion of RFE by pooling together resources, networking, exchange of experts, and technological and other logistics.

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Entrepreneurship Development Network Asia

The Entrepreneurship Development Network Asia (EDNA) connects leading universities in the Asian region who have the desire and capacity to develop coordinated entrepreneurship and innovation teaching, research and outreach. EDNA supports entrepreneurship education and engagement with local institutions. The goal is to ensure local institutions are networked with each other, have access to specialist resources and are able to leverage each other's strengths.

For more information, access:

<http://edna.asia>

Tech Events

2015

Jan 15-17
Mumbai,
India

7th Global IP Convention

Contact: ITAG Business Solutions Ltd.
Intellectual Property Consultants
Suite #1C&1D, 1st Floor, Subham Plaza
83/1, Beliaghata Main Road
Kolkata – 700 010, West Bengal, India
Tel: +91-33-2363-3924/25 (IN); +1-408-694-310 (US)
Fax: +91-33-2372-0635
Web: <http://www.iprconference.com>

Jan 19-22
Abu Dhabi,
UAE

World Future Energy Summit (WFES)

Contact: Reed Exhibitions Middle East, P.O. Box 77899
Abu Dhabi, United Arab Emirates
Tel: +971-2-491-76-15; Fax: +971-2-491-76-12
Web: <http://www.worldfutureenergysummit.com>

Jan 28-31
Tiruvannamalai,
India

2nd International Conference on "Bioenergy, Environment & Sustainable Technologies – BEST2015"

Contact: The Organizing Chairman, BEST2015
Department of Biotechnology, Arunai Engineering College
Tiruvannamalai – 606603
Tamil Nadu, India
Tel: +91-89038-88961; Mobile: +91-94887-73165
Fax: +91-4175-237789
E-mail: icbest2015@gmail.com
Web: <http://www.best.biotechpage.com>

Jan 29-31
Bangalore,
India

ICIER-IIMB International Conference on Entrepreneurship Education and Training: Design, Delivery and Effectiveness

Contact: Dr. Princy Thomas
Conference Secretariat, P-101, Faculty Block C
Indian Institute of Management Bangalore
Bannerghatta Road, Bangalore – 560 076, India
Tel: +91-(0)80-2699-3694 (Off); Mobile: +91-9741414089
Fax: +91-80-2658-4050
E-mail: icierconference@gmail.com
Web: <http://www.iimb.ernet.in/icier-iimb-international-conference>

Feb 9-10
Singapore

4th Annual International Conference on Sustainable Energy and Environmental Sciences

Contact: SEES Conference Secretariat
Global Science & Technology Forum (GSTF)
10 Anson Road, International Plaza
Singapore 079903
DID: +65-6327-0166; Fax: +65-6327-0162
E-mail: secretariat@env-energy.org
Web: <http://www.env-energy.org>

Mar 10-11
Seoul,
Republic of Korea

2015 6th International Conference on Food Engineering and Biotechnology (ICFEB 2015)

Contact: Ms. Lydia Liu, CBEEs Senior Editor
Asia-Pacific Chemical, Biological &
Environmental Engineering Society (APCBEEs)
Tel: +852-3500-0137
E-mail: icfeb@cbees.org
Web: <http://www.icfeb.org>

Mar 13-15
Seoul,
Republic of Korea

5th BIOTECH 2015 – Advances in Biotechnology

Contact: BIOTECH Conference Secretariat
Global Science & Technology Forum (GSTF)
10 Anson Road, International Plaza
Singapore 079903, Singapore
DID: +65-6327-0166; Fax: +65-6327-0162
E-mail: secretariat@advbiotech.org
Web: <http://www.advbiotech.org>

Apr 2-3
Bali,
Indonesia

World Clean Coal Conference

Contact:
E-mail: mss@worldcleancoal.org
Web: <http://www.worldcleancoal.org>

Apr 5-8
Seoul,
Republic of Korea

BIO KOREA 2015

Contact: BIO KOREA Organizing Committee
Tel: +82-1661-0810 (Dir. 1)
E-mail: registration@biokorea.org
Web: <http://www.biokorea.org>

Apr 22-23
Bangkok,
Thailand

International Conference on Biotechnology, Nanotechnology and Environmental Engineering (ICBNE'15)

Contact:
Tel: +66-849204416; +66-822120260
E-mail: info@iaast.org
Web: <http://iaast.org>

Apr 25-28
Jiangsu,
China

IBIO 2015 – BIT's 8th World Congress of Industrial Biotechnology

Contact: Ms. Fay Ren, BIT Congress Inc.
Tel/Fax: +86-411-8479-9609 x827
E-mail: fay@bitlifesciences.com

May 20-22
Dalian,
China

IWA Regional Symposium on Environmental Nanotechnology 2015

Contact: Dr. Hongtao Yu
Secretary, Conference Organizing Committee
School of Environmental Science and Technology
Dalian University of Technology
Linggong Road 2, Ganjingzi District
Dalian 116024, China
Tel: +86-411-84706267; +86-15840696039
E-mail: iwanano2015@dlut.edu.cn

May 30-Jun 3
Hong Kong,
China

The 12th IWA Leading Edge Conference on Water and Wastewater Technologies

Contact:
Tel: +44-207-654-5500; Fax: +44-207-654-5555
E-mail: let2015@iwahq.org

Jun 4-6
Prague Czech
Republic

4th International Renewable Energy and Environment Conference (IREEC-2015)

Contact:
E-mail: contact@warponline.org
Web: <http://www.warponline.org>

Jun 13-16
Osaka Prefecture,
Japan

The Fifth Asian Conference on Sustainability, Energy and the Environment 2015

Contact:
E-mail: acsee@iafor.org
Web: <http://iafor.org/iafor/conferences/acsee2015/>

Jun 15-16
Bangkok,
Thailand

2015 4th International Conference on Environment, Energy and Biotechnology (ICEEB 2015)

Contact: Ms. Lydia Liu, CBEEs Senior Editor
Asia-Pacific Chemical, Biological & Environmental
Engineering Society (APCBEEs)
Tel: +852-3500-0137
E-mail: iceeb@cbees.org
Web: <http://www.iceeb.org>

Jul 12-18
Chengdu,
China

International Conference on Composites/ Nano Engineering (ICCE-23)

Contact: Professor David Hui, Conference Chair
Department of Mechanical Engineering
University of New Orleans, New Orleans,
LA 70148, United States
Tel: +1-(504)-280-6652; Fax: +1-(504)-280-6192
E-mail: dhui@uno.edu
Web: <http://www.icce-nano.org>

Sep 1-3
Bangkok,
Thailand

ASEAN Power Week – POWER-GEN Asia, Renewable Energy World Asia and the POWER-GEN Asia Financial Forum

Contact: Lee Catania, Senior Marketing Manager
Tel: +44-(0)-1992-656-647; Fax: +44-(0)-1992-656-700
E-mail: leec@pennwell.com
Web: <http://www.aseanpowerweek.com>

Tech Ventures & Opportunities

Business Coach

Start-up Venture Creation

- Starting a business: pricing your product
- Records management

Technology Transfer

- An Indian perspective on licensing or sale of patents
- Patents in Thailand

Venture Financing

- Patents as collateral for Singapore companies
- Venture funds in Malaysia

Managing Innovation

- Government schemes and incentives in India
- Innovation certification for enterprise rating and transformation (1-innocert)

Green Productivity

- Green ratings
- Cleaner production case studies from Viet Nam

Tech Opportunities

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- Portable harvesting tool for thorny species (India)
- Value-added chemicals from cashew nut shell liquid (India)
- Biomaterials from regenerated silk fibroin (India)
- Titanium dioxide nano needles (India)
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Technology Resources and Networks of APC T T



Technology Opportunities
www.technology4.sme.net



Business Information
www.business-asia.net



Innovation Systems
www.nis.apcctt.org



Biotechnology Network
www.binasia.net



Traditional Medicine Network
www.apcctt-tm.net



Latest Innovations & News
www.techmonitor.net



Starting a business: pricing your product

Business Knowledge Resource Online, India

<http://business.gov.in>

Fixing the right price for a product is the most difficult task as it affects the volume of sales of the product of the firm as well as the profits of the firm. Although non-price factors have become more important in recent decades, price remains one of the important elements in determining the market share and profitability. Prices are set by a firm by taking into consideration factors such as costs, profit targets, competition, and perceived value of products. Taking into account the various factors, the steps generally followed in setting the price of a product are the following. Common start-up costs

Setting the pricing objective of the firm

It is the most important step as it varies from firm to firm. Setting a lower price may attract more customers and thus fetch a larger market share for the firm's product. But charging a higher price might reflect a high quality and prestige product.

Determining the demand for the product

Demand for the product sets a ceiling price. Penetration pricing is used when the product has a highly elastic demand and there is strong competition in the market. Under this policy, prices are fixed below the competitive level in order to obtain a larger share of the market. Once your product is in demand or is accepted in the market, the price of your product is increased. But when the demand for the product with respect to price is more inelastic, higher prices are charged for the product. This policy is generally followed during the initial stages of introduction of the new product.

Estimating the costs and profits

Costs set a floor price. Amount spent and return expected is the key factor in deciding the price. The various costs involved in producing the product must be covered in pricing the product. On a long-term basis also, the price must take into consideration the costs of doing business. This also includes sales forecast and profit margin.

Determining the competition for the product

Competitor's prices and the price of substitutes provide an orientation point. The number of competitors for the product in the market as well as the policy followed by them is also an important factor. Competitive pricing is used if the market is highly competitive and the product is not differentiated from that of the competitor's.

Considering the governmental regulations

Government policies and incentives are also taken into account. Prices are also affected by various tax liabilities which a company and the product is subjected to. It includes excise duty, sales tax, and local taxes like octroi.

Sales tax is levied on the sale of moveable goods in India at the rates which vary depending upon the type and nature of goods and the state in which sale has taken place. The central and state governments are both empowered to impose sales tax. The central sales tax deals with transactions in the nature of interstate sales, while the state sales tax deals with intrastate sales.

Octroi is a tax levied on the entry of goods into a municipality or any other specified jurisdiction for use, consumption, or sale. Goods in transit are exempted from it.

Selecting a suitable pricing method/policy

Right price for the product can be determined through pricing research and by adopting test-marketing techniques. The various pricing methods are:

- **Perceived value pricing:** in which a firm sets its price in relation to the value delivered and perceived by the customer. Perceived value is made up of several elements such as buyer's image of the product performance, warranty, trustworthiness, and esteem. Each customer gives different weightage to these elements. Some may be price buyers, others may be value buyers, and still others may be loyal buyers. If either the price is higher than the value perceived or the price is lower than the value perceived, the company will not be able to make potential profits.
- **Value pricing:** in which companies develop brand loyalty for their product by charging a fairly low price for a high-quality offering.
- **Going rate pricing:** is followed if it is difficult to ascertain the exact costs involved and the competitive response. Hence, firms base their price on competitor's price by charging the same, more or less than the major competitor.
- **Introducing a product at a premium price:** When a product is innovative and competition is low or nonexistent, this policy can be applied. Thus, profits are optimized. But when competition arises prices are lowered.
- **Ethical pricing:** Price is fixed keeping the welfare of the society in mind. For many life-saving drugs, this particular policy is used. The product is sold at the lowest possible price with either a very reasonable margin or no profit at all. Profit may be earned from other products.
- **Full line pricing:** If you are selling a range of particular product for example pickles, then you price the product in a particular range; this way you may earn more profit in one flavor and less on the other. But, you cannot sell only the one that gives you maximum profit, or else a customer may switch over to another brand where he would be able to exercise an option for other flavors.

Records management



SMEinfo, Malaysia

<http://www.smeinfo.com.my>

Records management (RM) is the practice of maintaining the records of an organization from the time they are created up to their eventual disposal. This may include classifying, storing, securing, and destruction (or in some cases, archival preservation) of records.

A record can be either a tangible object or digital information: for example, birth certificates, medical x-rays, office documents, databases, application data, and e-mail. RM is primarily concerned with the evidence of an organization's activities and is usually applied according to the value of the records rather than their physical format.

Definitions of records management

In the past, "records management" was sometimes used to refer only to the management of records which were no longer in everyday use but still needed to be kept "semi-current" or "inactive" records, often stored in basements or offsite. More modern usage tends to refer to the entire "lifecycle" of records from the point of creation right through until their eventual disposal.

The ISO 15489:2001 standard defines RM as "The field of management responsible for the efficient and systematic control of the creation, receipt, maintenance, use and disposition of records, including the processes for capturing and maintaining evidence of and information about business activities and transactions in the form of records."

The ISO defines records as "information created, received, and maintained as evidence and information by an organization or person, in pursuance of legal obligations or in the transaction of business." The International Council on Archives (ICA) Committee on Electronic Records defines a record as "a recorded information produced or received in the initiation, conduct or completion of an institutional or individual activity and that comprises content, context and structure sufficient to provide evidence of the activity." The key word in these definitions is evidence. Put simply, a record can be defined as "evidence of an event."

Practicing records management

A records manager is someone who is responsible for RM in an organization. The practice of RM may involve:

- Planning the information needs of an organization;
- Identifying information requiring capture;
- Creating, approving, and enforcing policies and practices regarding records, including their organization and disposal;

- Developing a records storage plan, which includes the short- and long-term housing of physical records and digital information;
- Identifying, classifying, and storing records;
- Coordinating access to records internally and outside of the organization, balancing the requirements of business confidentiality, data privacy, and public access; and
- Executing a retention policy on the disposal of records which are no longer required for operational reasons; according to organizational policies, statutory requirements, and other regulations; this may involve either their destruction or permanent preservation in an archive.

RM principles and automated RM systems aid in the capture, classification, and ongoing management of records throughout their lifecycle. Such a system may be paper based (such as index cards as used in a library), or may be a computer system such as an electronic RM application.

ISO 15489:2001 states that records management includes

- setting policies and standards;
- assigning responsibilities and authorities;
- establishing and promulgating procedures and guidelines;
- providing a range of services relating to the management and use of records;
- designing, implementing, and administering specialized systems for managing records; and
- integrating RM into business systems and processes.

Managing physical records

Managing physical records involves different disciplines and may draw on a variety of forms of expertise. Records must be identified and authenticated. This is usually a matter of filing and retrieval; in some circumstances, more careful handling is required.

Identifying records

If an item is presented as a legal record, it needs to be authenticated. Forensic experts may need to examine a document or artifact to determine that it is not a forgery, and that any damage, alteration, or missing content is documented. In extreme cases,

items may be subjected to a microscope, x-ray, radiocarbon dating, or chemical analysis. This level of authentication is rare, but requires that special care be taken in the creation and retention of the records of an organization.

Storing records

Records must be stored in such a way that they are accessible and safeguarded against environmental damage. A typical paper document may be stored in a filing cabinet in an office. However, some organizations employ file rooms with specialized environmental controls including temperature and humidity. Vital records may need to be stored in a disaster-resistant safe or vault to protect against fire, flood, earthquakes, and conflict. In extreme cases, the item may require both disaster-proofing and public access. Civil engineers may need to be consulted to determine that the file room can effectively withstand the weight of shelves and file cabinets filled with paper; historically, some military vessels were designed to take into account the weight of their operating procedures on paper as part of their ballast equation (modern record-keeping technologies have transferred much of that information to electronic storage). In addition to on-site storage of records, many organizations operate their own off-site records centers or contract with commercial records centers.

Circulating records

Tracking the record while it is away from the normal storage area is referred to as circulation. Often this is handled by simple written recording procedures. However, many modern records environments use a computerized system involving bar code scanners, or radio-frequency identification technology (RFID) to track movement of the records. These can also be used for periodic auditing to identify unauthorized movement of the record.

Disposal of records

Disposal of records does not always mean destruction. It can also include transfer to a historical archive, museum, or private individual. Destruction of records ought to be authorized by law, statute, regulation, or operating procedure, and the records should be disposed of with care to avoid inadvertent disclosure of information. The process needs to be well-documented, starting

with a records retention schedule and policies and procedures that have been approved at the highest level. An inventory of the records disposed of should be maintained, including certification that they have been destroyed. Records should never simply be discarded as refuse. Most organizations use processes including pulverization, paper shredding, or incineration. Commercially available products can manage records through all processes active, inactive, archival, retention scheduling, and disposal. Some also utilizes RFID technology for the tracking of the physical file.

Managing electronic records

The general principles of RM apply to records in any format. Digital records (almost always referred to as electronic records) raise specific issues. It is more difficult to ensure that the content, context, and structure of records is preserved and protected when the records do not have a physical existence. Particular concerns exist about the ability to access and read electronic records over time, since the rapid pace of change in technology can make the software used to create the records obsolete, leaving the records unreadable. A considerable amount of research is being undertaken to address this, under the heading of digital preservation. The Public Record Office Victoria (PROV) located in Melbourne, Australia published the Victorian Electronic Records Strategy (VERS) which includes a standard for the preservation, long-term storage, and access to permanent electronic records. The VERS standard has been adopted by all Victorian government departments. A digital archive has been established by PROV to enable the general public to access permanent records.

Electronic tax records

Electronic tax records are computer-based/non-paper versions of records required by tax agencies like the Internal Revenue Service (IRS). There is substantial confusion about what constitutes acceptable digital records for the IRS, as the concept is relatively new. The subject is discussed in Publication 583 and Bulletin 1997-13, but not in specific detail.

Businesses and individuals wishing to convert their paper records into scanned copies may be at risk if they do so. For example, it is unclear if an IRS auditor would accept a jpg, png, or pdf format scanned copy of a purchase receipt for a deducted expense item.

Global Brand Database

The Global Brand Database makes it easier to search around 11,820,000 records relating to internationally protected **trade-marks, appellations of origin** and armorial bearings, flags and other state emblems as well as the names, abbreviations and emblems of intergovernmental organizations. The Global Brand database allows free of charge, simultaneous, brand-related searches across multiple collections. The Database page lets you easily search multiple brand-related data sources and receive instant feedback, letting you explore the brand landscape in a new and powerful way.

For further information, contact:
World Intellectual Property Organization
34, chemin des Colombettes
CH-1211 Geneva 20, Switzerland
Web: <http://www.wipo.int/branddb/en/>



An Indian perspective on licensing or sale of patents

InvnTree Intellectual Property Services Pvt. Ltd., India

<http://www.invntree.com>

Patent licensing — introduction

A patent grants the patent owner the right to stop others from making, using, selling, or offering for sale the patent owner's invention without consent. In effect, this allows the patent owner to license or sell their invention to other parties on mutually agreed terms. A license is a legal tool by which a patent owner can transfer the patent rights to any person seeking the rights to work the invention at any time before the expiry of the patent. By granting a license to a person, the patent owner authorizes the person (licensee) to exercise the patent rights under certain circumstances. Patent licensing plays a vital role in technology commercialization.

Procedure for granting/acquiring a patent license

Documentation of the agreement between the parties

The patent owner and the licensee should mutually arrive at and sign an agreement in writing, as recited in Section 68 of the Indian Patents Act. The agreement should include the terms and conditions of the license.

Registration at the patent office

Following the signing of the license agreement, the party acquiring the license has to write to the controller to register the title or interest in the patent within 6 months from the date of agreement. The registration has to be done in accordance with Sections 69(1) and 69(2) and rules 90(1) and 90(2). The application must be accompanied by the agreement signed by both parties to support the validity of the license. The terms and conditions of the license can be kept confidential by the controller on request by licensee or the licensor.

Registration at the patent office

The controller reviews the application upon reception. Once reviewed, the controller enters all details along with the details of the supporting documents in the register of patents as per Section 67.

Any unregistered license agreement will be considered invalid by the controller or the court in case of related proceedings.

In the case of National Research Development Corp (NRDC) vs. ABS Plastics, NRDC was the assignee of two patents relating to a process for the manufacturer of Terpolymers of Acrylonitrile Butadiene (ABS Resins) using emulsion technology. NRDC licensed the patents to

ABS Plastics on July 23, 1975 for a period of 8 years. Under the license, ABS paid a lump sum royalty and agreed to pay a running royalty as well. As ABS failed to pay the royalty due under the license agreement, NRDC filed a suit to claim the pending royalty with interest. After reviewing the case and hearing the arguments of both the parties, the court held that the license was invalid and therefore unenforceable because it was not registered at the patent office. Further, the court cited that under section 69 of the Patent Act a license agreement must be registered at the patent office for it to be valid.

Restrictive/unlawful inclusions in a license

As per section 140 of the Indian Patent Act, unlawful insertions, considered as restrictive conditions, in any contract for sale or lease of a patented article or an article made by a patented process or in license to manufacture or use a patented article or to work any process protected by a patent includes:

- to require the purchaser or licensee to acquire from the vendor or licensor or his nominees, or to prohibit from acquiring or to restrict in any manner or to any extent his right to acquire from any person or to prohibit him from acquiring except from the vendor or licensor or his nominees any article other than the patented article or an article other than that made by the patented process; or
- to prohibit the purchaser or licensee from using or to restrict in any manner or to any extent the right of the purchaser, lessee, or licensee, to use an article other than the patented article or an article other than that made by the patented process, which is not supplied by the vendor or licensor or his nominee; or
- to prohibit the purchaser, lessee, or licensee from using or to restrict in any manner or to any extent the right of the purchaser, lessee, or licensee to use any process other than the patented process; or
- to provide exclusive grant back, prevention to challenges to validity of Patent & Coercive package licensing, and any such condition shall be void.

Conclusion

Appropriate care should be taken to ensure that clauses, which may be considered unlawful, are not included in patent licensing or sale agreements. Further, once the agreement is entered into, appropriate steps have to be taken to keep the agreement valid and enforceable.



Thailand promulgated its first patent law, the Patent Act, in 1979, with significant amendments added in 1992. The Act protects inventions, product designs, and pharmaceuticals. In 1997, a new intellectual property and international trade court began an operation, which has significantly improved enforcement. Appeals procedures at the trademark and patent offices have also been streamlined.

In January 2008, the National Legislative Assembly approved Thailand's plan to join the Paris Convention and the Patent Cooperation Treaty (PCT).

Thailand successfully became a party to the Paris Convention on August 2, 2008 and on September 24, 2009, Thailand submitted the instrument of accession to the PCT, making Thailand the 142nd state to become a contracting party. The PCT became binding on Thailand 3 months from the date of submission, that is, on December 24, 2009.

Since Thailand is a member of the Paris Convention, the World Trade Organization (WTO) and thus the Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPs), nationals of the Paris Convention, and WTO member countries will receive the same protection accorded to Thai nationals.

Accession to the PCT will help to facilitate the registration of patents abroad for Thai inventors. The PCT registration system meets international standards and is accepted by numerous countries; thus, inventors can receive protection in PCT member countries, many of which are Thai export markets such as the United States, Japan, Australia, China, and India. Thailand's participation in the PCT will also help applicants from other member countries seek patent protection for their inventions in Thailand.

Invention patents

For an invention to be patentable, it must

- have novelty;
- involve an inventive step; and
- be capable of being made or used for some kind of production activity.

Therefore, the following would not qualify for patents due to lack of novelty:

- An invention widely known or used by others in Thailand before the filing of the patent application;
- An invention, the subject matter of which was described in a document or printed publication, displayed or otherwise disclosed to the public in Thailand or a foreign country prior to the date of the application for the patent;
- An invention that has been granted a patent inside or outside Thailand prior to the date of the patent application;

Patents in Thailand

Thailand Board of Investment, Thailand

<http://www.boi.go.th>

- An invention for which an application for a patent was filed in a foreign country more than 18 months prior to the date of the patent application, the foreign patent not having been issued; and
- An invention for which application for a patent was filed in Thailand or in a foreign country and that application was published before the date of application in Thailand.

The revised Patents Act provides that the following are not patentable:

- Microbes and any components thereof which exist naturally; animal, plant, or extracted substances from animals or plants;
- Scientific or mathematical rules or theories;
- Computer programs;
- Methods of diagnoses, treatment or cure of human and animal diseases; and
- Inventions those are contrary to public order or morality, public health, or welfare.

In case an invention lacks an inventive step, the invention may be granted a petty patent if it is new and capable of industrial application. However, a petty patent and a patent shall not be granted for the same invention. The legal protection of a petty patent is less than of a patent, that is, term of protection.

Patentable product designs

Product design means any form or composition of lines or colors, which gives a special appearance to a product and can be used in industrial or handicraft applications.

A product design must be novel in order to be patented, that is, it must not fall under any of the following conditions:

- A design widely known or used in Thailand before the filing of the patent application;
- A design picture, the subject matter, or details of which have been displayed or disclosed in a document or printed publication inside or outside of Thailand before the filing of the application;
- A design that has been published in the patent journal under Section 65 and 28 before the filing of the patent application; and
- A design that so nearly resembles any of the product designs indicated in the points described above that it is apparently an imitation.

Non-patentable product designs

- Product designs which are contrary to public order and good morals; and
- Product designs prescribed by Royal Decree.

Eligibility

An inventor or product designer has the right to apply for a patent, as does a successor or assignee of the right. An assignment must be made in writing, signed by both the assignor and the assignee.

If, during the course of employment or an employment contract specifically for creating an invention or design, an employee creates an invention or product design, the right to apply for a patent belongs to the employer unless otherwise provided by agreement.

The Patent Act requires that an applicant for a patent must be a Thai national or a national of a country which allows persons of Thai nationality to apply for patents in that country.

Term of patents and patent holder rights

Term

- The term of an invention patent is 20 years from the date of filing an application in Thailand and is not renewable. The term of protection for a petty patent is 6 years from the date of filing an application in Thailand, which can be extended twice, for 2 years each.
- The term of a design patent is 10 years from the date of filing an application in Thailand.

Rights

- During the period of the validity of the patent, the patent holder has the exclusive right to produce, use, sell, have for sale, offer for sale, and import the patented invention or design. Any act of violation performed before the patent is granted, that would otherwise constitute an infringement of the patent, is not deemed an infringement.
- A patent holder has an exclusive right to use the words "Thai Patent," or an abbreviation or translation thereof.
- A patent holder may assign the patent to another holder.
- A patent holder may assign the patent to another holder.
- A patent holder may grant a license to another person, subject to restrictions:
 - o The patentee shall not impose upon the licensee any condition or restriction or any royalty covenant that is an unfair restraint of competition. Conditions, restrictions, or covenants that unfairly restrain competition shall be prescribed by a Ministerial Regulation.
 - o A patent holder may not require a licensee to pay a royalty or royalties after the validity of the patent has expired.
 - o Conditions, restrictions, or royalties which are contrary to the above two points are null and void.
 - o Any assignment of patent or license contract must be in writing and officially registered with the authority.

Compulsory licensing

An application for a compulsory license may be made under the following circumstances:

- If, after 3 years from granting of patent or petty patent or 4 years from date of application, whichever is later, the patentee or petty patentee has not enforced his/her lawful rights (Section 46 of the Thai Patent Act B.E. 2542).
- If the exercise of the patent rights of one party (the junior patentee) may infringe another patentee (the senior patentee) provided that:
 - o The junior patentee's invention must be a substantial technological advancement which is beneficial to the economy, compared to the invention under the patent for which the license is being sought;
 - o The senior patentee receives a cross-license to exploit the junior patentee's patent rights; and
 - o The junior patentee shall not assign a legal license to anyone unless it is an assignment together with his own patent (Section 47 and Section 47 bis of the Thai Patent Act B.E. 2542).
- A Ministry or a Department may exploit an exclusive right by itself or by designating another person in a patent for the benefit of public utilities or national defense; the preservation or acquisition of natural resources or the environment; the prevention of severe shortage of food or medicine or other necessities for living; or other public interests (Sections 51 and 52 of the Thai Patent Act B.E. 2542).

Cancellation of patents

The Director General may ask the Board of Patents to revoke a patent if:

- 2 years after issuance of license, the patentee or licensee has not manufactured the product or applied process under the patent in the kingdom without any legitimate reason, or for the time being the product is not being sold or imported for sale, or is being sold at an unreasonable high price; or
- The patentee has licensed other persons to exercise the rights under the patent without conforming to prescribed procedures.

Foreign patents

A foreign patent that has not been granted a separate patent in Thailand receives no protection under the Patent Act. However, foreign patent holders or owners of rights to inventions or designs in foreign countries may enter into business transactions with parties in Thailand and seek equivalent protection through contractual obligations in the form of a licensing agreement.

Since foreign patents, inventions, and designs receive no protection under the Patent Act, no civil or criminal action can be taken against a third party who produces or sells a patented product in Thailand without paying fees to the holder of the foreign patent or who applies in Thailand for a patent on an invention or design already patented in other countries. Nevertheless, legal solutions to such conflicts may be available under separate legislation.



Patents as collateral for Singapore companies

Gladys Mirandah, Patrick Mirandah Co. (S) Pte. Ltd., Singapore

<http://www.mirandah.com>

Patents were first used as collateral to secure financing by Thomas Edison in the late 1880s. Edison used his patent for the incandescent electric light bulb as collateral to secure financing to start his company, the General Electric Company. Since Edison's use of his patents as collateral, intellectual property has been used as collateral in the United States. Although the use of intellectual property as collateral did not gain popularity in the late 1800s with Edison's use, it has become quite popular in recent years.

A patent is a right granted to the owner of an invention that prevents others, without the owner's permission, from making, using, importing, or selling the invention. A patentable invention includes a product or a process that gives a new technical solution to a problem, or a new method of doing things, the composition of a new product, or a technical improvement on how certain objects work. A patent has a term of 20 years from the date of filing, subject to the payment of annual renewal fees. One main thing to think about when using patents as collateral is the fact that patent protection is territorial. If filed and granted in Singapore, a patent is only enforceable within Singapore and therefore, the protection is only afforded to a patent owner within Singapore.

On April 8, 2014, Singapore announced details of a new financing scheme aimed at helping local businesses secure bank loans by using their patents as collateral. The Intellectual Property Office of Singapore (IPOS) is the agency that implements this scheme and hopes that this will spark the interest of local companies.

Companies interested in availing themselves of the scheme must be local enterprises incorporated in Singapore and use a granted patent as collateral. As part of the approval process, their patent will be valued by a member of an IPOS-appointed panel, which includes valuation companies, that is, American Appraisal Singapore, Consor Intellectual Asset Management and Deloitte & Touche Financial Advisory Services. The panel will determine the worth of the patent to help banks decide on how much to lend. Three local banks — DBS, OCBC, and UOB — are currently participating in the scheme.

This 2-year plan by IPOS will involve the Singapore government sharing the default risk with participating banks. The banks will start accepting loan applications under this scheme from late second quarter of this year until April 2016. Interest ranging from 3.5

to 7.5 percent will be charged for loans of between 1 and 6 years. This rate is lower than the interest charged to smaller companies seeking unsecured loans, which is 8–10 percent.

IPOS chief executive Tan Yih San, during the scheme's launch, said: "What we are (doing) is to work with the banks to recognize intangible assets, which is not quite something that is readily available in the loan market today." He added that the scheme will open opportunities for companies to grow and expand not just locally, but overseas as well.

During the same event, Indranee Rajah, Senior Minister of State (Law and Education), said: "There is a growing trend of businesses being valued based on intangible assets. According to a report by Brand Finance, 42% of enterprise value in Singapore was in intangible assets in 2012, up from 35% in 2011. With IPOS' new IP Financing Scheme, businesses can monetize their IP assets," she added.

There are several advantages of using intellectual property as collateral.

One advantage is that intellectual property can be more secure than other forms of collateral. Most investors only invest in intellectual property that is receiving licensing royalties. The royalty payments are the ultimate source of cash that repay the loan. Hence, there is a consistent source of cash flow to repay the loan through licensing, and therefore, lower the risk of default. Another advantage is the increased return the owner of the intellectual property earns. Using intellectual property as collateral increases the owner's return through increased leveraging. Many royalty streams are collected in one lump sum rather than over time, and this lump sum can then be invested in future or current projects that have a higher return than the cost of financing.

On the other hand, risk is the main disadvantage in using intellectual property as collateral. However, this can be minimized through proper loan structure.

As Singapore is increasingly becoming a technology-driven, knowledge-based economy, the use of intellectual property as collateral will become popular moving forward.

Note: The article was first published in *Asia IP magazine*.

Source: <http://www.asiaiplaw.com/article/41/1817/>



Venture funds in Malaysia

Multimedia Development Corporation (MDeC) Sdn Bhd, Malaysia

<http://www.mscomalaysia.my>

Product development and commercialization fund (PCF)

Product development and commercialization fund (PCF) is aimed at assisting local MSC Malaysia (formerly the Multimedia Super Corridor) status companies to accelerate the development and commercialization of innovative, market-driven product/solutions/services as well as increasing the creation of intellectual property for commercialization.

About PCF

- Funding based on competitive bidding on targeted technology CALL areas — funds the best set of projects from a larger pool of bids;
- Is a performance-based fund, that is, applicants spell out realistic and achievable technical and commercial targets. Disbursements of PCF are based on reimbursement basis upon meeting the said technical and commercial targets;
- Supports market-driven, innovative product development with high commercial potential — applicants are encouraged to gather and address market demand as well as identify pilot implementation(s); and
- Supports end-to-end funding as it covers product development and commercialization costs.

The MAC3 Fund

The MAC3 Fund (formerly known as MaC3 Co-Pro Fund) is a funding support designed to help innovative local companies to develop, produce, and co-produce content in the areas of animation, game, digital film with visual effects (abbreviated as VFX) components, beyond entertainment (education, simulation, and training content), high-end technology deployment (film technology, editing and coloring, digitization), and digital music that will contribute to the overall development of Creative Multimedia Industry and MSC Malaysia.

MSC Malaysia innovation voucher

MSC Malaysia innovation voucher is a program designed to increase collaboration between Malaysia's public and private institutions of higher learning (IHL) and research institutions (RI) with MSC Malaysia status companies, so as to tap into each other's capabilities and strengths. This serve to create a cultural shift in the business community's approach to innovation as companies can tap into experts/talents residing outside the company. The innovation voucher is a financial incentive worth of RM10,000 awarded to qualified MSC Malaysia status companies to support collaborative research and

development (R&D) projects from the approved collaborators. These collaborative R&D activities would then facilitate the transfer of know-how from the collaborators to the MSC Malaysia status companies and vice versa. In turn, this will lead to the production of innovative prototypes, quality products, and potential intellectual property (IP) creation.

UX innovate program

UX innovate program is an initiative by MDeC to create awareness on user experience (UX) among local Information & Communication Technology (ICT) and new media companies to enhance customer satisfaction and ultimately help improve the sales volumes of products or services. The program includes financial incentive awarded to qualified MSC Malaysia status companies to assist companies in getting access to in-depth training and mentorship by the experts in the UX field. Be prepared to experience exciting and highly interactive workshops, increase your skills with UX gurus, and most importantly, learn how to structure and design your products around the needs of your customers.

UX is one of the most prominent aspects of technology-driven products today, with the apparent consensus being that premium experience resulting in positive user response is critical to a product's success. At its heart, UX design is about effectively addressing the needs and circumstances of your users, to produce an interface that is comfortable and even joyful to use. As if that was not enough to tackle, your users' needs are always changing, as people continually evolve their expectations and technologies.

Technology acceleration program

Technology acceleration program (TAP) is an initiative by MDeC to establish channels and partnership with leading technology providers to support early adopter program for companies to innovate in cutting-edge technologies for new sources of growth. In an effort to assist and accelerate the development process of market-driven local products, MDeC is focusing on increasing the adoption of big data analytics among MSC Malaysia status companies. TAP offers a RM5,000 financial incentive to qualified MSC Malaysia status companies in getting access to a focused and in-depth big data analytics training and mentorship by the experts in the big data analytics field. Be prepared to experience exciting and intensive workshops with big data experts, and most importantly, learn how to develop big data analytics application and groom your own data scientists and data analysts.



Government schemes and incentives in India

Business Knowledge Resource Online, India

<http://business.gov.in>

There are several schemes and incentives undertaken, from time to time, by the Ministry of Science and Technology, the central level authority as well as by the state governments. These schemes largely aim to build strong science and technology infrastructure in the country, which can further the process of innovation, promote technology commercialization, and thus can help to raise socio-economic conditions of the people.

One of the main initiatives taken in this direction is the launch of Technology Promotion, Development and Utilization (TDPU) program which is aimed at promoting technology development and industrial research in the country as well as encouraging its utilization by various sections of economy, be it industry, academic, scientific institution, and the society at large. The programs and activities under this scheme are centered around promoting industrial research and development (R&D); development and commercialization of technologies; acquisition, management, and export of technologies; promotion of consultancy capabilities; etc.

Under TDPU program, there is one very important program component called "Technology Development and Innovation Program (TDIP)," which aims to develop technologies and promote innovation in the country. TDIP is sub-divided into two programs, namely:

Technology Development and Demonstration Program (TDDP) — It was earlier known as "Program Aimed at Technological Self-reliance (PATSER)." It is a plan scheme of Department of Scientific and Industrial Research (DSIR) to promote industry's efforts in development and demonstration of indigenous technologies, development of capital goods, and absorption of imported technologies. That is, its broad objectives for achieving self-sufficiency in industrial growth are:

- Supporting industry for technology absorption, development, and demonstration;
- Building indigenous capabilities for development and commercialization of contemporary products and process of high impact;
- Involvement of national research organizations in joint projects with industry; and
- Technology evaluation in selected sectors.

The partial financial support by DSIR is primarily meant for covering expenditure involved in prototype development and pilot

plant work, test, and evaluation of products flowing from such R&D, user trials, etc. Bunks of costs of the project are from the industry's resources.

In general, following types of proposals for RDDE projects are considered for partial financial support:

- Projects undertaken solely by in-house R&D units of industrial firms;
- Projects undertaken jointly by industry and national R&D organizations and institutions;
- Collaborative projects of common interest to the concerned sector/area, proposed by a group of industries/users, national research organizations, etc.; and
- Projects may cover products and processes in various important industries such as metallurgy, electrical, electronics, instrumentation, mechanical engineering, earth moving and industrial machinery, and chemicals and explosives.

Technopreneur Promotion Program (TePP) was launched to tap the vast innovative potential of the citizen of India. TePP is a mechanism to promote individual innovators to become technology-based entrepreneurs (Technopreneurs). Thus, its main objectives are to:

- Promote and support untapped creativity of individual innovators;
- Assist the individual innovators to become technology-based entrepreneurs; and
- Assist the technopreneur in networking and forge linkages with other constituents of the innovation chain for commercialization of their developments.

The activities under TePP include providing financial support to selected and screened individual innovators having original ideas for converting them into working models, prototypes, and so on. TePP assistance is provided to the innovator to meet expenditure on the following:

- R&D/engineering consultancy;
- Procure small equipment, tools, etc., required;
- Raw material/accessories (for prototype/process trials);
- Fabrication cost (for prototypes);
- Patent guidance and support;
- Manpower;
- Testing and trials; and
- Any other relevant costs.



Innovation certification for enterprise rating and transformation (1-innocert)

SMEinfo, Malaysia

<http://www.smeinfo.com.my>

The National Innovation Council (NIC) under MOSTI chaired by YB Prime Minister has formulated the National Innovation Agenda (NIA), aimed to establish the national innovation-led economy to achieve market-driven and technology-driven innovation for wealth creation and societal well-being.

The council also established the Jawatankuasa Tindakan Penyelarasan Inovasi Negara (JTPIN) where SME Corp. Malaysia has been entrusted to lead a sub-committee under the JTPIN, namely, Innovation for SMEs Committee.

In view of the demands for a new breed of SMEs that can help drive market-driven and technology-driven innovation, a study visit has been carried out by Malaysian Industry-Government Group for High Technology (MIGHT), MITI, and SME Corp. Malaysia to Korea, to learn their best practices in developing innovative SMEs.

In Korea, the criteria and mechanism for 1-InnoCERT is based on two levels of assessment; on-line assessment and site visit evaluation by experts. The scheme implemented in Korea has since been adopted and fine-tuned to suit with the Malaysian companies. Four main parameters evaluated in the 1-InnoCERT are:

- Technology Innovation Ability;
- Technology Commercialization Ability;
- Technology Innovation Management Ability; and
- Technology Innovation Result.

It was hoped that through the 1-InnoCERT certification companies could be:

- Provided fiscal incentives and encourage greater participation in high risk venture;
- Launch Fast Track Program (FTP) for 1-InnoCERT companies;
- Establish angel network; and
- Program as benefits for the 1-InnoCERT companies.

In recognition of these innovative companies, SME Corp. Malaysia organized the SME Innovation Award 2010 in conjunction with SMIDEX 2010. Through the process 65 SMEs were deemed to be 1-InnoCERT-fied SMEs and there were six award winners based on their sectors. They are:

- The Top Winner of the SME Innovation Award and SME Innovation Award in Design 2010 — IC Microsystems Sdn Bhd;
- SME Innovation Award in Green Technology and Energy Efficiency 201 — Device Semiconductor Sdn Bhd;
- SME Innovation Award in Halal 2010 — Nutrivention Sdn Bhd;
- SME Innovation Award in the Services Sector 2010 — Romstar Sdn Bhd;
- SME Innovation Award in Agriculture and Biotechnology 2010 — TT Biotechnologies Sdn Bhd; and
- SME Innovation Award in the Manufacturing Sector 2010 — Subsea Explore Services (M) Sdn Bhd.

In response to YAB prime minister's visit to SMIDEX 2010; YAB prime minister announced during a cabinet meeting that a special council be set up and will be chaired by YB MITI minister and YB MOF II minister to prepare the "Green Lane Policy" to assist 1-InnoCERT companies and added that all GLCs should assist these 1-InnoCERT companies.

WIPO GREEN Database

WIPO GREEN consists of an online database and network that brings together a wide range of players in the green technology innovation value chain, and connects owners of new technologies with individuals or companies looking to commercialize, license or otherwise access or distribute a green technology. WIPO GREEN database assembles in one place technologies at all stages of development, from upstream research to marketable products (and everything in between). These technologies are available for license, collaboration, joint ventures and sale.

For more information, access:

<https://webaccess.wipo.int/green/>



Green ratings

Small Industries Development Bank of India (SIDBI), India

<http://smallb.in>

Green rating is an estimate of an industry's environment friendliness. It assesses the adverse impact on environment caused by an industry's activities and methods adopted by an industry to minimize the damage. This assessment is done by a credible third party evaluator. The rating is arrived at after considering industry's current processes and technology and their impact on the environment, adoption of clean technology, and various processes adopted for mitigating adverse impact on environment.

Green rating in India

Green rating initiatives in India are spread across various sectors ranging from buildings to manufacturing industries.

Green building initiative

In order to create more energy efficient and eco-friendly buildings, the Ministry of New and Renewable Energy in collaboration with The Energy and Resource Institute (TERI) initiated Green Rating for Integrated Habitat Assessment (GRIHA), the National Rating System for Green Buildings in India. GRIHA rating system consists of 34 criteria categorized under various sections such as site selection and site planning, conservation and efficient utilization of resources, building operation and maintenance, and innovation points. For further details, visit GRIHA.

Green rating project

It is a nongovernment initiative launched by Centre for Science and Environment (CSE) in 1995 to guide Indian industries to improve their environmental performance. The project mainly relied on voluntary participation of companies and depended upon the company's eagerness to avoid bad publicity as these ratings are released for public. Along with the assignment of green rating, the initiative charted out steps need to be taken by each industry to improve their performance. In majority of the cases, the companies have implemented the road map provided by CSE. The industries covered in this project are paper and pulp, cement, automobile, and the chlor alkali sector. For further details visit Green Rating Programme. A larger proportion of companies rated for green credentials under this program are large enterprises

SMERA green ratings

In India, green rating of enterprises is offered by SME Rating Agency of India Limited (SMERA). Green rating is a joint initiative of SMERA and SIDBI. The Energy and Resource Institute (TERI) acts as a knowledge partner. SIDBI promotes and facilitates the process by offering credit at concessional rate to Green-rated companies. The government of India (GoI) has urged lending institutions to encourage borrowing MSMEs to go for "Green Rating."

Benefits of green rating

- **An independent third party evaluation about environment friendliness:** It indicates that the micro, small and medium enterprises (MSME) is conscious about its duty toward environment and society at large.
- **Credit at concessional rate:** It will help a MSME to obtain credit at a concessional rate from lenders like SIDBI.
- **Mitigation of environmental risk:** It reduces the risk associated with the stringent environmental norms that is becoming stricter.
- **Confidence among value chain partners:** The rating assures lenders, buyers, collaborators, Joint Venture (JV) partners that the MSME is a responsible corporate citizen and does not adversely impact ecology.
- **Self-assessment tool:** Green rating is a self-assessment tool that can be used to identify areas of improvement.
- **Creating awareness:** Green rating awarded by an independent agency improves the visibility of MSME in the eyes of various stakeholders such as buyers, suppliers, and collaborators/JV partners.

Green rating process

A typical green rating process is described in the below diagram. Typically the entire process starting from information receipt to assignment of rating takes 15 business days (Source: SMERA). The cost of green rating conducted by SMERA is Rs. 50,000 (service tax extra).

- Request for Rating by MSME;
- Submission of financial and managerial information;
- Finalizing the assignment and detailed questionnaire;
- Site visit and discussion with management;
- Proposed rating before rating committee;
- MSME advised on rating;
- Appeal before rating committee; and
- Publishing of final rating.

Indicative list of documents required

- Small scale industries (SSI) registration certificate/entrepreneurs memorandum;
- Audited accounts report and balance sheet of last 3 years;
- Pollution control certificate for air, water, and noise pollution;
- Latest test results conducted by Pollution Control Board;
- ISO certificate or any other quality certificate;
- Energy audit certificate, if any;
- Details of process map and energy usage as per process map; and
- Any specific step by unit to mitigate harmful impact on environment.



Cleaner production case studies from Viet Nam

Vietnam Denmark Development Cooperation in Environment Program (DCE), Viet Nam

<http://sxsh.vn>

Vietnam PLATO JSC.

Vietnam PLATO JSC., is a private company specializing in electroplating, locating at Bong Hong Cluster, Bai Bong Town, Thai Nguyen. Prior to 2008, the company operated under the name of An Khanh Mechanic Workshop, in the field of zinc electroplating of Honda, Yamaha motorbikes' features (mirror handlebars, main stands, gear shift), springs, furniture features. From middle of 2008, due to the market needs, a Nickel–Chromium plating line was installed and come into operation; the company at the same time renamed into PLATO JSC. The company operations have provided jobs for a significant number of employees, around 160–200 labors every day.

In 2009, the company has received the financial support from the Ministry of Industry and Trade (MOIT) through the Cleaner Production in Industry Component (CPI) and technical assistance from Vietnam Cleaner Production Centre to conduct CP Assessment and propose CP options. The company has established a CP team led by Mr. Hoang Anh Hung, company director and five members to assess two production lines: Zinc plating and Nickel–Chromium plating. The team has conducted a walk-through assessment on the production line. After identification of waste streams, the team has conducted mass and energy balances for the whole production line. All collected data have been used to analyze and identify cleaner production options for each production steps.

After conducting cleaner production assessment (CPA) and identifying improvement options, the company has carried out 22 no-cost and low-cost options with total budget of VND 32 million during the period from November 2009 to February 2010. With the technical and financial assistance from the CPI, the company has actively implemented two high-investment options: changing to Ni–Cr plating on plastics technology and install wastewater electrolysis system to improve the production performance and reduce environmental emissions to the environment and meet the market demand.

The company has also set up environmental policy, whereby it is requested that the environmental protection law and other regulations should be followed strictly, ensuring the sustainable development of the company and reducing waste emission sources. The company has integrated process management system with the environmental management system; therefore, energy and material consumption is monitored at the same time with the monitoring of pollutant parameters in the waste streams.

Phu Dong Textile Company Limited

Phu Dong Textile Co. Ltd. is founded in 2006, and specializes in manufacturing grey fabric and interlocked and sized fabric according to

the demand of markets. Products are mostly for domestic markets such as central region, Hanoi, and Ho Chi Minh City, 40 percent of the products are exported to European, Korean, and Japanese markets. The capacity of plants is 5,000,000 m of sizing and warping per year, and 1,000,000 m of raw fabric per year.

Before applying CP, the serious problem of the company is pollution caused by wastewater and exhaust fumes. Wastewater of the company has exceeded the limit values in the standard TCVN 5945-2005; chemical oxygen demand (COD) (140.5 mg/l) was exceeded 2.8 times; biochemical oxygen demand (BOD) (73 mg/l) was exceeded 2.43 times; and total suspended solids (TSS) (132 mg/l) was exceeded 2.64 times. Company's exhaust fumes generated from fuel burning and boiler operation. CO content (1.264 mg/m³) in exhaust gas was exceeded 1.2 times in comparison with the limit value in national standard. For solving these problems, in 2009, the factory received the support from the Ministry of Industry and Trade via the CPI to conduct Cleaner Production Assessment and Application.

Under the MOIT support, in 2009, the company had implemented CP assessment. In the 1st phase (from July 2009 to February 2010), the company established a CP team led by Mr. Doan Xuan Tinh, Director of the company and other six members to assess the whole production line. The team has conducted a walk-through assessment on the tea production line at place. After the assessment and identification of waste streams, the team has conducted mass and energy balances for the whole production line. All collected data have been used to analyze and identify cleaner production options for each production step.

After conducting CPA and identifying improvement options, the company has carried out nine no-cost and low-cost options with a total budget of VND 50 million. Such application has reduced material and electricity-specific consumption to 20 percent and 3.4 percent respectively and saved 230 million dong. In the second phase (from March 2010), the company has actively implemented high-investment options to improve the product quality and solve completely the environmental issues at place and received CPI's support (2 billion dong) to install by a 3-pass horizontal boiler, update and repair sizing machine, install new automatic splicing machine, install dust suction and filtering system to improve environment working. Benefits from those solutions are 1.2 billion dong by reducing raw material consumption and reducing environment treatment cost.

TECHNOLOGY OFFERS

HUNGARY

L(–) malic acid production technology

Description

The malic acid is one of the hydroxy acids that are produced by aerobic organisms in the so-called citric acid cycle (Szent-Gyorgyi – Krebs cycle). As natural organic acid, L(–) malic acid exists in various fruits and vegetables, giving fresh acidic taste. It is recognized as an acidic agent, which has high additional value in different foods, from the feature of non-volatility, easy-to-cook, and less hygroscopic nature. According to Fuso Chemical (the biggest world producer of DL malic acid), it is known as a result of the panel test of many times that equivalent acidity is left from malic acid of a few quantities as compared with citric acid. Because of its lower melting point, it is preferably prescribed than other food acid for candy manufacture. Malic acid's synergism with certain food ingredients and flavors makes it a versatile and flexible acid of choice to create new taste sensations and to add new twists to existing products.

Areas of Application

- Food industry
- Chemical industry
- Pharmaceutical industry

Advantages

This technology has some significant advantages in comparison with the traditional fermentation and chemical production. Firstly, downstream operations become cheaper by the high conversion rate and lack of bypass products. Secondly, the very intensive technology decreases the investment expenditures. Thirdly, it is an environment friendly production, which does not have any effect on human health. There are no environmental risks or contraindications to use this technology, because the genetically modified cells are killed before use. No huge amount of waste water, no bypass salts (esq. NaCl, CaSO₄). The bioreactors are working as enzyme reactors during the process.

Environmental Aspects

Cleaner production

Development Status

Laboratory model

Transfer Terms

Technology licensing, Research partnerships

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Portable harvesting tool for thorny species

Description

The present invention relates to a portable harvesting tool for the thorny plants. The tool is handy, easy-to-use, efficient, affordable or inexpensive, easy-to-carry, light weight, and Y-shaped tool. The tool can also be used to harvest other plants like, out

of reach plants (grooves, steep hills), plants grown in aquatic or submerged areas, etc.

Areas of Application

Agricultural industry

Advantages

The tool is handy, easy-to-use, efficient, affordable or inexpensive, easy-to-carry, and light in weight.

Environmental Aspects

Harvesting tools

Development Status

Laboratory model

Technical specifications

A Y-shaped portable harvesting tool for the thorny plants comprising extendible handle, wire, screws, foldable basket, aluminum ring spring, blades, and the tool.

Transfer Terms

Consultancy, Technical services, Technology licensing, Research partnerships

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Value-added chemicals from cashew nut shell liquid

Description

A range of difunctional monomers (dihalides, diacids, diisocyanates, diamines, diacylhydrazides, diphenols, dialdehydes, etc.) and polymer additives are produced utilizing 3-pendadecyl phenol derived from cashew nut shell liquid (CNSL) using NCL technology. A host of high-performance polymers (polyimides, polyamides, polyesters, poly(amide-imide)s, etc.) can be prepared using the difunctional monomers mentioned above.

Areas of Application

- Thickeners in paints, cosmetics, oils, food, and textiles
- Electrical insulating varnishes
- Enamels and adhesives
- Auto brake lining
- Substitute for linseed oil (in manufacturing foundry core oil, which is used as a binder)
- Cement hardening agent
- Used in lamination industry (for reduced brittleness and improved flexibility)
- Epoxy resins and rubber compounding resins

Advantages

- High performance polymers produced from CNSL have improved processability characteristics
- Produced from low cost raw materials that are widely available in India
- Sustainable, renewable source

Development status

Laboratory model

INDIA

Legal Protection

Patent

Transfer Terms

Technology licensing

Biomaterials from regenerated silk fibroin

Description

NCL scientists have developed various processes for producing 3D porous biomaterials from regenerated silk fibroin (RSF). Our process for the accelerated gelation of RSF resulting in a porous structure lowers the gelation time to a few hours instead of several days. The protein concentration can be between 0.1% and 40%. It works in a broad pH range of 5–7.5, within temperatures ranging from 20 to 70°C. Another process using electrospinning of RSF from an aqueous solution forms 3D porous structures (like non-woven mats), which have various biomedical applications. Surface modification of such biomaterials for improved performance is currently under progress.

Areas of Application

- In tissue engineering — as bio-degradable bioabsorbable scaffolds (due to lower inflammatory and superior mechanical properties) and damaged tissue regeneration (e.g., bone, nerves, ligament, etc.)
- In wound healing bandages (provides a moist environment to facilitate re-epithelialization, re-modeling of connective tissues, and collagenization)
- As controlled drug delivery vehicles
- Silk fibroin peptides are used in cosmetics due to their glossy, flexible, elastic coating power, easy spreading and adhesion

Advantages

- Free of microbial growth (superior performance of implants, lower toxicity)
- Shorter gelation time opens-up the potential spectrum of applications of the materials developed using this method
- Process is cheaper and faster (aqueous solution used instead of organic solvent eliminates several intermediate steps)
- Implant that could be reproduced with great consistency and quality
- Wide range of pore sizes: 1–10 microns

Development status

Laboratory model

Legal Protection

Patent

Transfer Terms

Technology licensing

Titanium dioxide nano needles

Description

NCL technology involves a one-step electrochemical process for the synthesis of pure rutile titanium dioxide (TiO_2) nanoneedles, with high aspect ratio, at room temperature. Nanoneedles with aspect ratio of equal to 10 can be produced with very good control over the morphology of the resulting TiO_2 .

Areas of Application

Rutile TiO_2 is widely used as/in:

- UV protecting agent
- In optical coatings
- Beam splitters
- Anti-reflection coating
- Humidity sensor
- High-temperature oxygen sensor
- Photo-catalyst
- Biomedicine

Advantages

- Less energy intensive (process carried out at room temperature)
- Ability to synthesize phase-pure rutile TiO_2
- Reduced time for synthesis (as this process avoids any formation of intermediate amorphous powder or anatase phase and hence does not need heat treatment to form rutile TiO_2)
- Easier, cheaper, quicker process (when compared to previous methods of synthesis)

Development Status

Laboratory model

Legal protection

Patent

Transfer terms

Technology licensing

For the above three offers, contact:

National Chemical Laboratory, CSIR, A208, PAML Building, Dr Homi Bhabha Road, Pune – 411007, India. Tel: +91-20-25902982; E-mail: dt.patel@ncl.res.in

Vacuum pump filter

Description

This technology safeguards all types of vacuum pumps from contamination from dust, mist, oily, and gaseous particles by providing a unique kind of filter, which operates on electrostatic precipitation principle. The technology also provides a low cost ultra high vacuum pressure electrostatic filter, which can filter effectively up to 0.3-micron size. This filter can eliminate chemical fume and solvent by 80%. The efficiency of 99.9% filtering of different foreign material can be achieved. The electrostatic filter can be used for all kinds of vacuum pumps up to ultra high vacuum pumps.

Features: Traps all particles (solid, liquid, gases); traps even up to 0.3 micron particles; no periodic replacements; no choke up; high efficiency more than 98%. Other features such as increased area of collection electrodes, a separate cleaning fluid inlet valve, more grounded collection area for fumes and collectants are provided to improve filter efficiency and to increase filter cleaning.

Area of Application

Battery, lightening, semiconductor, solar, chemicals, oil and gas, steel, automobiles, pharma and bulk drug, glass and ceramics, plastic and rubber, electrical and electronics in processes such as vacuum impregnation, filling, distillation, drying, degassing, metalizing, coatings, extrusion, conveying, forming, heat treatments, reactions, castings, molding and packaging.

TECHNOLOGY OFFERS

Advantages

- Reduces maintenance on vacuum pumps
- Reduces energy costs and cycle time
- Improves vacuum levels and process efficiency
- Safeguards all types of vacuum pumps with 98% efficiency

Environmental aspects

Energy efficiency

Development Status

Commercial prototype

Legal Protection

Patent applied for

Transfer Terms

Technology licensing

Contact:

SkyQuest Technology Consulting Pvt. Ltd., 501, Krishna Complex,
Opp. Devashish School, Bodakdev, Ahmedabad – 380054, India
Tel: +91-7940088139
E-mail: kathak.mehta@skyquestventures.com

Retort pouch technology

Description

The technology relates to a ready-to-serve fish curry in retortable pouch. The technology provides a method for preparing the ready-to-serve fish curry in retortable pouch with excellent storage stability and quality with a shelf life of more than 1 year at ambient temperature.

Areas of Application

Food, meat, fish processing

Advantages

- The technology provides a method for preparing the ready-to-serve fish curry in retortable pouch with excellent storage stability and quality.
- The ready-to-serve fish curry is thermal processed and do not require any further processing before consumption.
- The thermal processing conditions have been standardized for this product in order to make it safe for consumers.

Environmental aspects

Energy efficiency

Development status

Pilot plant, fully commercialized

Transfer Terms

Consultancy, Technical services, Technology licensing

Contact:

Central Institute of Fisheries Technology, CIFT Junction, Mat-
syapuri, Willingdon Island, Cochin – 682029, India
Tel: +91-4842666845
E-mail: nitin.bpd@gmail.com

New design of tyre using Möbius Strip

Description

This idea is applying of Möbius strip on the tires that use in different kinds of vehicles. Tire is a ring but in this idea will change to the Möbius strip in the form of appendix: Möbius strip obtained from a papery strip at rectangular figure for example in dimensions of

1 × 10 inch ABCD: that turn this strip semi-rotary and stick end of each 2 other of that, as AB not repose on the CD but repose on the DC. This ring only has the one surface as if place a pencil on the one point of that and drawing a line and go front regularly, will reach to the same 1st point again. In second formula may be use from 2 Möbius strip as they stick each other from flank for producing of new tires now the tires are exist in market that may be say they are twin and a furrow is exist in middle of tire probably that tires are used in lorry and trailer. May be use from second formula by formats designed in picture that contorted places in Möbius strip are distinct by black solid circles.

Areas of Application

In production of tires and rubbers

Transfer Terms

Joint venture, technology licensing, research partnerships, assignment, investment, others

Contact:

Molavi BLVD, Shahid Kazem Nasiri Alley, 1st Northern Floor No.
13, Keyvan Aghvami & Baghe Family, Shahid Seddighi St, Second
Floor, P.O. Box 35146-17117, Semnan – 35196-54891, Islamic
Republic of Iran
Tel: +98-2313332494
E-mail: keyvanaghvami@gmail.com

Nanotechnology value-added products for industrial and domestic applications

Description

We can offer technologies for manufacturing many nano-tech value-added products for domestic as well as industrial applications.

Areas of Application

Multiple sectors including energy, food processing, rubber, chemicals, electronics and so on.

Advantages

- Cost-effective
- Environment-friendly
- Cleaner production
- Proven and tested and certified by government agency.

Environmental aspects

Cleaner production, waste utilization, energy efficiency

Development status

Laboratory model, pilot plant, commercial prototype, fully commercialized

Legal protection

Patent

Transfer terms

Consultancy, turnkey

Contact:

Industrial Technology Development Institute (ITDI), DOST Com-
pound, General Santos Avenue, Bicutan, Taguig City,
Metro Manila, Philippines
Tel: +632-837-2071
E-mail: basiliablessie@gmail.com

TECHNOLOGY REQUESTS

INDIA

Sodium sulfide flakes manufacturing plant

Description

We are looking for an expert/company to provide us consultancy service for manufacturing sodium sulfide flakes from sodium sulfate and coal as raw material. Presently, we are making sodium sulfide from sulfur and caustic. Please let us know if you are interested in having cooperation to give us consultancy service to produce sodium sulfide.

Area of Application

Textile, leather, and chemical industry

Studies available

Feasibility report, others

Project Type

Diversification

Assistance sought from potential partner

Manufacturing process, machinery involved, plant

Contact:

Suraj Khurana, Shivom Chemicals, 115, Karnavati Complex, Narol, Ahmedabad – 382405, India

Tel: +91-9377480597

Fax: +91-7925716580

E-mail: shivom96@gmail.com

Boric acid manufacturing

Description

We are interested in setting up a manufacturing plant of boric acid using colemanite as a raw material.

Area of Application

It is mainly used in iron industries and refectories.

Studies Available

Feasibility report, others

Project Type

New idea

Contact:

Jain Borax and Chemicals, Pitaiband, Rajim, Raipur – 493885, India

Tel: +91-9826335016

E-mail: oegchemcg@yahoo.co.in

Full cereal and health bar extrusion line

Description

We are a company that is looking at setting up an entire cereal flakes extrusion line. At the next stage, we will be setting up the same for health bars.

Area of Application

Food processing equipment

Project Type

Start-up

Contact:

Kottaram Agro Foods, No. 9 & 10, 3rd Cross, Muneshwara Block, Harlugatte village, Kudlu Gate, Bangalore – 560068, India

Tel: +91 9686202763

E-mail: support@kottaram.co.in

Technology for lime manufacturing unit

Description

We would like to start a new lime manufacturing unit. We need lime for our effluent treatment plant (ETP) plant.

Area of Application

Lime industry

Studies Available

Feasibility report

Project Type

Start-up

Contact:

Binani Industries Ltd., Binani Zinc Ltd., Ernakulam – 683502, India

Tel: +91-9809030723; Fax: +91-4842532134

E-mail: avrominus@binanizinc.co.in

Scrap tyre recycling technology

Description

Our client is part of a major European group operating throughout the waste-recycling sector. Systematically extending its reach to incorporate all aspects of waste recycling, the company is now seeking partnering and investment opportunities in the tyre-recycling sector and in return is offering marketing expertise and capital to help access appropriate markets. We are particularly seeking new product opportunities where our client's recycled rubber crumb material can be a significant component and this will require them to add value to their current product. We will consider niche opportunities across a diverse range of products, markets, and applications. The client is keen to find opportunities for markets outside the construction/landscaping industries where rubber crumb is currently used and is considered a commodity product. For clarity, this search forms part of our client's diversification strategy and therefore all opportunities will be considered.

Area of Application

Value added recycled tyre products

Project type

New idea

Contact:

Strategic Allies, 113 High Street, Berkhamsted HP4 2DJ, United Kingdom

Tel: +44-1442860634

E-mail: suzanne@strategicallies.co.uk

UNITED KINGDOM

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