

Strengthening innovation-driven inclusive and sustainable development

Asia-Pacific

Tech Monitor

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Digital technology and economy fostering inclusive development



Plus

- Technology News and Events
- Tech Ventures & Opportunities
- Business Coach



APCTT
Asian and Pacific Centre
for Transfer of Technology



UNITED NATIONS
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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.

The Centre will achieve the above objectives by undertaking such functions as:

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- Networking and partnership with international organizations and key stakeholders; and
- Training of national personnel, particularly national scientists and policy analysts.



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Web: www.techmonitor.net

Editorial Board

Ms. Michiko Enomoto

Dr. Satyabrata Sahu

Dr. Krishnan Srinivasaraghavan

ASIAN AND PACIFIC CENTRE FOR TRANSFER OF TECHNOLOGY

C-2, Qutab Institutional Area

Post Box No. 4575

New Delhi 110 016, India

Tel: +91-11-3097 3700

Fax: +91-11-2685 6274

E-mail: postmaster.apctt@un.org

Website: <http://www.apctt.org>

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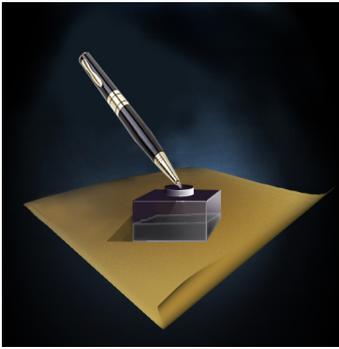
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Introductory note

In recent years, there has been rapid progress in the development of advanced digital technologies thus creating huge opportunities across the world faster than ever. These include internet, mobile communication, analytics and cloud computing, big data, industrial automation and sensors, 3-D printing, robotics, artificial intelligence, machine learning and social media. Today, digital technology is emerging as the key driver of development and touches almost every sphere of industrial, economic and social activities.

Such new digital technologies offer immense potential to accelerate economic development, enhance productivity and promote new markets and industries. While big data can increase productivity and profitability for companies, it can significantly contribute to evidence-based policy making in the countries. Artificial intelligence tools are not only used to track and manage the huge volume of big data but also help in the development of intelligent machines for industrial automation, speech recognition, language detection, computer vision, robotics and many more. 3-D printing and rapid prototyping substantially reduce the time and cost of creating new and innovative products. Advanced generations of mobile networks provide opportunity for using digital tools and data which revolutionizes the way people access information and services. Cloud-based and data-driven digital health solutions for hospitals are being designed to make more proactive and informed decisions. Innovative digital platforms are emerging to allow policymakers and organizations to better access, analyze, and use the available data and information.

Thus, there is phenomenal potential for digital technologies to help countries in achieving the 2030 Sustainable Development Goals. These technologies will not only act as key enablers of development in countries, but can also improve the quality of people's lives, achieve equitable growth and protect the environment. In addition, digital technology could also promote innovation and creativity, ensure efficiency and productivity, and improve the delivery of services in businesses and industries. Rapid deployment of digital technologies can promote entrepreneurship and enhance job creation thereby contributing to the economic growth of countries.

Towards achieving inclusive and sustainable development, the Asia-Pacific countries need to harness the potential of such advanced digital technologies. The key challenge for most developing countries of the region is to develop and adopt low-cost, simple and scalable digital technology solutions which could help millions of people live a better life. In this regard, countries will need to focus on developing adequate human resources to facilitate the adoption and utilization of such advanced digital technologies. The national governments need to establish appropriate policy, institutional and regulatory frameworks to harness the development of digital technologies and take the benefit from them for their economic and social development.

This issue of *Asia-Pacific Tech Monitor* highlights the challenges, opportunities, current practices and innovative models of digital technology-driven inclusive and sustainable development in the Asia-Pacific countries.

Michiko Enomoto
Head, APCTT-ESCAP

ASIA-PACIFIC

ASEAN patents increased by 40% in past three years

The Association of Southeast Asian Nations (ASEAN) almost doubled its share of the world's scientific literature, and increased its patenting activity, a common industry measure of innovation, by more than 40 percent in the last three years. These are just some of the key findings from the "ASEAN – The Emerging Research and Innovation Hub" report produced by the Intellectual Property & Science (IP & Science) business of Thomson Reuters, which suggests that the ASEAN region is becoming a hub of research and innovation activity.

The regional research output is dominated by research communities in Singapore, Malaysia and Thailand, which account for 85 percent of the region's research publications followed by a second group comprising Vietnam, Indonesia and the Philippines.

Some key findings from the report are:

1. The ASEAN group has nearly doubled its share of the world's scientific literature, as indexed in the Web of Science, from 1.37 percent in 2006 to 2.43 percent in 2015.
2. Malaysia, Brunei and Vietnam have all sharply increased their output of research papers in the last decade, with each posting gains of at least 300 percent between 2006 and 2015.
3. Patenting activity from the ASEAN group has increased more than 40 percent in the last three years.
4. Patent filings by domestic organizations as a proportion of total filings have risen from less than 9 percent in 2005 to nearly 12.5 percent in 2014, suggesting that the ASEAN nations' investment in home-grown R&D efforts is beginning to yield benefits.
5. The technology concentration of the ASEAN group, as reflected in patents, is focused more towards the chemical, agricultural and medicinal sectors

and less toward semiconductors and telecommunications.

<http://www.asianscientist.com>

CHINA

R&D spending rises in China

China's research and development (R&D) spending has consistently gone up despite its slowing economy as the country seeks to foster new growth engines by boosting innovation. R&D spending reached 1.42 trillion yuan (about \$208.38 billion) in 2015, up 8.9 percent over 2014, according to a report jointly published by the National Bureau of Statistics (NBS), the Ministry of Science and Technology and the Ministry of Finance. Last year's R&D expenditure equaled 2.07 percent of the GDP, up from 2.02 percent in 2014 and marking the third straight year above the 2-percent mark.

Chinese companies were the largest contributor, according to the report. Enterprises, led by those in the manufacturing, computer and telecommunications sectors, spent 1.09 trillion yuan on R&D in 2015, up 8.2 percent from the previous year and accounting for 76.8 percent of the total.

R&D spending by government-affiliated research institutes expanded 10.9 percent to 213.65 billion yuan, taking up 15.1 percent of the total, while that by universities and colleges grew 11.2 percent to 99.86 billion yuan, or seven percent of the total. Despite being the world's second-largest R&D spender behind the United States, China still lags behind developed countries which normally spend 3 percent of their GDP on R&D, according to NBS statistician Guan Xiaojing.

<http://www.chinadaily.com.cn>

China to strengthen TCM R&D

China will upgrade its research and development (R&D) of traditional Chinese medicine (TCM) in 2011 by improving the systems for inheritance and innovation, according to a senior health official. Wang Guoqiang, vice health minister and director of the State Administration of TCM (SATCM), made the remarks here Thursday at the annual national conference on traditional Chinese medicine. In terms of in-

heritance, Wang urged efforts be made to establish databases of ancient traditional Chinese medicine publications, to study its basic theories and to conduct a general survey on TCM resources. He also called for innovation in building a clinical R&D system, setting up key TCM labs, facilitating technology transfers into the industry and improving R&D management and quality control. Wang also disclosed the following figures concerning the country's previous efforts in promoting traditional Chinese medicine:

In 2010, the SATCM accepted the registration of 400 important ancient traditional Chinese medicine books. Besides providing inheritance studios for 181 TCM masters, the SATCM started a comprehensive service platform for the exchange of their clinical experiences and academic thoughts. The first national level survey on traditional medicines of ethnic groups was also conducted last year, which identified 150 feature publications and 140 techniques for diagnosis and treatment. In 2009, China spent 10.97 billion yuan supporting TCM, an increase of 165 percent over 2005. From 2005 to 2009, the number of TCM hospitals grew 9.6 percent to 3,299 with 449,000 beds, 42.6 percent higher than 2005. Wang also said that China would further develop traditional Chinese medicine amid the country's ongoing reform of the national health care system.

TCM generally refers to the comprehensive Chinese medical system based upon the body's balance and harmony. Among the components of TCM are acupuncture, diet, herbal and nutritional therapy, physical exercise, and remedial massage. As a sign of the world's growing acceptance of traditional Chinese medicine, acupuncture and moxibustion were inscribed on the Representative List of the Intangible Cultural Heritage of Humanity last November by the UN Educational, Scientific and Cultural Organization.

TCM is widely used in China, and policymakers are promoting traditional Chinese medicine to reduce burdensome medical costs and allow universal access to health care. However, the share of traditional Chinese medicine in the global medical

market, which is dominated by Western medicine, remains low.

<http://www.chinadaily.com.cn>

INDIA

India's first coastal industrial corridor

The Asian Development Bank (ADB) has approved \$631 million in loans and grants to develop the first key 800-kilometer section of a planned 2,500-kilometer-long East Coast Economic Corridor that will spur development on India's eastern coast and create seamless trade links with other parts of South and Southeast Asia. The Visakhapatnam-Chennai Industrial Corridor section of the East Coast Economic Corridor, connecting four economic hubs and nine industrial clusters, will mark the first industrial corridor developed along India's coast. The East Coast Economic Corridor will ultimately extend from Kolkata in West Bengal in the northeast of India to Tuticorin in Tamil Nadu near the southernmost point of the country.

The Indian government is keen to encourage manufacturing, including through its "Make in India" initiative, to maintain strong economic growth over the longer term and to create productive, well-paying jobs for a labor force that is growing by around 12 million people per year. Currently, manufacturing provides around 15% of India's gross domestic product (GDP) and around 12% in Andhra Pradesh where the new corridor will be developed.

India's National Manufacturing Policy is targeting manufacturing contributing at least 25% of GDP by 2022, much the same as in the People's Republic of China, Malaysia, and Viet Nam now. ADB's loans and grants comprise a \$500 million two-tranche facility to build key infrastructure and a \$125 million two-tranche loan to help with industrial policies and business promotion. There will also be a \$5 million grant from the multi-donor Urban Climate Change Resilience Trust Fund that is managed by ADB to build climate change resilient infrastructure and a \$1 million technical assistance to help the Andhra Pradesh local government manage the

corridor. The Indian government will provide extra funding of \$215 million to the \$846 million project.

The new infrastructure will be built in the four main centers along the corridor - Visakhapatnam, Kakinada, Amaravati, and Yerpedu-Srikalahasti - as well as in nearby industrial areas. It will include 138 kilometers of state highways and roads, effluent and water treatment plants, 488 kilometers of drinking water pipes, 47 kilometers of storm drains, 10 power substations, and 281 kilometers of power transmission and distribution lines. The program will also focus on increasing women's participation in the industrial workforce. Skills training for 25,000 male and female workers, entrepreneurs, and students along with an investor promotion plan is expected to help develop businesses along the corridor.

<http://www.cfoinnovation.com>

Patent sharing scheme planned

The central government plans to create a policy framework to enable patent sharing between companies and academia in order to promote innovation happening at education and research institutes, while creating a market opportunity for them, said Ravi Shankar Prasad, Minister of Communication and Information Technology. "It is an idea which I have floated today. We have got outstanding teachers and researchers, and we have got companies. There is a need for innovation, so the companies and academia must partner and whatever new products come, it will have a patent. And the fruits of the patent be shared between the both," said Prasad on the sidelines of 1st edition of Medical Electronics Innovation Summit, organized by Ministry of Electronics & Information Technology, at IIT Bombay. "The companies can collaborate with professors and researchers for innovation, and the IP created can be shared by those who have partnered in the project."

The underlying vision is to transfer the technology from research and development (R&D) labs to companies that can then take it to market, while protecting the rights of innovators. This is in line with the

objective laid down by Intellectual Property Rights (IPR) policy, unveiled earlier this year in May, which aims to create a balanced intellectual property rights regime in India to foster creativity and innovation. The industry experts see it as a move in the right direction. At present, researchers, doctors and professors, who work with research and development companies to create IPs do not own them, since they are bound by contracts which allow companies to have a right over the IPs. With the patent sharing regime, people who have developed the IPs will also own them and get the benefits such as revenue sharing.

Meanwhile, Ministry of Electronics and Information Technology (Meity) is working with Andhra Pradesh government to facilitate technology transfer from government labs to the entrepreneurs in the state. Society of Applied, Electronics Engineering & Research (SAMEER), a research and development laboratory of Meity, partnered with Andhra Pradesh Medical Technology Zone (AMTZ), a research and technology park in Vishakhapatnam entailing about 300 entrepreneurs, and AP government to transfer its research projects to the companies at AMTZ who will manufacture the products, which will then be brought by AP government for its 21 government hospitals and medical colleges.

<http://www.business-standard.com>

India plans for pharma R&D hub

The government is preparing for multi-billion dollar investment to push India into top five pharmaceutical innovation hubs by 2020, ASSOCHAM said. The goal of the program will be for the country to establish global presence in pharmaceutical research by launching at a global level 1 out of every 5-10 drugs discovered in the country, the industry association added. The effort will be with 50% public funding through its public private partnership (PPP), it said.

The Indian Government has been very active in boosting growth and investment in Indian pharmaceutical industry. It allows 100 per cent FDI (Foreign Direct Investment) under automatic route (without

prior permission) in the pharmaceuticals sector. "FDI favourably impacts the Indian pharma industry by providing access to more capital/funds for investing in R&D, which in turn, leads to creation of more IPR," found a study titled 'IPR in pharmaceuticals: Balancing, innovation and access,' jointly conducted by ASSOCHAM and TechSci Research.

The Government has been actively undertaking policy initiatives for growth of the pharmaceutical industry. One such initiative is tax-breaks in the pharmaceutical sector. There is also a weighted tax deduction at a rate of 150% for the research and development expenditure incurred. Steps to streamline methods for development of a new drug molecule, or clinical research, etc., have also been considered.

Indian Government also launched two schemes including New Millennium Indian Technology Leadership Initiative in 2003, and the Drugs and Pharmaceuticals Research Programme in 1994-95, specially targeted at pharmaceutical research, adds the study. The Department of Industrial Policy and Promotion (DIPP) data suggests that the drugs and pharmaceuticals sector in India has attracted FDI worth USD 1,523 million during April 2014-March 2015. Additionally, industrial licenses are not essential in India for most of the pharmaceutical products. Hence, drug manufacturers are free to develop any drug upon approval by the Drug Control Authority. Indian and foreign pharmaceutical companies are progressing with rising patented drug launches in India. The Indian Patent Office granted 2008 patents between 2010 and 2013.

The Department of Pharmaceuticals has drafted Pharma Vision 2020 document, with an aim to establish India as a leading county for end-to-end drug manufacturing and innovation. This initiative by the government aims at providing support to Indian pharmaceutical sector through state-of-the-art infrastructure, internationally competitive scientific research personnel for pharmaceutical R&D, and funding for research in the public and private sectors.

<http://rtn.asia>

INDONESIA

ADB supports Indonesia's inclusive growth

The Asian Development Bank (ADB) has approved a new Country Partnership Strategy with Indonesia for 2016-2019, setting out a program of support to foster a sustainable economic growth path that delivers benefits for all the country's citizens and regions. "Indonesia has made tremendous social, economic, and political progress since its independence 7 decades ago," says Sona Shrestha, Deputy Country Director at ADB's Indonesia Resident Mission. "ADB's new partnership with Indonesia will help build on that progress by working toward inclusive and environmentally sustainable growth through improved infrastructure services, better public sector governance and management, and enhanced education and skills."

ADB will increase infrastructure investments in support of the government's ambitious targets. ADB's support in energy infrastructure will boost the reliability and efficiency of the national electricity grid and promote cleaner energy sources, such as geothermal and natural gas. To improve rural incomes, support will focus on irrigation, water supply, and high-value crops. In cities, the urban poor will benefit from upgrades to sewerage and wastewater management.

"ADB will support fiscal reforms to improve public expenditures and the delivery of services to those who need them most," said Ms. Shrestha. "Support for implementation of reforms to improve the investment climate and reduce the cost of doing business will contribute to broadening the economic base and creating jobs."

<http://www.cfoinnovation.com>

MALAYSIA

Innovation in Malaysian universities

The quality of Malaysian universities must improve so that they can contribute to research and innovation as well as produce skilled graduates, according to the Organisation for Economic Cooperation and Development (OECD). The *OECD Re-*

views of Innovation Policy: Malaysia 2016 report said that while the number of university graduates and postgraduates has increased, the country was still missing overall quality. "Responsiveness to industry needs remains an area of concern, as is ensuring quality education in private universities. "No Malaysian institution is on the list of the top 100 in the Asian QS University Rankings — in contrast to universities from Singapore, Hong Kong (China) or India, who have recently joined this list. The quality and supply of science and technology graduates needs to improve to respond to the business sector's growing demand for such skills," said the OECD report.

According to the report, the research and development (R&D) in Malaysian universities multiplied by 11 between 2000 and 2012 and the number of researchers expanded five-fold between 2006 and 2012 from 12,152 to 64,962 researchers. "Research and innovation capabilities at HEIs show signs of improving, but mostly in terms of quantity of publications rather than quality and impact," said the OECD report, referring to higher education institutions.

The report noted that although there has been an "unprecedented surge" in the number of publications, their impact measured by citations has been "very low". Similarly, although the number of patents from tertiary institutions jumped quickly, the intellectual property created by research remained un-commercialised. "The attractiveness of university patents to industry and their practical applicability seems weak; this is in part due to the lack of relevance of research to industry and weak communication between the two sectors. "The quality of these patents remains a concern given the high costs of patenting and renewing intellectual property rights (at both national and international levels)," said the OECD report.

The OECD observed that only a few universities have started to collaborate with the business sector in R&D. "While universities have taken steps in articulating research policies and research management offices, research efforts remain fragmented both across and within universities and lack effective strategic prioritisation," the OECD added.

The OECD also highlighted the lack of a national policy on research infrastructure, which it said affected universities' research excellence. "The Ministry of Science, Technology and Innovation has begun efforts to conduct a national inventory but no co-ordination mechanisms are yet in place," said the OECD report. "Guidelines for the collective use of infrastructure also need to be established to ensure a cost-efficient use of infrastructure and equipment. A competitive and well-managed research infrastructure is critical to foster research excellence, enhance the quality of research and attract talented young researchers, including from abroad," it added.

<http://www.themalaymailonline.com>

PHILIPPINES

Philippines venturing into artificial intelligence, space technology

The Department of Science and Technology (DOST) plans to include artificial intelligence (AI) on its research and development agenda starting 2017-2022, DOST Secretary Fortunato dela Peña said during the National Research and Development Conference. The National R&D Conference is a prologue to the crafting of a Harmonized National R&D Agenda (HNRDA) for science and technology, which intends to unify all R&D projects and initiatives in line with the Philippine Development Plan called "Ambisyon Natin 2040."

In the 80s, Dela Peña wrote a scientific article on the future of technology where AI had been prominently described as the next wave of technological development in the global technological space. However, the former UP professor said the government then had to focus more on other priority areas of development.

<http://www.update.ph>

SINGAPORE

Open innovation platform launched

Singapore recently launched the A*StartCentral at JTC LaunchPad @ one-north – the first and only open innovation platform with life science lab facili-

ties in Singapore. This latest initiative by Exploit Technologies Pte Ltd or ETPL as it is popularly called, aims to support the startup ecosystem in the one-north community. ETPL is A*STAR's commercialisation unit, spearheading their licensing and spin off or start up strategies and practice.

A*StartCentral was started after they identified a major gap in the ecosystem. While there is a high percentage of incubators and accelerators in Singapore which cater to digital startups through their dry labs, access to physical facilities for Medtech and LifeSciences startups is virtually non-existent. A*StartCentral wants to fill this gap by providing first; the hardware in the form of space, facility and wet lab infrastructure where members can create and test out design prototypes and hypothesis using ready-to-access tools and equipment; and second; support in the form of mentors, entrepreneurship programmes, bootcamps, funding and legal assistance, business networks and clinics.

A*StartCentral helps scientist-entrepreneurs to incubate their technology projects and startups, to provide pre-startup ideation and post-startup acceleration programmes, and develop a supporting community of strategic partners especially for Medtech and Life Science startups. The 983 square meters facility which is strategically located at the heart of the one-north entrepreneurship community, serves as the nexus to bring together scientists, entrepreneurs, investors, mentors, incubators and accelerators under one roof.

Since its opening in March this year, A*StartCentral has attracted A*STAR spin-offs and licensees and promising companies which have emerged from across other research institutes and abroad. It now houses over 12 start-ups and projects, comprising Medtech, biotech and Internet startups. At full capacity, it can incubate up to 25 startups. Some of the programme partners with whom they organize joint programmes to seed innovations include Joyful Frog Digital Innovation (JFDI) and the Singapore-Stanford Biodesign (SSB), Action Community for Entrepreneurship (ACE), SMART Innovation Centre, Tech for Good, Centre for Health-

care Innovation (CHI), Biotech Connection Singapore, TNB Venture.

<https://biotechin.asia>

REPUBLIC OF KOREA

Comprehensive strategy on bio industry

Republic of Korea rolled out a package of measures to fuel the growth of the country's bio-health industry, aiming to become a global powerhouse in the sector and add nearly 1 million new jobs, the health ministry said. The comprehensive plan for the next four years was finalized in a meeting presided over by Prime Minister Hwang Kyo-ahn and announced by the Ministry of Health and Welfare. It marks the first time for the government to map out the comprehensive plan following concerns over a lack of a coordinated strategy and overlapping projects by government offices and relevant institutions.

Under the plan, Republic of Korea aims to become a global biotech and medical industry hub by investing more in research and development (R&D) on medicine, medical devices and cosmetics. The government forecast that 940,000 new jobs will be created by 2020 in the industry that is widely viewed as the nation's next growth engine after IT. First, the government will offer higher tax benefits and incentives for clinical trials of indigenous drugs and investment on R&D facilities, officials said.

The combined exports of medicine, medical instruments and cosmetics jumped to 9.3 trillion won (US\$8.5 billion) in 2015 from 4.7 trillion won in 2011, data showed. The number of people working in the industry also jumped to 760,000 in 2015 from 620,000 in 2011, according to the data. The government forecast outbound shipments of the three to increase up to 20 trillion by 2020 on the back of various support measures.

In recent years, local pharmaceutical companies have become more competitive on the global stage on the back of robust R&D spending and policy backup by the government. Medicine exports by South Korean pharmaceutical firms jumped by 22 percent in 2015 from a year earlier, the biggest on-year rise in five years.

The government will also expand the R&D budget for the development of various medical devices and put effort into improving distribution channels to further foster exports. To further enhance competitiveness, the government plans to increase the number of homegrown drugs from the current three to 17 by 2020. Also, the government plans to expand support to local drug firms in an aim to expand the number of generic drugs from five in 2015 to 10 by 2020, officials said.

In 2015, local drugs firms, including Hanmi Pharmaceutical Co., clinched 26 out-licensing deals and collaboration projects worth a combined 9.3 trillion won. The local bio-health industry only accounts for 1.4 percent of the global market, data showed. However, the local industry is forecast to log an annual 5.7 percent growth by 2020. The ministry said it will support expanding R&D investment in anti-aging products and other cosmetics. With the plan, the government expects that two local cosmetics firms would rise to rank among the top 10 global firms by 2020 and the revenue from the overseas shipments of cosmetics to jump to 23 trillion from 11 trillion in 2015. The ministry will expand the R&D budget for the development of stem cell and gene therapy as well as create funds to support bio startups.

<http://english.yonhapnews.co.kr>

Investments in robot industry

Republic of Korea will spend a total of 500 billion won (US\$450 million) in the coming five years to foster the robot industry as a new growth engine for Asia's fourth-largest economy, the trade ministry here said Tuesday. "The robot industry has emerged as a new technology frontier that will give a fresh boost to the manufacturing sector," Trade Minister Joo Hyung-hwan said in a meeting with businessmen in Daejeon. "The government will fully support the businesses' investment into research and development in a bid to help the industry grow as a new export leader."

The public and private sectors will invest a combined 350 billion won in R&D to localize a few key fundamental technologies in the next five years, with more than 100

billion won to be poured in funding corporate R&D centers to launch up-to-date robots by 2020 and bringing up robot experts and researchers.

The Republic of Korean government has recently focused on the potential of robot technology as a new growth engine as the global robot market expanded to \$16.7 billion in 2014 from \$9.6 billion in 2010. Korea has a market share of 4.7 percent in 2014, ranking fifth following China, the United States, Germany and Japan. However, the trade ministry said vacuum robots accounted for most of the service robots that are used in the household, medical and agricultural sectors in the country.

<http://english.yonhapnews.co.kr>

Tax benefits for R&D spending

Republic of Korea's government plans to expand tax benefits for research and development of robotics and other technologies as it seeks out industries that could become new economic growth engines. Up to 30 percent of R&D expenses will be tax deductible for companies across 11 key sectors starting 2017, the Ministry of Strategy and Finance said in its annual review of the tax code. Spending on development of artificial intelligence technologies, flexible displays, 3-D printing, and hyper-plastics are some of the areas subject to the tax code revision, it said.

Republic of Korean conglomerates such as Samsung Electronics Co Ltd and LG Electronics Inc spend billions of dollars a year on R&D investment, but smaller companies have been skittish in doing so due to limited resources and economic uncertainties, leading to a severe downturn in capex in the first quarter. The Park Geun-hye administration has also been increasingly looking to technological developments and the service sector to provide a new growth engine for the economy as China continues to challenge South Korea's traditional strength in manufacturing.

The government's push for restructuring of indebted companies in shipbuilding and shipping industries is adding to growth woes when exports remain weak.

Earlier this month, the government announced an 11 trillion won (\$9.73 billion) extra budget following the Bank of Korea's decision to lower its policy rate to a record 1.25 percent in June.

<http://www.businessinsider.com>

THAILAND

New investment tools

To enhance national competitiveness and make Thailand a more attractive investment destination in Asia, the government sector is working in concerted efforts to ensure a pleasant investment atmosphere by improving both investment incentives and various infrastructures to facilitate potential investors in high technology, innovation, and research and development projects. To achieve this, the Cabinet has recently approved two acts directly related to the Board of Investment (BOI) -- the first is the amendment of the Investment Promotion Act 1977 and the second is the Country's Competitiveness Enhancement Act.

The amendment of the Investment Promotion Act 1977 is designed to be more attractive by extending corporate income tax (CIT) exemption period from currently up to 8 years to 13 years. The 50% tax reduction will also be extended to up to 10 years. The incentives are limited to projects that use high technology, high innovation, and R&D in the production. The law also included exemption on import duties of products that are imported for R&D purposes.

Under the Country's Competitiveness Enhancement Act, there will be a board to consider and screen projects that are eligible to obtain financial support from the one trillion baht fund. The board can provide CIT exemptions for up to 15 years and grant capital to support investments with specific criteria.

Both Acts have passed the Cabinet and the Council of State. They are now in the process of approval from the National Legislative Assembly.

Since 2015, the BOI has been focusing on promoting investments that use advanced technology and innovation, as well as,

promoting investments under the Policy to Promote Science, Technology, and Innovation which had the highest number of project applications from January - July 2016. For the first seven months of 2016, the Digital Economy had 143 project applications with a total investment value of 3.68 billion baht. This is an 85.7% increase for the project applications and a 237.6% increase for the investment value from the same period last year.

Under the Policy to Promote Science, Technology, and Innovation, there were 133 project applications with a total investment value of 32.17 billion baht. This is a 160.7% increase for the project applications and a 409.8% increase for the investment value when the period of seven months of 2015 and 2016 are compared.

<http://www.prnewswire.com>

Thailand pledges to ASEAN science development fund

Three areas of cooperation to stimulate education in science and technological development in the region will be implemented from Oct. 1. Thailand will invest an initial \$1 million to establish a Science, Technology and Innovation Development Fund for ASEAN. After the first Asean Science & Technology Innovation (STI) Forum, held in Bangkok last week, Science and Technology Minister Pichet Durongkaveroj said the forum had come up with three plans to stimulate education in science and technological development in the region. "As host of the event, Thailand proposed providing \$1 million in initial investment capital to set up a Science, Technology and Innovation (STI) Development Fund for ASEAN, so that ASEAN countries will have a tangible plan to direct responsible development of science and technology," he said.

After Thailand's proposal, representatives of other ASEAN countries responded to the idea and said they would ask their governments to approve budgets for contributing to the fund. Durongkaveroj said the Newton Fund, which is managed by the UK Department of Business, Energy and Industrial Strategy in collaboration with 16 partner countries, would support

the establishment of the STI Development Fund for ASEAN. Moreover, he said that after discussions with Mark Walport, science adviser to the prime minister of Britain, Thailand and the UK had agreed to draw up a memorandum of understanding on support for science and innovation.

After the first Asean STI Forum, three areas of cooperation will be implemented from October 1. The first plan is to set up of the STI Fund for ASEAN, initially funded by Thailand at \$1 million. Second, Thailand will support ASEAN human-resource development by providing scholarships for the pursuit of master's and doctoral degrees. And third, the government sector will assist the private sector in doing research and innovative work in the region.

Durongkaveroj said that although ASEAN had encouraged science education and innovation for many years, it had lacked a centre to continue such support. The ASEAN STI Forum and Fund should help tighten cooperation in this area and lead the region towards sustainable development. ASEAN cooperation in science and technology affects many sectors, such as food, energy and alternative energy, and biodiversity.

<http://www.thejakartapost.com>

VIET NAM

Technology transfer law to be revised

In the September 13 meeting, the NA deputies heard the Government report on ten years of implementing the law. The report affirmed that the law had contributed to pushing up the domestic technological renovation and transfer in production which helped increase the competitiveness of businesses as well as the growth rate of the economy. However, the law needed to be adjusted to meet the demand of economic growth and in-depth international integration processes. Minister of Science and Technology, Chu Ngoc Anh, told the meeting that "the adjustment of the current Law on Technological Transfer aims to create favorable conditions for technological transfer activities inside and outside Vietnam so as to help

businesses renew the technologies."

According to the report, the current law was revised and 16 out of 61 clauses were supplemented. In the discussion, many deputies raised concerns over whether to adjust only 16 clauses or fully revise the current law. Some deputies said that with the domestic current situation of technology, adjusting some items in the current law would not meet the demand of the country's industrialisation and modernisation process. Speaking at the meeting, the NA Chairwoman Nguyen Thi Kim Ngan said "the adjustment should be practical and inherit good points as well as overcome shortcomings of the current law".

Meanwhile, deputy Phan Thanh Binh, chairman of the NA Culture, Education and Teenage Affairs Committee, said that the draft revised law just mentioned regulations on technological import but not on domestic technological transfer. "At present, there were difficulties on technological transfer among research institutes, universities and businesses. The revised law should have regulations to solve the issues. However, the matter was not clarified in the revised law", said Binh.

After discussion, the NASC agreed that the law should consider businesses as a core for technological renewal, application and transfer so as to increase the production capacity and competitiveness, and environment protection as well.

The technological transfer must ensure support for the domestic technological and science market as well as preventing the transfer of outdated technologies to Viet Nam.

<http://english.vietnamnet.vn>

Start-ups to get financial aid

Some start-up projects in Ho Chi Minh City will receive financial support of up to 2 billion VND (90,000 USD) within two years under a mechanism recently issued by the municipal People's Committee. The beneficiaries will operate in the city's four key industrial sectors: manufacturing mechanics, electronics-information-technology, chemicals-rubber-plastics, and food processing. Those investing in the

support industry and services will also be eligible for the funds, Sai Gon Giai phong (Liberated Saigon) newspaper reported. The eligible projects will be selected from contests on renovation and creation organised by the municipal Department of Science and Technology, or projects registered with the department.

HCM City, one of the country's largest economic hubs, aims to expand the number of enterprises in the city to 500,000 by 2020, according to its draft plan announced in July. Currently, the southern metropolis has 270,000 registered firms, including 170,000 in operation. It also has 250,000 family businesses with potential to develop into companies.

Vietnamese policymakers are embracing an ambitious plan to turn the country into a start-up nation in the next four years. Recently, the Vietnamese government approved various initiatives aimed at promoting a boom in technology start-ups. Under the project, the government will provide legal and financial support for an estimated 2,600 start-ups across the country over the next 10 years. The government plans to launch an online portal that will keep start-ups updated about technologies, policies and funding. The government will also set up co-working spaces where startup companies can gain access to infrastructure at low costs. Start-ups will even receive financial support from the government for training, product testing and marketing. The Ministry of Planning and Investment has also developed incentives that will draw local and foreign venture capital funds.

<http://www.saigon-gpdaily.com.vn>

Innovative startup accelerator launched

The Vietnam Innovative Startup Accelerator (VIISA) announced that it is launching the call for applications into its inaugural batch in November 2016. VIISA is an open ended fund that is a partnership of major corporations, BIDV, Dragon Capital, FPT and Hanwha Investment. VIISA will invest US\$8 million (RM33.2 million) into start-ups that will build global companies out of Vietnam. With Vietnam's rapidly grow-

ing middle class, an increasingly digital population and availability of technical talent, it is increasingly becoming a start-up hub of choice in Southeast Asia. VIISA programme director Adrian Tan said that there are more than 650 million people in South-East Asia and a fast growing middle class. He believes that VIISA can help entrepreneurs create value through innovative products and services for the emerging markets that can impact millions of people.

VIISA aims to attract foreign and local entrepreneurs to seize the opportunities and build their startup from Vietnam. VIISA will invest up to US\$15,000 into each company and provide up to US\$200,000 worth of technical resources, office accommodation, accountancy and bank account services and access to more than 100+ world class mentors and investors. Promising startups will also receive up to US\$500,000 of follow-on funding.

According to Dragon Capital Group chairman Dominic Scriven technology is completely transforming lives. It is therefore imperative to keep abreast of technology trends and turn them to our advantage. FPT Ventures head Tran Huu Duc feels that in order to spur the growth of a startup ecosystem, there is a need to bring together founders, local and foreign investors, and innovative government leaders. VIISA will be able to create a platform to accelerate innovation in the country. Meanwhile, Jong Min KIM, Head, New Business team at Hanwha feels that VIISA will be able to position itself as a focal point in the Vietnam startup ecosystem. "We believe that the synergies between the different cofounding partners from different industries will help to trigger Vietnam to become the next startup hub in South-East Asia."

<https://www.digitalnewsasia.com>

Support to start-ups

The Government's Small- and Medium-Sized Enterprise Development Foundation (SMEDF) could provide support to startups in the form of venture capital and crowd funding, according to a draft decision. The draft on the Prime Minister's decision on the organisation and operation of SMEDF

was being posted for public comment on the Ministry of Planning and Investment's website. SMEDF, a public financial institution, which officially began operations on April 22 this year, aims to provide support to small- and medium-sized enterprises (SMEs) nationwide.

According to the draft, SMEDF could provide support to SMEs in a number of ways, including direct lending, credit guarantee, venture capital (VC), crowd funding and support in enhancing SMEs' capacity. The ministry said the diversification in SMEDF's support measures would help improve the efficiency of financial support being provided to SMEs, especially to startups which were in a disadvantageous position for accessing loans due to the shortage of mortgaged assets. The ministry said venture capital and crowd funding would enable startups to access capital.

Regarding venture capital, SMEDF would provide counterpart funds to startups, which received investment from angel investors, in exchange for stake in the SMEs. The participation of both the Government and the private sector in venture capital was expected to promote the startup spirit and fuel the sector's development, the ministry said. In addition, SMEDF could contribute capital to a VC fund that had already raised a minimum of VNĐ10 billion (US\$447,000) from private investors and had its portfolio approved by the foundation. Venture capital from SMEDF would be capped at below 25 per cent of the foundation's charter capital. SMEDF, under the draft, would also provide an online platform of crowd funding to SMEs, aimed at improving access to capital for startups and to call for idle capital from the private sector. The current charter capital of SMEDF was VNĐ2 trillion, which was still short compared with the demand of financial support of more than 500,000 SMEs nationwide, the ministry said, adding that the draft would allow the fund to raise capital in a number of ways, including capital raised from financial and credit institutions and the private sector, in addition to State funding.

<http://vietnamnews.vn>

Technology Scan

Focus: Nanotechnology

ASIA-PACIFIC CHINA

Light-seeking synthetic Nanorobot

A team of researchers led by Dr Jinyao Tang of the Department of Chemistry, the University of Hong Kong, has developed the world's first light-seeking synthetic Nano robot. With size comparable to a blood cell, those tiny robots have the potential to be injected into patients' bodies, helping surgeons to remove tumors and enabling more precise engineering of targeted medications. The findings have been published in October earlier in leading scientific journal *Nature Nanotechnology*.

The Nanorobot developed by Dr Tang's team use light as the propelling force, and is the first research team globally to explore the light-guided Nanorobot and demonstrate its feasibility and effectiveness. In their paper published in *Nature Nanotechnology*, Dr Tang's team demonstrated the unprecedented ability of these light-controlled Nanorobots as they are "dancing" or even spell a word under light control. With a novel Nanotree structure, the Nanorobots can respond to the light shining on it like moths being drawn to flames. Dr Tang described the motions as if "they can "see" the light and drive itself towards it".

The team gained inspiration from natural green algae for the Nanorobot design. In nature, some green algae have evolved with the ability of sensing light around it. Even just a single cell, these green algae can sense the intensity of light and swim towards the light source for photosynthesis. Dr Jinyao Tang's team spent three years to successfully develop the Nanorobots. With a novel Nanotree structure, they are composed of two common and low-price semiconductor materials: silicon and titanium oxide. During the synthesis, silicon and titanium oxide are shaped into nanowire and then further arranged into a tiny Nanotree heterostructure. Dr Tang said: "Although the current Nanorobot cannot be used for disease treatment yet, we are working on the next generation na-

norobotic system which is more efficient and biocompatible."

"Light is a more effective option to communicate between microscopic world and macroscopic world. We can conceive that more complicated instructions can be sent to Nanorobots which provide scientists with a new tool to further develop more functions into Nanorobot and get us one step closer to daily life applications," he added.

<http://www.nanotech-now.com>

OLEDs with low-temperature processing technique

OLEDs are thinner, lighter and more flexible than their inorganic counterparts. However, they are also particularly vulnerable to contamination from gases and water vapour in the air, which can greatly impinge on their performance. Researchers at South China University of Technology (SCUT) have now demonstrated a protective laminate for high-performance OLEDs that decreases the transmission of water vapour and other gases into the device by around an order of magnitude.

"No one has used MgO for OLED encapsulation before," says Lei Ying, a SCUT researcher, after listing the various inorganic materials that have been considered. Yet as the SCUT researchers tell *nanotechweb.org*, MgO has a number of advantages: a low refractive index giving high transmittance, a wide bandgap, high dielectric constant, high chemical stability and a lack of UV irradiation treatment requirements. It is also cheap, commercially available, and with the new protocol reported in *Nanotechnology*, it is readily deposited on an Al₂O₃-coated device.

Engineers have traditionally used Al₂O₃ as a protective coating as it is quite successful in blocking the transmission of damaging water vapour and other gases. However, OLEDs' extreme susceptibility to water vapour and gas damage has spurred researchers on to investigate ways of developing improved protective laminates by combining with other inorganic semiconductors. In fact, MgO's string of advan-

tages has already encouraged attempts to add it to enhance protective Al₂O₃ layers, but without success.

Led by Junbiao Peng, professor in the School of Materials Science and Engineering at SCUT, the researchers developed a protocol to successfully deposit MgO layer-by-layer at temperatures of just 80 °C. The OLED was then protected without any signs of damage for up to 600 hours in an extreme environment of 60 °C and 100% humidity, extending the lifetime of the device by around an order of magnitude. What is more, they identified the critical thickness below and above which the MgO layer is not effective.

The researchers deposited the MgO layer-by-layer using atomic layer deposition, with the precursor Mg(CpMe)₂ along with water and tetramethylammonium (TMA). The ligands of Mg(CpMe)₂ evaporate at around 70 °C as opposed to the 150–200 °C needed for Mg(Cp)₂, so the MgO can be deposited at much lower temperatures.

While Al₂O₃ protects the OLED by blocking the transmission of water vapour, MgO enhances this protection by absorbing water vapour so that it does not reach the device. This means there is a minimum thickness of 1 nm below which the MgO layer will not be uniform, and there will not be enough of it to effectively absorb water vapour.

In addition, the MgO layer must be amorphous as water molecules can penetrate between the domains of crystalline MgO films. The researchers found that above 1 nm the layer forms in the crystalline phase; 1 nm is the critical MgO layer thickness for effectively enhancing the protective behaviour of the coating.

<http://nanotechweb.org>

INDIA

Eco-friendly nanotechnology for water purification

The Scientists team from the Institute of Advance Study in Science and Technology (IASST), Guwahati in Assam developed an eco-friendly nanotechnology for water-softening applications. The report was published online on 30 March

2016 in the journal *Nanoscale* and the authors are Upama Baruah and Achyut Konwar of IASST.

The key characteristics of the technology include:

- The green technology is the first of its kind with potential to act as a biodegradable and green material for water-softening applications
- It can be used in civic water treatment plants for generating potable water.
- The technology is basically a biopolymer, which uses a naturally occurring substance called Chitosan.
- Chitosan is obtained from the hard outer skeleton of shellfish, including crab, lobster, and shrimp. It will be used as a backbone for the carbon nanoparticles to sit on during the purification process.

In conventional water-softening techniques the synthetic resins are used where as in the newly developed biopolymer, the nanoparticles are the functional parts. They remove calcium and magnesium components of water through ion exchange which will purify the water.

<http://www.jagranjosh.com>

ISLAMIC REPUBLIC OF IRAN

Biosensor makes accurate cancer detection

Iranian researchers have developed highly accurate and cost-efficient biosensors that can detect cancers that require tissue sampling. Dr. Mohammad Abdollahad, the project manager of 'biosensor for detection of metastatic phase of cancer' told Mehr News that his team has been successful in developing various biosensors in the past six years, but their latest system is more cost-efficient for cancer detection.

He maintained that the biosensors have been designed and developed via nanotechnology, adding most of which can be used at a research scale. "Our latest product is in fact the tenth generation of cancer sensors and is able to detect various kinds of cancers in the shortest time possible and with the highest accuracy," he said. According to him, the biosensor has

so far yielded successful results in detecting cancers that require tissue sampling such as breast cancer, prostate cancer and cancer in lymph nodes. "The biosensor is simple to use, highly cost-efficient, easily accessible and very accurate," he said.

He explained the applications of the cancer detection sensor as, "assessing the metastatic growth in cancer cells, evaluating the effects of anticancer drugs on cancer cells, and studying the interaction of cancer cells with vascular cells." He stressed that the biosensor has been 100% accurate in detecting cancers in patients whose cancers have been previously detected through current tests, and even successful in detecting cancer where current tests had failed to do so. "This system has been patented in Iran and the US, and no other country has yet the technology to develop such a biosensor," he said.

<http://en.mehrnews.com>

JAPAN

Flexible, portable scanner made from carbon nanotubes

Terahertz rays, which lie between the infrared and microwave bands of the electromagnetic spectrum, can pass through a wide variety of materials without damaging them. As such, terahertz cameras have great potential for non-invasive, high-resolution imaging. Promising applications include revealing hidden weapons, identifying explosives, checking for defects in machined parts, among others.

However, conventional terahertz imaging technologies "use inflexible materials and therefore are adaptable only to flat samples," says Yukio Kawano at the Tokyo Institute of Technology. So these imagers encounter difficulties when scanning most real-life samples—which possess 3D curvature—greatly limiting their use, he says. For instance, terahertz scanners at security checkpoints need to rotate detectors 360 degrees around human bodies to image them, a necessity that makes these systems very bulky.

Kawano and his colleagues devised their new flexible terahertz imaging device from films of carbon nanotubes, which are pipes of carbon only nanometers or

billionths of a meter wide. At room temperature, their imager could detect a wide band of terahertz rays, ranging in frequency from 0.14 to 39 terahertz. This work marks "the first realization of a flexible terahertz camera," Kawano says.

The scientists developed portable terahertz scanners they could wrap around objects. Using these scanners, they could image hidden items such as metal washers or paper clips concealed behind paper sheets or germanium plates or find a piece of chewing gum hidden in a plastic box. They could also identify metal impurities in a plastic bottle and a break in a syringe. These findings suggest this scanner could find use in "high-speed and multi-view inspections of industrial products, especially non-flat samples," such as plastic bottles and pharmaceutical products, Kawano says.

In addition, the scientists developed a wearable scanner that could detect terahertz rays emitted by a human hand. "The wearable terahertz imaging of human hand without external terahertz sources is an important step for future medical applications," Kawano says. For instance, this scanner could help inspect a broad range of things including cancer cells, sweat glands, and tooth decay, enhancing "real-time monitoring of daily health conditions," Kawano says.

The scientists detailed their findings online 14 November issue of *Nature Photonics*.

<http://spectrum.ieee.org>

RUSSIAN FEDERATION

Eco-friendly fabrication of silicon nanowires

Scientists from the Faculty of Physics, the Lomonosov Moscow State University have worked out a new and more eco-friendly method of silicon nanowires obtaining, which allows to replace hydrofluoric acid (HF) by ammonium fluoride (NH₄F) (*Nanoscale Research Letters*, "Optical Properties of Silicon Nanowires Fabricated by Environment-Friendly Chemistry").

Kirill Gonchar, a Junior researcher in the Low Temperature Physics and Superconductiv-

ity Department, the Faculty of Physics, at the Lomonosov Moscow State University, describes the whole scheme of nanowires elaboration. He says: "We've used a two-step method of etching. At the first stage silver nanoparticles were deposited on the surface of a silicon wafer. But this deposition didn't produce a level layer but different island regions. At the second stage the silicon wafer was etched right in the places, covered with silver. Because of this, those silicone sheet places, which were uncovered with silver, turned into nanowires. Silver nanoparticles fell into the silicone sheet. And the more etching was lasting the longer nanowires were got at the output. At the end silver was removed with the help of nitric acid."

Researchers from the Lomonosov Moscow State University have replaced dangerous and toxic hydrofluoric acid by ammonium fluoride at all stages of chemical etching. Moreover, they have studied optical properties of silicon nanowires, produced with the help of this method, and compared them with nanowires, received on the basis of conventional method, rested on hydrofluoric acid usage. Kirill Gonchar shares, how this idea to use ammonium fluoride in nanowires synthesis has emerged. He clarifies: "The idea of ammonium fluoride application wasn't new, it was borrowed from experiments of porous silicon obtaining, which took place 20 years ago. Ammonium fluoride was also used there instead of hydrofluoric acid. There were similar projects where nanowires were produced in ammonium fluoride, however, there was no replacement at all etching stages. We've studied optical properties of the nanowires we got and proved that they don't differ much from nanowires, obtained by conventional method."

<http://www.nanowerk.com>

SINGAPORE

Nanotechnology solution for oil spills

Current approaches to dealing with oil spills range from adding grease and setting the slick on fire to using barriers and skimmers to remove the oil. No current method is universally successful. Alternatively, some studies

are taking place with oil-digesting bacteria but these have yet to be trailed successfully. In a new approach the A*STAR Institute of Bioengineering and Nanotechnology (Singapore) has developed molecules with special gelling abilities. These can transform oil into a type of jelly. These so-called "super-gelators" work in a matter of minutes.

The process works through the molecules being sprayed onto oil. On impact the molecules become long fibers ('long', that is, relative to the nano-scale). The fibers create a web that traps immersed oil into a jelly. This jelly floats on the surface, which facilitates its removal from the water. Tests have been successful with both freshly spilled crude oil and highly weathered crude oil (these have different viscosities and sulfur levels).

In a statement, lead researcher Dr. Yugen Zhang commented: "Nanoscience makes it possible to tailor the essential structures of materials at the nanometer scale to achieve specific properties." The researcher explains further: "Structures and materials in the nanometer size range often take on distinctive properties that are not seen in other size ranges."

The research has been published in the journal *Chemistry of Materials*. The paper is titled "Instant Room-Temperature Gelation of Crude Oil by Chiral Organogelators"

<http://www.digitaljournal.com>

EUROPE SPAIN

Nanotechnology microsensor

Catalan researchers are targeting the healthcare sector with a tiny new sensor that's so precise it can detect the flutter of a butterfly. In fact the thermoelectric sensor based on silicon nanotechnology can detect the flutter of butterfly wings, according to its creators at Barcelona's UAB, IMB CNM-CSIC, and the Polytechnic University of Catalonia. They believe the device could have a number of applications in a range of fields, including the health sector.

Because the sensor can be used to detect very small changes in gas flow, it's sensitive enough to, for example, pick up a variation

of temperature measured in millikelvins in someone's breathing rhythm. As a result, it could offer a low-cost way of helping diagnose sleep apnea or even pneumonia. It's because of this sort of business opportunity that the researchers decided to create a spin-off called FutureSiSens.

The company is currently testing various prototypes of the microsensor in real environments to compare it with the equipment used in hospitals, and to see what advantages and benefits it offers. "Today, patients have to spend a whole night at the hospital surrounded by qualified personnel and covered by a bunch of sensors connected to their body measuring their vital signs to get a good diagnosis of sleep apnea. Considering its characteristics, our sensor has an undoubted potential in this sector," Moreno says.

In the coming months, FutureSiSens plans to improve the device and reduce it even more in size to make it two square millimeters. That size reduction will allow it to be easily integrated into personal protective equipment used by firefighters or miners, instantly detecting a respiratory failure and sending an alarm signal to a PBX.

<http://www.zdnet.com>

NORTH AMERICA USA

Solar nanotech-powered clothing

Scientists at the University of Central Florida's NanoScience Technology Center, have developed filaments in the form of copper ribbons that are thin, flexible and lightweight. The ribbons have a solar cell on one side and energy-storing layers on the other. Though more comfortable with advanced nanotechnology, the team then bought a small, tabletop loom. After another UCF scientist taught them to use it, they wove the ribbons into a square of yarn.

The proof-of-concept shows that the filaments could be laced throughout jackets or other outdoor wear to harvest and store energy to power phones, personal health sensors and other tech gadgets. It's an advancement that overcomes the main shortcom-

ing of solar cells: The energy they produce must flow into the power grid or be stored in a battery that limits their portability. There are a host of other potential uses, including electric cars that could generate and store energy whenever they're in the sun.

<https://www.sciencedaily.com>

Semiconductor nanocomposite material

A research team at Worcester Polytechnic Institute (WPI) has developed a revolutionary, light-activated semiconductor nanocomposite material that can be used in a variety of applications, including microscopic actuators and grippers for surgical robots, light-powered micro-mirrors for optical telecommunications systems, and more efficient solar cells and photodetectors.

"This is a new area of science," said Balaji Panchapakesan, associate professor of mechanical engineering at WPI and lead author of a paper about the new material published in *Scientific Reports*, an open access journal from the publishers of *Nature*. "Very few materials are able to convert photons directly into mechanical motion. In this paper, we present the first semiconductor nanocomposite material known to do so. It is a fascinating material that is also distinguished by its high strength and its enhanced optical absorption when placed under mechanical stress.

"Tiny grippers and actuators made with this material could be used on Mars rovers to capture fine dust particles," Panchapakesan noted. "They could travel through the bloodstream on tiny robots to capture cancer cells or take minute tissue samples. The material could be used to make micro-actuators for rotating mirrors in optical telecommunications systems; they would operate strictly with light, and would require no other power source."

Like other semiconductor materials, molybdenum disulfide, the material described in the *Scientific Reports* paper ("Chromatic Mechanical Response in 2-D Layered Transition Metal Dichalcogenide (TMDs)-based Nanocomposites"), is characterized by the way electrons are arranged and move about within its atoms.

In particular, electrons in semiconductors are able to move from a group of outer orbitals called the valence band to another group of orbitals known as the conduction band only when adequately excited by an energy source, like an electromagnetic field or the photons in a beam of light. Crossing the "band gap," the electrons create a flow of electricity, which is the principal that makes computer chips and solar cells possible. When the negatively-charged electrons move between orbitals, they leave behind positively charged voids known as holes. A pair of a bound electron and an electron hole is called an exciton.

In their experiments, Panchapakesan and his team, which included graduate students Vahid Rahmehin and Farhad Khosravi, as well as colleagues at the University of Louisville and the University of Warsaw Pasteura, observed that the atomic orbitals of the molybdenum and sulfur atoms in molybdenum disulfide are arranged in a unique way that permits excitons within the conduction band to interact with what are known as the p-orbitals of the sulfur atoms. This "exciton resonance" contributes to the strong sigma bonds that give the two dimensional array of atoms in molybdenum sulfide its extraordinary strength. The strength of this resonance is also responsible for a unique effect that can generate heat within the material. It is the heat that gives rise to the material's chromatic (light-induced) mechanical response.

To take advantage of the later phenomenon, Panchapakesan's team created thin films made up of just one to three layers of molybdenum disulfide encased in layers of a rubber-like polymer. They exposed these nanocomposites to various wavelengths of light and found that the heat generated as a result of the exciton resonance caused the polymer to expand and contract, depending on the wavelength of the light used. In previous work, Panchapakesan's team harnessed this photo-mechanical response by fabricating tiny grippers that open and close in response to light pulses. The grippers can capture plastic beads the size of a single human cell.

In further testing, Panchapakesan and his team discovered another unique behavior

of the molybdenum disulfide composite that opens the door to a different set of applications. Employing what is known as strain engineering, they stretched the material and discovered that mechanical stresses increased its ability to absorb light.

<http://www.nanotech-now.com>

Plastic clothing material that cools the skin

Stanford engineers have developed a low-cost, plastic-based textile that, if woven into clothing, could cool your body far more efficiently than is possible with the natural or synthetic fabrics in clothes we wear today. Describing their work in *Science*, the researchers suggest that this new family of fabrics could become the basis for garments that keep people cool in hot climates without air conditioning. "If you can cool the person rather than the building where they work or live, that will save energy," said Yi Cui, an associate professor of materials science and engineering at Stanford and of photon science at SLAC National Accelerator Laboratory.

This new material works by allowing the body to discharge heat in two ways that would make the wearer feel nearly 4 degrees Fahrenheit cooler than if they wore cotton clothing. The material cools by letting perspiration evaporate through the material, something ordinary fabrics already do. But the Stanford material provides a second, revolutionary cooling mechanism: allowing heat that the body emits as infrared radiation to pass through the plastic textile.

To develop their cooling textile, the Stanford researchers blended nanotechnology, photonics and chemistry to give polyethylene – the clear, clingy plastic we use as kitchen wrap – a number of characteristics desirable in clothing material: It allows thermal radiation, air and water vapor to pass right through, and it is opaque to visible light. The easiest attribute was allowing infrared radiation to pass through the material, because this is a characteristic of ordinary polyethylene food wrap. Of course, kitchen plastic is impervious to water and is see-through as well, rendering it useless as clothing. The Stanford re-

searchers tackled these deficiencies one at a time.

First, they found a variant of polyethylene commonly used in battery making that has a specific nanostructure that is opaque to visible light yet is transparent to infrared radiation, which could let body heat escape. This provided a base material that was opaque to visible light for the sake of modesty but thermally transparent for purposes of energy efficiency. They then modified the industrial polyethylene by treating it with benign chemicals to enable water vapor molecules to evaporate through nanopores in the plastic, said postdoctoral scholar and team member Po-Chun Hsu, allowing the plastic to breathe like a natural fiber.

That success gave the researchers a single-sheet material that met their three basic criteria for a cooling fabric. To make this thin material more fabric-like, they created a three-ply version: two sheets of treated polyethylene separated by a cotton mesh for strength and thickness. To test the cooling potential of their three-ply construct versus a cotton fabric of comparable thickness, they placed a small swatch of each material on a surface that was as warm as bare skin and measured how much heat each material trapped. The comparison showed that the cotton fabric made the skin surface 3.6 F warmer than their cooling textile. The researchers said this difference means that a person dressed in their new material might feel less inclined to turn on a fan or air conditioner.

<http://news.stanford.edu>

Nanotechnology developed to capture energy

Experts at the Michigan State University have developed a nanotechnology device that is as thin as film and can turn human motion into energy. This means that a mere finger swipe over a smartphone screen can keep it running indefinitely. Similarly, by typing on keyboards, laptop batteries will be charged. Fitness trackers too can gain power from the kinetics of jogging feet. Known as biocompatible ferroelectric nanogenerator, or FENG, the technology is discussed in greater detail in Nano Energy.

“What I foresee, relatively soon, is the capability of not having to charge your cell phone for an entire week, for example, because that energy will be produced by your movement,” said Nelson Sepulveda, lead researcher and associate professor of electrical engineering at Michigan.

The experts showcased a prototype device that is flexible, thin and apt for many applications. The processes are enabled by the device’s structure that is built on a silicon wafer, where layers are separated by walls of thin polypropylene ferroelectric, silver, and polyimide slices.

Ionized layers upon compression help in generating electric energy from the substrate. The miniature or nano size of the device needs special mention. A case in point is the palm-sized device that was demonstrated by the researchers powering a slew of LED lights. Also tiny was the one that energized a touch screen device smaller than a finger.

The Michigan researchers affirm that FENG has the potential to turn into “a promising alternative in the field of mechanical energy harvesting” as far as autonomous electronics such as cell phones, wireless headsets, and touch-screen devices are concerned. More impressive is the device’s ability to double power output when folded. The researchers are also mulling how the technology would ignite power from the heel strike to run gadgets like headsets.

The new technology holds promise as nanomaterials — carbon nanotubes, silver nanowires, graphene and other 2D materials — are emerging as key to the future development of wearable electronics in healthcare and fitness. Already wearable low-power silicon electronics, LEDs in fabrics with integrated Lithium-ion batteries (LIB), and electronic devices such as smart glasses, watches and lenses, have been commercialized only in the recent past, as seen in the case of Google Glass and Apple Watch.

<http://www.techtimes.com>

Nanotech wafer turns carbon dioxide into ethanol

Scientists have found a way to take everyone’s least favorite greenhouse gas, car-

bon dioxide, and mix it with water to create alcohol. A research team at Oak Ridge National Laboratory in Tennessee developed a way to convert carbon dioxide into ethanol—and they did it by accident. Originally, they were hoping to convert carbon dioxide that had been dissolved in water to methanol, a chemical released naturally by volcanic gases and microbes, which can cause blindness in humans if ingested. But instead of methanol, they discovered they had ethanol, a primary component of gin and also a potential fuel source. Surprised, the team realized that not only was their new material converting the carbon dioxide to ethanol, it needed very little outside support.

The material is a small chip—about a square centimeter in size — covered in spikes, each just a few atoms across. Each spike is constructed out of nitrogen with a carbon sheath and a small sphere of copper embedded in each tip. The chip is dipped into water and carbon dioxide is bubbled in. The copper acts as a small lightning rod, attracting electricity and driving the first steps of the conversion of the carbon dioxide and water into ethanol, before the molecules move to the carbon sheath to finish the process.

The new nano-structured material allowed the researchers to use widely available materials like copper instead of more expensive options like platinum. In the past, this has hampered the ability to manufacture a material like this at larger scales. The team hopes that their material, because it’s made from more easily available components, will be able to scale up successfully. Even though the process probably won’t help much with carbon dioxide in the atmosphere — Rondinone says it would be too energetically costly — he believes there is another way for this process to help meet energy demands. Rondinone sees an opportunity to help with intermittent power sources like wind and solar. By capturing excess electricity generated by the process and storing it in the form of ethanol, it could be burned later when the wind turbines aren’t spinning or the sun isn’t shining.

<http://www.popsci.com>

DIGITAL TECHNOLOGY AND ECONOMY FOSTERING INCLUSIVE DEVELOPMENT

THAILAND EXPERIENCE

Kamolrat Intaratat

Assoc. Prof. & Chair of Communication Arts for ASEAN Program, School of Communication Arts, Chair of CCDKM, Research Center of Communication and Development Knowledge Management (CCDKM)
Sukhothai Thammathirat Open University
Chaengwattana, Rd,
Muang Thong Thani,
Bangpood, Pakkret, Nonthaburi,
Thailand, 11120
Tel: +66 02 504 8756
E-mail: kamolratchim@gmail.com



Abstract

For over a decade, Thailand has been internationally recognized as a regional centre for ICT growth and development, and its ICT Policy Framework has been an exemplary model for the development of an effective telecommunications and ICT regulatory environment (GSMA, 2015).

In 2014, an innovative E-policy framework called Smart Thailand 2020 was introduced. Its main principal objective is to boost accessibility, making ICTs a basic commodity for the entire country through ongoing improvements in infrastructure and mobile broadband penetration under its four main Pillars: Digital e-Commerce, Digital Entrepreneurs, Digital Innovation, and Digital Contents. ICT literacy also promoted to provide opportunities for all marginalizes. Since 2006, CCDKM has trained both offline and online 348,820 Thai marginalized people. From 2013-2015, 80,000 plus people got trained on digital literacy and entrepreneurship skills via all 2,000 plus telecentre nationwide networks. As for 2015, Thailand's GDP has likely grown between 3.5 and 4.5 percent, because the Government has been accelerating Digital Economy holistically.

Background

For over a decade, Thailand has been internationally recognized as a regional centre for ICT growth and development, and its ICT Policy Framework has been an exemplary model for the development of an effective telecommunications and ICT regulatory environment (GSMA, 2015).

In 1995, the country launched an ambitious project to address the goal of ensuring access to education for all through technology. In 2002, the National ICT Master Plan, a comprehensive policy framework for ICT development, was created and the Ministry of Information and Communication Tech-

nology (MICT) was established. Since the policies were enacted, there has been a tremendous boost of the ICT sector. In recent years, both the Ministry of Information and Communication Technology (MICT) and the Ministry of Education (MOE) have set development plans to build both infrastructure and people's ICT literacy with the mission to "create a labor force of adequate ICT professionals that are knowledgeable, skilled and information literate, in order to develop Thailand in a sustainable and stable knowledge and innovation based society" (2009).

In 2014 till currently, a new policy framework called Smart Thailand 2020 was introduced. The principal objective of

the new plan is to boost accessibility, making ICTs a basic commodity for the entire country through ongoing improvements in infrastructure and increased mobile broadband penetration (MICT 2011-2020).

Thailand recognizes that ICT literacy provides opportunities for women to fully and equally participate in the digital economy and society, and exercise their right to speak, share ideas, access information and build knowledge. The existing 2,000 plus Telecentres scattered across the country and set up at sub-district administrative offices, community centers, health care centers, schools, and the USO NET Community Centers, provide access to ICTs and the Internet in rural and remote areas with a focus on digital literacy. Furthermore, thus far, Smart Thailand has also resulted in the establishment of some 400,000 public Wi-Fi access points (GSMA, 2015). These developments are expected to continue as the country becomes a leader in ICT development in ASEAN.

However, as research shows, there are several challenges when it comes to telecentres in Thailand; for instance, how to ensure their sufficient sustainability, organizational stability, and programmatic flexibility to allow these spaces to survive once the immediate round of funding allocated for their set-up runs out. In fact, many telecentres in Thailand have shut down and there is growing awareness that the first generation of telecentres which provided a basis for introducing the Internet and basic ICT literacy (particularly in rural areas and among marginalized and disadvantaged groups) has now become obsolete. Most of Thai telecentres have been transforming themselves to be the Community Co-Working Space or the Community One Stop Services Centre instead.

Success stories of E- Inclusive development

Since 2006, The Ministry of Information and Communication Technology of Thai-

land (MICT) has supported CCDKM to train both offline and online 348,820 Thai marginalized people, ensuring gender equality. This was made possible by leveraging the network of over 2,000 Telecentres scattered all over the country. From 2013-2015, 80,000 plus people have been trained on digital literacy and entrepreneurship skills. The main supporter of these projects under the priorities of the Digital Economy Policy Plan Pillar 4, namely: Digital e-Commerce, Digital Entrepreneurs, Digital Innovation, and Digital Contents.

NBTC (the National Broadcasting and Telecommunication Commission of Thailand), and other partners, i.e. the Ministry of Social Development and Human Security, the Office of Women Affairs, and CCDKM has joined its hands to topping up for the previous digital literacy program of other agencies such as the Telecentre Women (TCW) Project opened the opportunity to young and adult women like the homeworkers, out-schools girls, women farmers, women vendor, handicap girls & women, aged women, etc. to gain ICT knowledge and skills enabling them to become self-confident and self-sufficient. To bridge the digital divide and reach out to one of the vulnerable groups in the society, the series of training in ICT for young and adult women was timely and imperative (MICT 2013).

Some of its tangible projects and outcomes are as follows:

E- Women homeworkers

In Thailand, Digital Economy is the innovative R&D Participatory Action Project of CCDKM since 2006. Home-based work is widespread in all regions of Thailand. Most homeworkers use their houses as the workplace for producing textiles and garments, wood products, basketry, artificial flower making, food processing, leather goods and plastics, metal products and jewellery, and then deliver them to the employers or business mediators. This is not the same as production for direct sale. In 2007, the National Statistical Office (NSO) reported that out of the 249,290 households, there were 440,251 people earning their livelihood through homeworking. Of this number, 337,526 or slightly more than three quarters of them were women and 102,725



(www.ccdkm.org) (20/Oct/2015)

were men. This study builds on previous research conducted in 2006 on the status of women homeworkers in Thailand and their use of ICT to promote economic empowerment and generate new income opportunities. Since 2006, Thailand has undergone numerous social, economic, and political changes. Acknowledging the problems homeworkers face, in 2010, the Thai Parliament passed the Homeworkers Protection Act B.E. 2553 and a social protection policy came into force in May 2011. The law mandates fair wages, including equal pay for men and women doing the same job. Even though this Act is into effect, most homeworkers are still not aware of their legal rights and keep working under unfair conditions (Chasombat, 1999).

The Digital SME (Smart Entrepreneur): Microsoft Youth Spark – Enhancing ICT for youth SMEs in Thailand

Microsoft YouthSpark is a global initiative committed to helping young people worldwide create and seize opportunity through ICT skills. The initiative was established in 2013 in partnership with the Population and Community Development Association (PDA) and CCDKM, to equip Thai entrepreneurs aged 18 to 24 with e-commerce and e-business skills that will enable them to develop small and medium enterprises (SMEs) in Thailand, improve business efficiency and growth and reach out to regional and international markets. Since the initiative was established, 48,000 youth, ensuring gender equality, from over 20 provinces in Thailand have been trained and 120 business weblogs have been created for start-up businesses.

Intel Programs: Youths and community start-up

In Thailand, Intel provides girls and women with access to education and technol-

ogy through programs such as the Intel Teach, Intel Learn and Intel Easy Steps. For 10 years, through the Intel Teach program implemented by the Office of the Basic Education Commission (OBEC), 150,000 primary and secondary school teachers from 76 provinces in Thailand, ensuring gender equality, have been trained on how to integrate technology into classrooms and promote student-centered approaches that will prepare students to enter the digital world. In addition, the Intel Easy Steps program established in 2010, has been providing adult learners, ensuring gender equality, the opportunity to improve their social and economic self-sufficiency through digital literacy. The program is designed to teach participants basic computer skills that are locally relevant and useful to drive Thailand into the digital economy more effectively. In 2012, Plan International Thailand Office implemented Intel Easy Steps to equip girls and women with digital literacy skills in remote areas; since then, the program has expanded to reach people in rural and migrant communities across Thailand. CCDKM also localized and implemented the Intel Easy Steps program and trained 50,000 Thais through the telecentre network. To date, 1 million adult learners, approximately half of whom are women, have been trained with this program.

E-Crafts

Through the WE.STYLE.FOR A CAUSE initiative, CCDKM has met the demand of thousands of women homeworkers to upgrade through ICT, their entrepreneurial, design and styling skills to fit the trends and requirements of international and regional markets. For the first time in Thailand, local and international trainers, fashion and lifestyle experts, have joined

forces to deliver an innovative, practical and community friendly pedagogy based on hands on experience and collaborative learning. Over 200 women have already benefited from the free simplified trainings on how to build a brand, business communication, social media for business, smartphone photography, product pictures and retouching for commercial use, landscape and tourism photography, financial literacy, and online business solutions to sell products directly to customers.

Community based tourism

The Very Local Trip Community Based Tourism project integrates the social, economic, and environmental dimensions of development by enhancing the capacities of local artisans and farmers to use ICT and media, to promote and conserve cultural and environmental heritage, including arts and crafts and sustainable Thai agriculture and organic farming methods. The project also contributes to the promotion of Thailand’s digital economy, in particular ICT, Tourism and Sustainable Development by: facilitating the involvement of Thai local people and communities in tourism development around natural and cultural heritage sites; establishing business linkages (online and offline) between local communities, tourism enterprises and visitors; providing communication and marketing e-services on local tourism in Thailand; improving the quality of tourism experiences at the local level; strengthening the capacities of local guides on how to use ICT to promote their local experiences on Very Local Trip web-platform.

CCDKM and Very Local Trip have created enormous possibilities for local communities and individuals to promote local tourism through online platforms which symbolize a source of income generation and job opportunities. Local communities recognize that the Internet defines the 21st century business environment and is an enabler of development. Marginalized communities are also aware that unless they master the right skills to access and use new ICTs to access both local, regional and foreign markets, they will be left behind and be caught in the social, economic and technological divide.



(www.ccdkm.org) (20/Oct/2015)



Air Asia’s Travel3Sixty magazine (<https://www.travel3sixty.com/indigo-dreams/>)

Through innovation and digital technology for inclusive development, CCDKM and Very Local Trip provide solutions to boost programs to empower rural communities and create the conditions for better livelihood and living.

VeryLocalTrip utilizes traditional media and new media to create awareness about the community local trips through channels including online and printed magazines, social media (Facebook, Instagram, Twitter, YouTube), videos production for web, participation to local and international events, CBT conferences and fairs.

Smart Farm: SAB – SAFETY AGRICULTURE BURIRAM

SAB: a social enterprise and creative space where farmers can link and exchange about organic farming, food safety and sustainable agriculture methods. Founder of Akelada Hotel (the corporate) in collaboration with The Nat Space and CCDKM developed this concept where farmers and members of the ASEAN community can exchange and find new solutions related to fair trade, farmers’ market price, and sustainable farming methods to achieve good crop yields without harming the

natural environment or the people who live and work in it.

Conclusion

Thailand has been internationally recognized as a regional center for ICT growth and development, and its ICT Policy Framework has been an exemplary model for the development of an effective telecommunications and ICT regulatory environment (GSMA, 2015). Especially since 2006, under supported by the Ministry of Information and Communication Technology of Thailand (MICT) marginalized population have been accessing to all kinds of ICT training both offline and online with more than 80.000 people both on digital literacy and entrepreneurship skills. Not only the GDP aspect since 2015, Thailand’s GDP has likely grown by between 3.5 and 4.5 percent. E-inclusive development has seen more tangible results under the Smart Thailand and Digital Economy policies.

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Global program for assisting inventors

The World Intellectual Property Organization (WIPO) has launched a first-of-its kind global program in which patent attorneys provide pro bono help to inventors in developing countries who want to file a patent for their invention but lack the means to do so. WIPO, in cooperation with the World Economic Forum, officially unveiled the Inventor Assistance Program on October 17, 2016 in Geneva, following a successful pilot effort in Colombia, the Philippines and Morocco.

The program aims to help inventors and small enterprises with limited finances to pursue the patent protection that is key to successful commercialization of a product or new solution. Qualified attorneys help by providing free legal advice to inventors who would otherwise be unable to afford the legal costs of obtaining a patent. Research shows many patent applications are rejected on procedural issues that IP lawyers can help avoid.

The Inventor Assistance Program has already helped a dozen inventors in Colombia, Morocco and the Philippines to file patent applications for the new technologies they have invented. These include a wheel-mounted device that helps vehicles gain traction on slippery ground and a machine that transforms vegetable refuse into animal feed in a novel manner. The lawyers participating in the program have, without payment, helped the inventors draft and file patent applications and follow up with patent offices afterward.

In order to join Inventor Assistance Program, participating countries, lawyers and inventors must meet a set of criteria that is designed to ensure the best fit for all involved, while establishing a mechanism to deter any potential conflicts of interest. The pilot program was launched between April 2015 and March 2016 in the three pilot countries after research showing that many patent applications were being rejected on procedural issues stemming from applicants' unfamiliarity with the filing process and lacking the resources to engage counsel. Ultimately, the Inventor Assistance Program seeks to stimulate an innovative environment where all inventors are able to commercialize their products, bringing economic benefits to them, their families and communities, while ultimately boosting the pool of fee-paying clients for lawyers who helped launch this cycle by foregoing payment.

Leading international law firms, corporations as well as international associations support the Inventor Assistance Program, including the Inter-American Association of Intellectual Property (ASIPI), the International Federation of Inventors' Associations (IFIA), Novartis, Qualcomm, the European Patent Institute and the Federal Circuit Bar Association.

For more information, contact:

Media Relations Section
World Intellectual Property Organization (WIPO)
Tel: (+41 22) - 338 81 61 / 338 72 24
Fax: (+41 22) - 338 81 40
Web: <http://www.wipo.int>

DOES INFORMATION AND COMMUNICATION TECHNOLOGY (ICT) IMPACT SMALL BUSINESS IN INDIA?

EMERGING PATTERNS

Bino Paul

Professor,
School of Management and Labour Studies
Tata Institute of Social Sciences
V.N. Purav Marg, Deonar
Mumbai-400088, India
E-mail: bino@tiss.edu

Abstract

Gauging the extent of small business in India does not seem to be a straight forward exercise. It is enmeshed in a variety of categories such as small and medium enterprises, unorganized enterprises, livelihoods and so on. However, unequivocally, there appears to be a discernible concurrence that small business makes pivotal contribution to gross domestic product and employment. Whilst positioning the small business as a poignantly dynamic and significant system in Indian socio-political-economy, Information and Communication Technology (ICT) has been pervasively impacting the nature of business, irrespective of its extent, scope, and scale. We juxtapose small businesses in India with access to and use of ICT, by plotting patterns drawn from simple descriptive analysis of micro data from National Sample Survey 67th Round. Our analysis shows that there is a significant positive covariation between access to and usage of ICT and performance of small business units. These patterns seem to corroborate the scholarly view that ICT, being the core component of absorptive capacities created by small business units, tends to be a major catalyst to units' performance.

Introduction

In complex milieus like hugely diverse small business system located in a populous dynamic socio-political-economy such as India, positing value added by business as a tractable function of tangible factors like fixed capital and human resources presumably throws inferences like largest chunk of positive variation in value added emanates from variation in labour, but not from the fixed capital. This is nothing short of stylized facts like smaller the scale of business, larger the stake of the labour. However, fusing Information and Communication Technology (ICT) amidst the conventional technical relation between

value added, labour, and fixed capital in the context of small business seems to usher in a variety of scenarios that make us ponder over systems like human-machine linkage, socialising in the business unit, communication within and outside business unit stakeholders, organising knowledge through codification and diffusion and so on. It is no much of a surprise if we surmise that amongst resources that are being engaged in generating value added, ICT will be a permeating factor that is technological, social, and cultural in nature; it creates, disseminates, stores, and communicates contents, design, messages, data, and so on. Whilst, like fixed capital, ICT can be labour saving, there are a multitude

of scenarios that portray the symbiosis between ICT and labour. More interestingly, modularity and convergence of ICT and its capacity to be relevant for any scale of business is quite noteworthy. An ICT system tends to have complex and dynamic interactive structures that encompass dyadic, triadic, and hyperspace combinations of persons, equipment, networks, and virtual space; this is like structures such as person with person, equipment with equipment, person with equipment, network with network, person with network, equipment with network, person and equipment with network, and so on. Whilst a whopping chunk of small business in the unorganised sector, characterised by less than 10 workers being employed in the unit with discernibly lower fixed capital base, increasingly small business units are being absorbed in globally pervasive value chains as catchments of cheap supplies. Are these relational forms of business win-win for a few dominant firms in the global value chains and numerous small units in the unorganised sector? Intuitively, even if both parties in the game get positive incremental pay offs, presumably compared to small suppliers big buyers who are large corporations tend to have much bigger stakes. Although being positioned in imperfectly competitive structures such as the global value chain that distributes pay offs unevenly, titling towards mightier and larger businesses, close to a half of gross value added in India originates from the unorganised sector¹ whilst self-employment, casual employment, and contract employment that originate from households, and unorganised enterprises form more than four-fifth of aggregate employment in India.

¹ http://nceuis.nic.in/Final_Booklet_Working_Paper_2.pdf

Does Information and Communication Technology (ICT) impact small business in India?

Unlike big corporations/firms, small business units are often left with niggardly resources for creating dynamic capabilities through processes like research and development, while large firms tend to invest on generating new capabilities. How, then, small business units generate unique capabilities that make them competitive? Drawing cues from Gray (2006), small business units, whilst exploring the vistas of sustained performance, tend to make capacities that absorb knowledge, learning, and diverse intangible resources, called 'absorptive capacity'. Amongst factors that shape the absorptive capacity – socialisation, learning and artefacts -, unequivocally, ICT appears to assume pivotal role primarily due to its modularity and convergence. It shapes organizational memory through connected

networks and artefacts. It facilitates massive reproduction and dissemination possibilities. It creates symbiotic linkage between human creativity and machines; computed aided design (CAD) and Computer Numeric Control (CNC) machinery are exemplary cases.

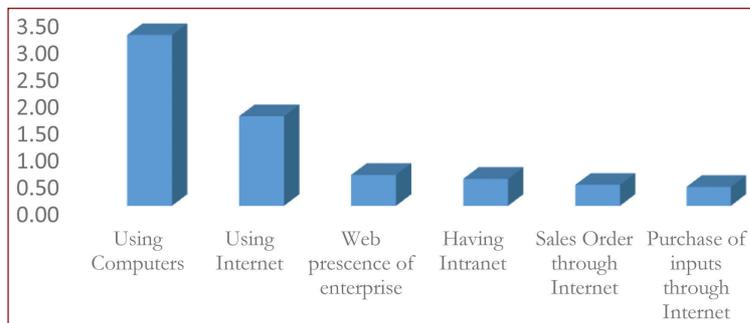
Using computer and internet

Drawing cues from unit records of National Sample Survey 67th Round and Annual Survey of Industries, we plot patterns that delineate covariation between select indicators of ICT usage by enterprises and indicators of enterprise's performance.

As figure 1 delineates, merely 3.5% unorganised small business units use computers, whilst usage of internet confines to a measly 2% enterprises. Not even 1% enterprises have web presence.

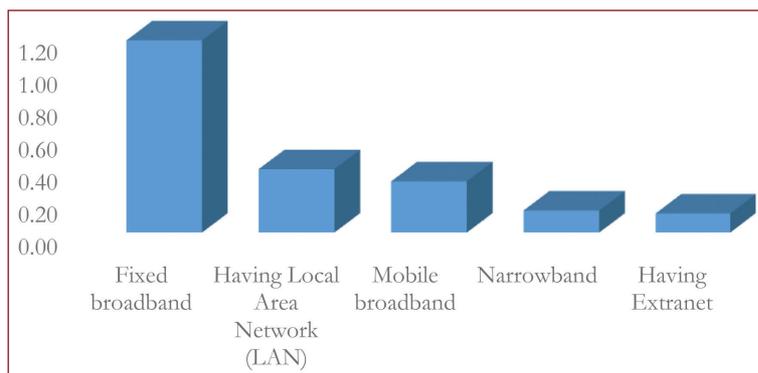
Enterprises with intranet is invisibly minute, while very tiny percent (hovering around 5%) of enterprises resort to transactions - sale order and purchase of inputs - through internet. Hardly these enterprises seem to use networks. Amongst networks, only fixed broadband reports slightly above 1%, whilst other networks - Local Area Network, Mobile Broadband, Narrowband, and Extranet - report less than 0.5 %, apiece (Figure 2). Combining these patterns, unequivocally, amongst unorganized small business units in India, usage of ICT appears to be abysmally low, even in recent times. This posits poignant questions on acute shortage of ICT and digital capabilities in unorganized small business sector in India. More importantly, inter and intra organisational networking appears to be prevalent in imperceptibly minute segment of enterprises. Intuitively, drawing cues from these patterns, abilities of these enterprises to create shared knowledge, memory and informational resources may presumably be limited to 'hard to replicate' intangible resources like tacit knowledge. While tacit knowledge may have certain advantages such as difficult to mimic competencies that create unique advantages to enterprises, refraining from creation of easy to replicate shared resources through internet or intranet or diverse forms of network may trigger off dynamic positive pay offs, particularly in synthesizing human dexterity and contents that have been organised through information systems. As figure 3 shows, notwithstanding versatility of internet in synchronizing diverse activities of an enterprises – email, e-commerce, internet banking, interaction with government, recruitment, and training - usage rates are imperceptibly lower among these enterprises.

However, in unorganised small business segment, usage of computer and internet varies with respect to the economic activity (Figure 4). Amongst economic activities, while professional, technical and scientific sector reports the highest usage rate -12 % use computer and 6% use internet -, transport and storage reports the least



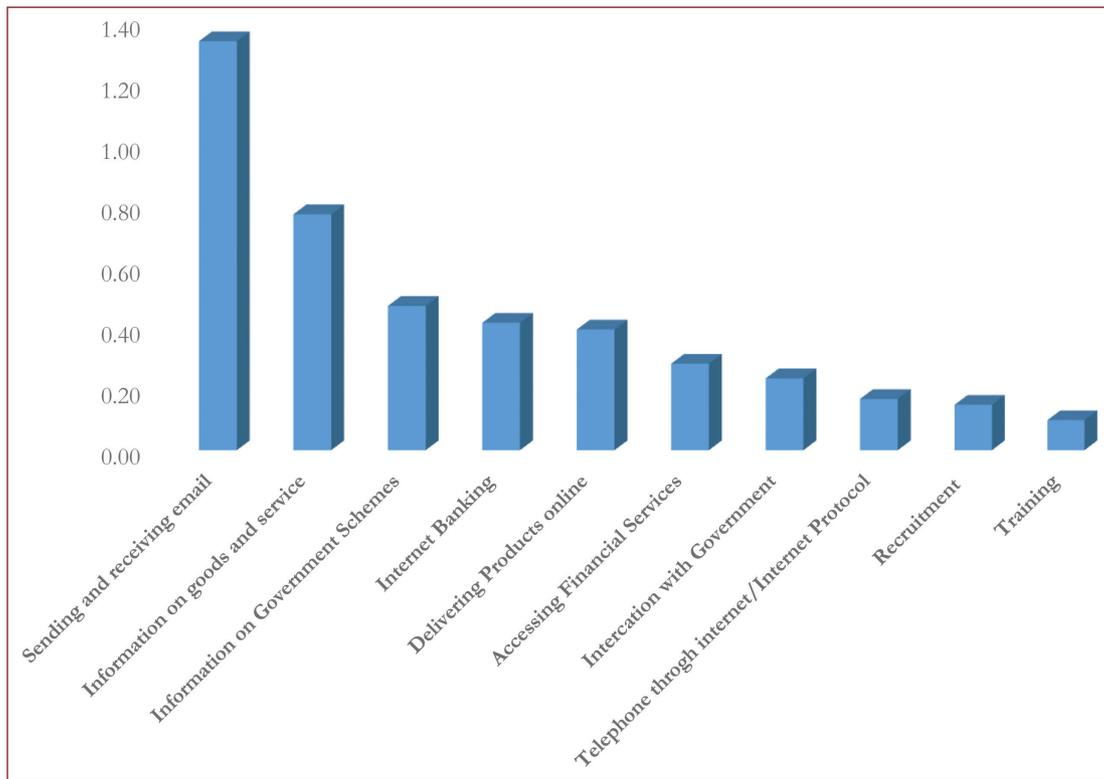
*N= 57530990 Enterprises estimated from a sample of 333665 unorganised Enterprises
Source: Computed from unit records of National Sample Survey 67th Round (2009-10)*

Figure 1: Percentage of small business (unorganised) enterprises using ICT in India



*N= 57530990 Enterprises estimated from a sample of 333665 unorganised Enterprises
Source: Computed from unit records of National Sample Survey 67th Round (2009-10)*

Figure 2: Percentage of small business (unorganised) enterprises using Networks in India



*N= 57530990 Enterprises estimated from a sample of 333665 unorganised Enterprises
Source: Computed from unit records of National Sample Survey 67th Round (2009-10)*

Figure 3: Percentage of small business (unorganised) enterprises using internet for select needs in India

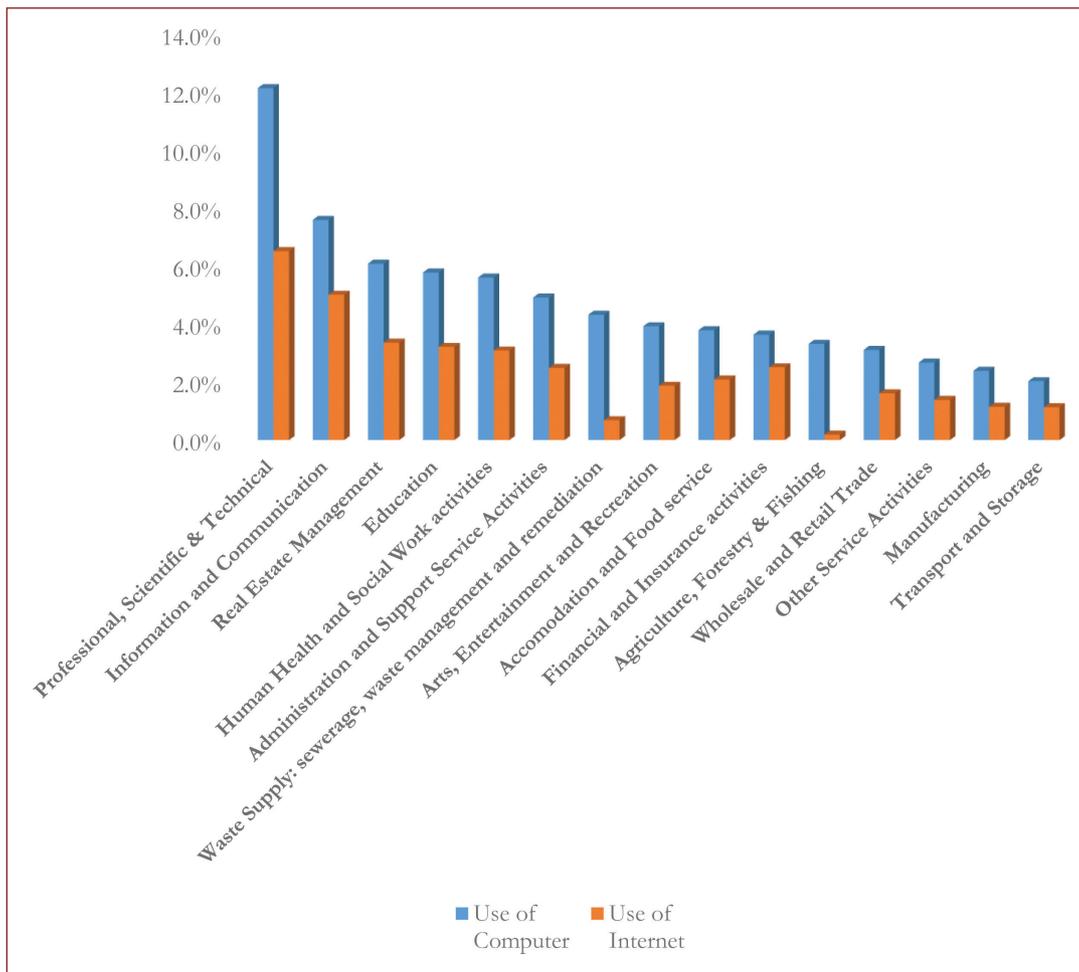
usage rates (both in the proximity of 2%). On a descending order, information and communication sector reports the highest rates, followed by real estate management, education, health, while the bottom is marked by sectors like manufacturing, trade etc. In aggregate, service sector reports discernibly higher usage rates than secondary and primary sectors do. Presumably, service based economic activities seem to be apparently more interactive and communication oriented than manufacturing is, requiring service based industries to use networks, internet and computer. Notwithstanding apparent variation within the distribution of economic activities, prevalent usage rates obviously fall short of threshold level of computer and internet usage. Another interesting cue emerges from Figure 5 that portrays usage rates with respect to type of enterprise's ownership. Broadly, ownership is classified to seven: Proprietary (male), Proprietary (female), partnership with mem-

bers of the same household, partnership between members not all from the same household, self-help group, Trust, and Others. Amongst ownership categories, interestingly, partnership between members not all from the same household reports highest usage rates (computer usage is 12%; internet usage is 7%), while the category self-help group reports lowest rates. Quite important, between partnership between members not all from the same household and partnership with members of the same household, the former reports perceptibly higher rates than the latter. Does this mean that partnerships with seemingly 'weak' ties induce enterprises to use ICT more? Compared to strong social ties, embedded with kinship, family or social structure, contacts that are outside the family or strongly embedded social structures presumably entail enterprises to resort to organised information/knowledge sharing systems like computer and internet.

Impact on enterprise's surplus

What does computer and internet usage mean for enterprise's surplus? Increase or decrease. Does the pattern remain valid across sources of heterogeneities such as ownership of enterprise? Examining these questions, we posit a simple null hypothesis that enterprise's surplus is not significantly impacted by use of computer and internet. To do this, we use analysis of variance. As given in Table 1, compared to enterprises that do not use computer, units that do use computer report significantly higher magnitudes of surplus. Interestingly, we obtain similar result for internet usage, as well. Moreover, these inferences are valid across type of ownership. Quite important, whilst small unorganised enterprises that use computer earn median monthly surplus of INR 14,4000, enterprises that do not use computer earn a mealy sum of INR 3,590. Therefore, by using computer, small business units earn 301%

Does Information and Communication Technology (ICT) impact small business in India?



*N= 57530990 Enterprises estimated from a sample of 333665 unorganised Enterprises
Source: Computed from unit records of National Sample Survey 67th Round (2009-10)*

Figure 4: Percentage of small business (unorganised) enterprises using ICT in India (Industry wise)

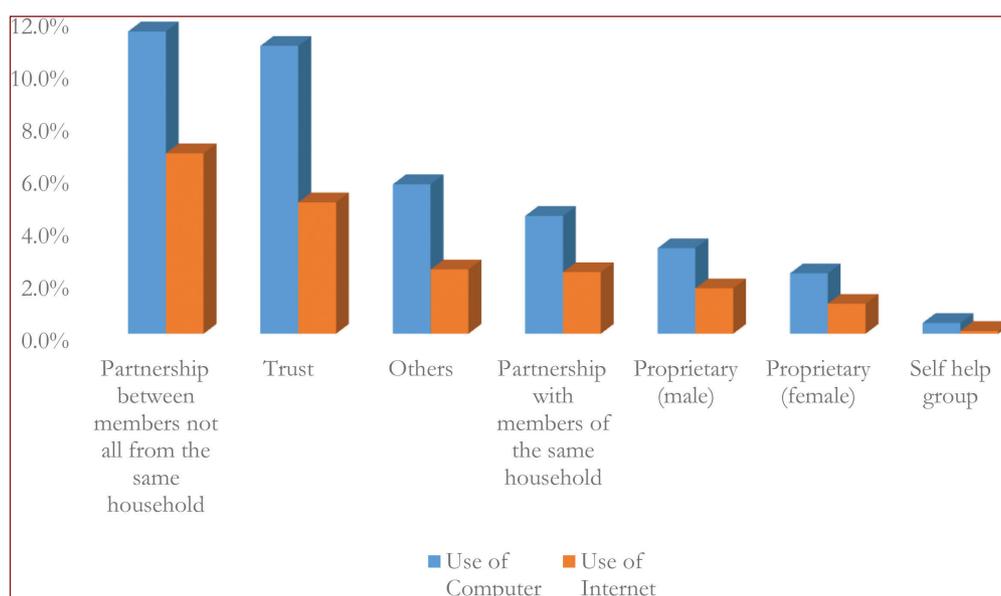
incremental pay off over non users. Interestingly, positive differential of surplus in favour of enterprises using internet over non users is even higher, i.e. 359%. Incremental surplus earned by users of computer over nonusers varies from 230% (self-help group) to 350% (partnership with members of the same household), while incremental surplus earned by users of internet over nonusers is in the range of 207% (trust) to 650% (self-help group).

Impact on Gross Value Added (GVA)

Drawing patterns and inferences discussed above, we gauge impact of computer and internet use by small unorganized enterprises on enterprises'

presumably non-cyclic performance indicator such as Gross Value Added (GVA). Quite important, intuitively, surplus tend to be far more cyclic than GVA is. While seeing the impact of using computer and internet on GVA, we put enterprise's labour and fixed capital as other explanatory variables. We derive capital by adding enterprise's own fixed assets, leased assets, and yearly addition to the stock. Labour or person employed is the aggregate of working owner, formally and informally hired workers, indirect workers and helpers. We transform GVA, capital, and labour into two ratios: GVA per person employed and fixed capital per person. Further, we covert these ratios to logarithmic scale. We estimate two models. First model puts

GVA per person employed as a function of fixed capital per person, whether enterprise uses computer (1 for Yes, 0 for No), fixed effects that emanate from identities such as type of ownership, state where the enterprise is located, and type of industry. Second model retains the same structure of first except that use of computer is substituted by use of internet (1 for Yes, 0 for No). Quite important, we refrain from having both computer usage and internet usage in the same model since both these variables appear to directly co-vary. Out of the whole sample (333,665 units), however, only 18,169 units were filtered for the analysis since only these units report all variables that have been specified in the model.



N= 57530990 Enterprises estimated from a sample of 333665 unorganised Enterprises
 Source: Computed from unit records of National Sample Survey 67th Round (2009-10)

Figure 5: Percentage of small business (unorganised) enterprises using ICT in India (Ownership wise)

Table 1: Surplus (last 30 days preceding the interview) earned by small business enterprises (Rupees) users and non-users of computers and internet

Ownership of enterprise	Use of computer*			Construction location		
	Yes	No	Incremental surplus earned by users over nonusers	Yes	No	Incremental surplus earned by users over nonusers
	Median surplus (last 30 days preceding the interview)		Percentage	Median surplus (last 30 days preceding the interview)		Percentage
Proprietary (male)	15,000	3,860	289	17,000	4,000	325
Proprietary (female)	11,000	3,000	267	15,000	3,000	400
Partnership with members of the same household	18,000	4,000	350	21,000	4,400	377
Partnership between members not all from the same household	20,000	6,000	233	20,000	6,000	233
Self-help group	6,600	2,000	230	15,000	2,000	650
Trust	15,000	4,500	233	15,350	5,000	207
Others	15,000	4,000	275	20,000	4,000	400
Total	14,400	3,590	301	17,000	3,700	359

*Source: Computed from unit records of National Sample Survey 67th Round (2009-10)

*Analysis of Variance (ANOVA) in Median Surplus with respect to Use of Computer and Use of Internet reports p values less than 0.001 that reject that changes in Median surplus is not just due to chances, rather variation is explained.
 N= 57530990 Enterprises estimated from a sample of 333665 unorganised Enterprises

Table 2: Regression of gross value added per person on fixed capital per person and computer and internet usage

Dependent Variable: Natural Logarithm of Gross Value Added per persons employed				
Independent variables	Model 1		Model 2	
	Coefficient	Bootstrap standard error	Coefficient	Bootstrap standard error
Quantile (.25) (Pseudo R Square =0.16)				
Constant	3.79***	1.03***	3.76***	1.06
Natural Logarithm of Fixed Capital per person	0.3***	0.006***	0.3***	0.006
Using Computer (Yes/No) (Reference category: Yes)	0.08***	0.02***	—	—
Using Internet (Yes/No) (Reference category: Yes)	—	—	0.15***	0.02
Quantile (.50) (Pseudo R Square =0.16)				
Constant	6.04***	0.89***	6.07***	1.12
Natural Logarithm of Fixed Capital per person	0.27***	0.006***	0.27***	0.06
Using Computer (Yes/No) (Reference category: Yes)	0.09***	0.02***	—	—
Using Internet (Yes/No) (Reference category: Yes)	—	—	0.19***	0.02
Quantile (.75) (Pseudo R Square =0.16)				
Constant	6.26***	0.7***	6.17***	0.76
Natural Logarithm of Fixed Capital per person	0.27***	0.006***	0.27***	0.008
Using Computer (Yes/No) (Reference category: Yes)	0.14***	0.01***	—	—
Using Internet (Yes/No) (Reference category: Yes)	—	—	0.26***	0.03
Fixed Effects				
Type of Ownership Dummies	Yes		Yes	
State Dummies	Yes		Yes	
Industry Dummies	Yes		Yes	
Number of Enterprises	18169		18169	

Source: Computed from unit records of National Sample Survey 67th Round (2009-10)

*** Significant at the 0.01 level (2-tailed).

To begin, we estimated Ordinary Least Square (OLS) regression estimates for both the models. While all coefficients turn out to be statistically significant, dependent variable appears to have been discernibly swayed by outliers, causing rejection of the hypothesis of constant variances of error distribution or homoscedasticity. One option to make regression sensitive to outliers is to use quantile regression (Koenker and Hallock, 2001). In quantile

regression, we let central measures to be positioned across distribution-lower quantile (0.25), mid quantile (0.50), and higher quantile (0.75). Moreover, quantile regression is subject to assumptions that are applicable to OLS. For equation 1, coefficients with respect to Natural Logarithm of Fixed Capital per person and Using Computer are positive and statistically significant across quantiles (Table 2). An interesting finding that stand out is, for

quantile 1 (0.25), changing category from 'no using of computer' to 'using computer' increases logarithm of GVA per person employed, by 0.08, while regression coefficients with respect to using computer increases as we move up quantiles (0.08 for mid quantile (0.50) and 0.14 for higher quantile (0.75)). Unequivocally, these inferences point to that computer usage in higher echelons of small business tends to account for positive changes of higher

magnitude in GVA, while not using computer pulls down GVA across quantiles. Estimates of model 2 almost resembles estimates of model 1. The binary variable 'Using internet' shows positive sign, while coefficient in respect of this variable tends to progressively increase with respect to quantiles. As quantiles go up, coefficients, too, rise (0.15 (quantile 0.25), 0.19 (quantile 0.50), and 0.26 (quantile 0.75)). Presumably, drawing cues from above discussed results, internet being a system of network appears to be a little more influential to cause increment in GVA than computer does. This means that internet being a network good provides opportunities to link with not just a few close acquaintances or contact, also it connects with many a hitherto not so known contacts or even first time contacts, whilst computer and internet are complimentary to each other.

Even amidst discernible patterns of digital divide that exist in the system of small businesses in India, using internet and computer appears to offer significant positive payoffs to small unorganised enterprises. Not only it helps organization in organizing data, information, and knowledge, it aids enterprises to facilitate faster and effective buying and supply processes. Moreover, if using of computer and internet is synergised with human resources, these resources certainly shape absorptive capacities that generate dynamic capabilities in enterprises. It is noteworthy that the view that computer and internet usage pulling enterprise's performances up is undoubtedly not a serendipitous occurrence. Rather, drawing cues from inferential exercises, both

in bivariate and multivariate analysis, we conclude that computer and internet usage turn out to be significant predictors of indicators of enterprise's performance. This result assumes primacy when, according to recent statistics, just one fourth of persons in India use internet², while, in the United States of America (USA), three fourth of persons use internet. Although, using computer and internet pushes enterprise's performance up, amongst small unorganised enterprises in India, usage rates are abysmally low. It appears, as we go on discussing, to increase the usage of computer and internet among these enterprises, it is important to generate common digital facilities that are open to these enterprises.

Conclusion

For small unorganised enterprises in India, to perform sustainably, ICT and its use has been emerging as inevitable factors. As discussed in the paper, obviously, enterprise's performance appears to have been explained by labour, capital, and usage of computer and internet. However, large many enterprises seem to have refrained from using computer, internet, networks, and major internet applications, culminating in imperceptibly minutest usage rates. In the emerging business milieu that entail accentuating global connects and ever growing need for data, information, and knowledge, ICT needs to penetrate to the largest extent of small businesses within a short span of time. The dynamics of ICT, in particular innovative knowledge management (Nonaka, 2008), communication, and e-commerce, arises as the most criti-

cal game changer for small enterprises. Undoubtedly, the digital divide prevalent in India³ is far being conducive to create contexts for an innovative small business system that has global connects. This challenge may well translate to creative public policy (OECD, 2004) option such as envisaging ICT as a public good or a common, in particular the internet.

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² http://www.itu.int/en/ITU-D/Statistics/Documents/statistics/2016/Individuals_Internet_2000-2015.xls

³ Although, as per recent data, size of mobile subscription in India exceeds 1 billion, only one fourth of individuals use internet.

UNESCO Science Report

Written by about 60 experts who are each covering the country or region from which they hail, the *UNESCO Science Report: towards 2030* provides more country-level information than ever before. The trends and developments in science, technology and innovation policy and governance between 2009 and mid-2015 described here provide essential baseline information on the concerns and priorities of countries that should orient the implementation and drive the assessment of the 2030 Agenda for Sustainable Development in the years to come. For two decades now, the *UNESCO Science Report* series has been mapping science, technology and innovation (STI) around the world on a regular basis. Since STI do not evolve in a vacuum, this latest edition summarizes the evolution since 2010 against the backdrop of socio-economic, geopolitical and environmental trends that have helped to shape contemporary STI policy and governance.

The report is available for download at:

<http://unesdoc.unesco.org/images/0023/002354/235406e.pdf>

ICT for inclusive and sustainable development in Asia-Pacific

Selected programmes and initiatives

Compiled by

Asian and Pacific Centre for Transfer of Technology

BANGLADESH

e-Krishok

The agricultural service of Bangladesh Institute of ICT in Development (BIID) is branded as e-Krishok, an initiative which is aimed at farmers with the desired goal of providing services from which farmers will benefit both in terms of their farming activities and opening up opportunities in new avenues which will ultimately translate into increased income for farmers. Farmers with any problem or query or issue which is related to agriculture can go to nearby ICT enabled Information Center / Telecentres and receive the information that they are seeking. The information usually provided to them in a timely and quick manner, so that the farmers can get on with their activities. With such timely and appropriate information, farmers will be able to maximize their economic gain; enabling them to achieve income growth through agricultural activities. e-Krishok is now in a process of transforming into a transactional service. BIID in collaboration with Grameen Phone (GP) introduced SMS/call back service via Short Code.

Intel® Easy Steps

Intel Corporation in cooperation with BIID has launched a programme for deployment of the Intel® Easy Steps Program in Bangladesh. The Intel® Easy Steps program offers adult learners the opportunity for enhanced social and economic self-sufficiency through digital literacy. The Intel Easy Steps materials use adult learning techniques to teach practical and applicable skills to people with minimum computer knowledge. The Intel® Easy Steps program is being car-

ried out by Intel in Asia to address the digital literacy needs of government employees, as well as adults in rural communities, women, unemployed youth, and other underserved populations. A government needs ICT-literate labor for a competitive workforce which would bring about a competitive economy. On the other hand participants have an opportunity to improve skills thus enhancing their employment prospects. The program includes instructions on running Internet searches, using email, using word processors for creating resumes and other documents, creating spreadsheets, and using multimedia tools to create brochures and posters to promote small businesses. Thus the trainees can develop literacy skills and immediately start applying them into their personal or professional lives. BIID will facilitate value added services for the trainees to end up with a job opportunity or get self-employed with support from relevant stakeholders.

e-Clinic

BIID initiated e-Clinic project to bring quality health service to rural areas where Telemedicine has been identified as one of the most potential tool to bridge the gap. Considering the present health care facilities in Bangladesh, BIID has taken the initiative to start an interactive healthcare facility by utilizing modern technology blended with ICT tools. The e-Clinic project will cover the awareness building initiatives on health care among the rural communities and will use video consultations and other ICT based tools to offer basic primary health care services in rural settings. The rural underprivileged communities, mainly the women and children groups will be served with quality health

care facilities of which they are deprived most. In the pilot phase, there will be a Central Management Unit (CMU) located in Dhaka equipped with 'state of art' technologies and qualified health professionals, and 10 Service Delivery Points at different parts of the country with basic ICT infrastructure. The rural communities will be served in a sustainable manner by offering e-health facilities with the support of existing health service providers including the health professionals working in the rural areas. Continued Medical Education (CME) will also be introduced through the network of e-Clinic.

eXtension.org.bd

BIID and Sher-E-Bangla Agricultural University (SAU) jointly launched the www.extension.org.bd portal to establish an ICT based knowledge sharing platform for various stakeholders of agricultural extension. This online platform will foster usage of ICT in agricultural extension to faster growth in the agriculture sector through knowledge sharing, consequently enhancing the efficiency of knowledge & skill of expertise on continuous basis of relevant stakeholders including researchers, extension officers, academicians, policy makers, private sectors, media, development agencies, NGOs etc. Instrumentally, it will coordinate among these stakeholders and link the research to field, provide relevant and updated extension related information to the people on a more regular basis. BIID foresee this platform as a knowledge hub for policy makers, academicians and extension workers.

<http://www.biid.org.bd>

INDIA

Unique Identification project

The Unique Identification project was initially conceived by then Planning Commission as an initiative that would provide a clear and unique identity number for each resident across the country and would be used primarily as the basis for efficient delivery of welfare services. It would also act as a tool for effective monitoring of various programs and schemes of the Government.

Aadhaar number is a 12-digit random number issued by the UIDAI ("Authority") to the residents of India after satisfying the verification process laid down by the Authority. Any individual, irrespective of age and gender, who is a resident of India, may voluntarily enrol to obtain Aadhaar number. Person willing to enrol has to provide minimal demographic and biometric information during the enrolment process which is totally free of cost. An individual needs to enrol for Aadhaar only once and after de-duplication only one Aadhaar shall be generated, as the uniqueness is achieved through the process of demographic and biometric de-duplication.

Aadhaar number is verifiable in an online, cost-effective way. It is unique and robust enough to eliminate duplicates and fake identities and may be used as a basis/primary identifier to roll out several Government welfare schemes and programmes for effective service delivery thereby promoting transparency and good governance. This is the only program of its kind globally, wherein a state-of-the-art digital and online Id is being provided free of cost at such a large scale to people, and has the potential to change the way service delivery functions in the country.

Aadhaar is a strategic policy tool for social and financial inclusion, public sector delivery reforms, managing fiscal budgets, increase convenience and promote hassle-free people-centric governance. Aadhaar can be used as a permanent Financial Address and facilitates financial inclusion of the underprivileged and weaker sections of the society and is therefore a tool of distributive justice and equality. The Aadhaar

identity platform is one of the key pillars of the 'Digital India', wherein every resident of the country is provided with a unique identity. The Aadhaar programme has already achieved several milestones and is by far the largest biometrics based identification system in the world. Aadhaar identity platform with its inherent feature of Uniqueness, Authentication, Financial Address and e-KYC, enables the Government of India to directly reach residents of the country in delivery of various subsidies, benefits and services by using the resident's Aadhaar number only.

<https://uidai.gov.in>

eBasta

In line with the government's Digital India initiative, this project has created a framework to make school books accessible in digital form as e-books to be read and used on tablets and laptops. The main idea is to bring various publishers (free as well as commercial) and schools together on one platform. In addition to the portal, a back-end framework to facilitate the organization and easy management of such resources has also been made, along with the web based applications that can be installed on tablets for navigating the framework.

The framework, implemented as a portal, brings together three categories of stakeholders: the publisher, the school and the student. The eBasta Application can access the basta created using the portal framework, and renders it for easy navigation by the student.

<https://www.ebasta.in>

ICT For Social Welfare project

ICT For Social Welfare project "e-Saadhya (Sara Anukulaney Adhyayan) an Adaptable & Accessible e-Learning framework for the children with mild mental retardation and Autism", has been awarded the prestigious SKOCH "Order-of-Merit", Certifying it as one of the India's best Smart Governance projects for the year 2014. The tool is developed by C-DAC Bangalore. It is an initiative of e-Learning Division of Department of Electronics and Information Technology (DeitY), Government of India and

being implemented by C-DAC Bangalore and C-DAC Hyderabad in association with National Institute for the Mentally Handicapped (NIMH), Secunderabad.

<http://www.cdac.in>

agropedia

agropedia is a comprehensive, seamlessly integrated model of digital content organization in the agricultural domain. It aims to bring together a community of practice through an ICT mediated knowledge creating and organising platform with an effort to leverage the existing agricultural extension system. agropedia is envisioned to be a one stop shop for all kinds of information related to Indian agriculture.

The practice of crop knowledge models (KM) has been defined and developed for the first time worldwide to create architecture for accumulating known codified and approved information about crops, with the support of Food and Agriculture Organisation (FAO), Rome. These KMs are the structural representation of knowledge by using symbols to represent pieces of knowledge and relationships between them, which can be used to connect seamlessly to the knowledge base in agropedia using semantic tools. KMs have been represented using Concept Map (C-Map) Tools. In our site, KMs have been designed with the intention of using them for indexing and browsing the content that we gather in the repository. A template for objects and relationships within the KMs as well as guidelines to develop KMs were formulated by the NAIP-KM team of IITK with the assistance and support of FAO. Following this, the knowledge models of Chickpea, Pigeon pea, Sorghum and Groundnut are developed at ICRISAT, Wheat, Sugarcane, Litchi and Vegetable pea are developed at GBPUAT and Rice is developed at IITK.

agropedia is now deployed as SaaS - Software as a Service model which means it can be used to rapidly build agriculture portals for communities such as Universities, Crops, Sectors, Institutions, etc. Some of them are icrisat.agropedia.in, uasr.agropedia.in, iitk.agropedia.in and the unified portal for all of these is at agropedia.in.

<http://agropedia.iitk.ac.in>

MALAYSIA

Startups Programme

MSC Malaysia for Startups Programme provides an alternative for companies to choose if they prefer to be an MSC Malaysia Status company without being tied to any location requirements and it allows MSC Malaysia Status companies to go beyond designated MSC Cybercities and Cybercentres. This is effective for companies approved after 1st January 2015. This programme anticipates further expansion of 8,000 potential ICT companies to participate in MSC Malaysia in all regional corridors.

IHL-MSC MALAYSIA STARTUP CHALLENGE (I-MSC): IHL-MSC Malaysia Start-up Challenge (i-MSC) was previously known as the MSC Malaysia-IHL Business Plan Competition (MIBPC). In this 11th cycle, the competition has taken a new approach to scale up and attract more students to participate in this competition by broaden the requirements of participation and have a more hands-on experience before and after the submission. The i-MSC provides an attractive avenue or platform for students to gain hands-on experience in applying innovative thinking methods to solve real problems for real customers; and at the same time acquire knowledge and skills on entrepreneurship. Students who are interested to explore entrepreneurship and have innovative ideas can be identified through this competition and their potential will be further groomed to be able to accelerate to become SME start-ups.

<http://www.msomalaysia.my>

e-Farmasi

e-Farmasi is a project that links communities to their neighbourhood pharmacies and provides an impartial database on illnesses and medicines. e-Farmasi will enable the community to access a database of unbiased information about medicines, their use, side effects, directions for use etc. Using ICT, community members can direct questions to a pharmacist and where appropriate, complete a pharmaceutical transaction over the net. Part of the project also involves the provision of a pharmacy

management program to pharmacists – to help them manage their pharmacy, keep patient medication records and provide pharmaceutical care. The database contains information on over 27,000 products that are nationally registered (NPCB) in both English and Bahasa Malaysia. Medicines can be searched by either ingredient or brand name, assistance is also provided to guide patients towards the right product for non-serious ailments. The site also contains information on a variety of ailments, including diagnostic guides and self-care strategies. The website contains extensive listings of participating and independent pharmacies as well as some non-registered outlets such as apothecaries.

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

PAKISTAN

“ICTs for Girls” program

The “ICTs for Girls” program launched by the Pakistan Government aims at providing information and communications technology (ICT) education to as many as 5,000 girls through 50 labs. The initiative would provide awareness, training, ICT courses, coding as well as app development to girls and ultimately focusing on empowerment of women to better realize and protect their own rights, earn a livelihood without undue burden and to strive freely for their socio-economic development. The programme is a joint effort of Pakistan Baitul Maal (PBM), Universal Service Fund (USF) and Microsoft to help young girls from underserved areas.

PHILIPPINES

Community eCenter Program

The Philippine Community eCenter Program envisions a Community eCenter in every Municipality. It seeks to establish new Community eCenters (CeCs) in municipalities and priority areas where there are no shared Internet access facilities, and enhance and strengthen existing CeCs. A three-year program, it is now beginning to set the stage for its third and final implementation phase. Thus, this proposal is submitted to request for the funding to back

up the Year 3 program activities. The Year 3 phase will devote its attention towards implementing the program and its activities in the barangays as it pursues all-inclusive and total ICT coverage in the local countryside.

There is an even greater need for digital opportunities in the barangays. Despite the best efforts of the program to establish at least 400 new Community eCenters in priority areas during its Year 1 and Year 2 phases, a significant number of barangays are still digitally isolated. Of the newly established Community eCenters, only 30 are located in rural barangays.

<http://dict.gov.ph/tech4ed/>

SRI LANKA

eSamurdhi integrated welfare management program

The programme integrates the eSamurdhi with Single window for Sri Lanka Safety Net Management system. The programme also integrates of eSamurdhi with Beneficiary evaluation and subsidy management solution to establish a proper beneficiary evaluation system based on different criteria and ranking.

eLocal Government (eLG) project

The project enhances all citizen services provided by local government bodies and ensure proper security and audit policies. envisages developing and implementing an ICT based solution which can be freely deployed at all (Local Govt Authorities) LAA to meet their generic requirements in providing citizen services- Support & Maintenance, eLocal Government-phase II, Project Management & Infrastructure

Implementation of Electronic Medical Records in Sri Lankan Government Hospitals

The purpose of this project is to improve quality and efficiency in health care services provided by the government hospitals in Sri Lanka by implementing electronic medical records and supportive information systems in 45 government hospitals throughout the country by end of the year 2016.

<https://www.icta.lk>

INTRODUCTION TO THAILAND 4.0

DRIVING THE COUNTRY TO VALUE-BASED ECONOMY ERA

Attaphon Satidkanitkul^a and Suchada Inluksana^b

^aMT, Consulting Director, Detecon (Thailand) Ltd.

^bPlan and Policy Analyst acting for Internal Controller Director, Ministry of Digital Economy and Society, Thailand
E-mail: suchada.i@mict.go.th

Abstract

The Royal Thai government has formed the national direction to support economic and social development by using digital technology (information and telecommunication with innovation) as a strategic tool. Since 2014, there have been many of new proprietary words regarding Thailand's direction, for example, Thailand 4.0, Digital Thailand, and Digital Economy (DE). Those have been supporting the country's direction and change its positioning to a developed country. In this article, the authors intend to illustrate background of national scheme of Thailand 4.0 to enhance country development by using ICT and innovation to drive the country's economy. In this paper, the study will identify the DE policies and initiatives, Government plans of development and using the information management on the broadband network to earn higher incomes and increasing the quality of life. The projects initiated and measures taken by the Government of Thailand in the financial services, healthcare, transportation and government sectors have been launched to boost up the Thai economy.

Introduction

With globalization, the society is constantly changing by information technology and Internet access which play an important role in communication, social, political, economic or even environmental. Because of the rapid-technological advancement, many countries are moving up their focus on developing infrastructure to enhance the information technology and innovation. The data transmission, not only text messages but also pictures such as VDO conference, are important to make use of information technology faster and more efficient. The perception is very convenient and faster and hence requires a good core broadband infrastructure.

Generally, the national economic and social development plan is required for long term development, while Thailand has been implementing the 11th plan during 2012-2016. The next is 12th plan (currently is in a draft) will replace the 11th plan in 2017, which will be divided into

10 strategies, where Thailand 4.0 scheme is one layer of them. However, this ongoing national plan seemed to focus on economic and social circumstances based on country strategic positioning by increased economic growth and sustainability, while there is partial focus on digital technology promotion and adoption by using both information and telecommunication technology (ICT).

Since 16 September 2016, Ministry of Information and Communication Technology has been transformed to Ministry of the Ministry of Digital Economy and Society. The role of the Ministry of Digital Economy and Society is to enable leaders to take governments' decision based on the real time and reliable information. Of course, the government leaders in many countries realize that the quality and performance on the connecting network would directly affect developing countries. In order to monitor the countries in the crisis situation, a stable and qualified network is required which is called as broadband

network. In the past, according to ICT2020 Policy Framework and Broadband Policy, Ministry of ICT has tried to accelerate connecting broadband network to develop ICT infrastructure in Thailand.

The country development model has been starting from Thailand 1.0, which emphasizes on agricultural development, and Thailand 2.0 and 3.0 mainly focused on manufacturing development (both light and heavy industries) and export business. However, those 3 versions improved the country positioning from low middle-income to upper middle-income range but cannot shift to high-income country due to the middle-income trap situation like limitations in productivities, technology transfer, human capital management, FDI policy, as well as research and development (R&D) plan. In addition, the other traps to obstruct the country growth are inequality trap and imbalance trap.

In this article, the authors intend to illustrate background of national scheme of Thailand 4.0 to enhance country development by using ICT and innovation to drive country's economy. Focusing on this scheme, there are many vertical sectors influencing the economy such as manufacturing, agriculture, financial services, healthcare, transportation, and government sectors. The information has been gathered by interacting with the executive officers of the International Telecommunication Unions (ITU), the National Broadcasting and Telecommunications Commission (NBTC), Ministry of Information and Communication Technology, Thailand, by interviewing the officers of government departments: Ministry of Finance (MOF), Ministry of Commerce (MOC), Ministry of Public Health (MOH), Ministry of Education (MOE) and etc.

Driving the country by Thailand 4.0 scheme

To increase the competitiveness and shift to high-income category country,

Thailand 4.0 scheme is raised as a national scheme to increase productivity by introducing and adopting technologies and innovations along with value creation to build a new economy platform.

The Thailand 4.0 is a scheme to transform the current economy platform, which is propelled by non-agricultural sectors, to value-based economy, that requires ICT and innovation. This scheme is expected to increase the country's productivity, competitiveness, as well as to increase the income of population. According to a message of Deputy Minister of Ministry of Commerce, driving of Thailand 4.0 scheme requires 3 engines of growth factors. These are (1) Productive growth engine, driven by technology and innovation; (2) Inclusive growth engine, driven by provincial economy cluster, building good business environment, and negative income tax; and (3) Green growth engine, which promotes and supports green technologies such as renewable energy to balance between cost and lost advantages of environmental effect.

New economy model as the value-based economy would have impacts in the following ways:

- 1) From production-based to services-based economy: This will be accomplished by building national human capabilities (or national human capital development) of citizens in the country. In fact, high skill human resources generate high services value and productivity stimulating the economic system. Moreover, more skilled citizens generate higher income for the country in the long run.
- 2) From "general" to "innovative" products and services: By building awareness and promoting research and development. In terms of product development, the production of cross-functional product concept would be presented in the new product development process (NPD).
- 3) From industrial-driven to technology and innovation-driven country: This will be done by government policy ini-

tiatives and implemented by government agencies to support innovation practices in the real sectors.

For example, The Board of Investment of Thailand (BOI) provides different types of incentives in several dimensions such as tax reduction or special privileges for innovative manufacturers or enterprises that demand high skill, technology, and innovation.

Another agency that supports innovation-driven strategy is The National Innovation Agency (NIA) in providing innovation support in 5 strategic-based innovating programs, led by the Royal Thai Government initiative. These are Innovation for kitchen to the world, Organic agriculture business, Bio-based materials, Bio-medical industry, and Clean energy industry.

Government in action: from 6 pillars to digital economy

To achieve Thailand 4.0 scheme, digital infrastructure improvement in several dimensions is required to support roll-out plan. Digital Economy (DE) roadmap plays an important role in its development. As the first step, the Royal Thai Government has continued to push this roadmap to be adopted nationwide by dividing into 6 pillars since 2014 and amended to 6 major driving strategies in 2015 to ensure that the digital economy roadmap will be implemented to support digital infrastructure improvement. These 6 strategies to drive digital economy roadmap are:

- 1) **Hard infrastructure development:** This involves network infrastructure improvement and expansion to reduce digital divide and Internet penetration gap. Broadband penetration expansion nationwide and network infrastructure and frequency of policy development plans are examples.
- 2) **Soft infrastructure development:** This strategy is to review and issue the law and regulation supporting digital economy. Definitely, there are a number of laws and bills to be revised and updated to cope with the digital econ-

omy era. For example, digital economy and personal data protection (online) bills are prioritized in this pillar.

- 3) **Service infrastructure development:** To enhance digital services such as building of an open data standard platform at national level and providing government's electronic platform like "e-service" as a digital gateway to serve businesses and individuals.
- 4) **Digital economy acceleration:** It is to optimize and promote business competency and increase business competitiveness for future competition. For example, to encourage SMEs segment to utilize digital technology in business, promote new digital entrepreneurs with innovation, and promote research and development with innovation that is related to digital businesses.
- 5) **Digital society development:** This strategy is to improve digital society readiness in several dimensions. These are: preparation of Thai citizens to digital era, increase equality of technology access, develop digital content for whole life learning, increase net income of the Thai citizens, and augment the Thai educational system by using digital and relating technologies.
- 6) **Digital workforce development:** This strategy involves human capital development in both private and public sectors to understand and familiarise with digital platforms. The strategy moreover promotes skill set development (interdisciplinary), builds international workforce networks, and facilitates expatriate workforces in special professions for working in the country. Last but not the least, it plans to develop government's CIOs to be aware and ready for digital economy and technologies in the near future.

In the roadmap, these 6 crucial strategies will drive the national strategic plan named Digital Economy and Society Development Plan that brings Thailand to DIGITAL THAILAND theme and support the country to Thailand 4.0 era. The plan

is aligned with strategies and composed of a number of ICT projects implementation.

DIGITAL THAILAND examines about the use of creativity and innovation of digital technology to develop infrastructure, human capital, and other resources to push country's economic and social development for stability and sustainable development.

DIGITAL THAILAND theme divides country's development into 4 phases with 20 years' timeline. In a whole picture, it is starting from building digital infrastructure capabilities in order to be ready for digital economy and society effectiveness. The goal of the theme is to bring Thailand to become a developed country within the timeline. The plan can be divided into 6 driving dimensions, which are aligned with 6 strategies of digital economy roadmap as follows:

- Dimension 1: Infrastructure improvement and development for digital coverage nationwide
- Dimension 2: Business and economy driven by digital technology
- Dimension 3: Social quality improvement with digital technology
- Dimension 4: Government transformation: transforms all government processes and services to digital government platform
- Dimension 5: Develop country's workforce to be available for digital economy and society
- Dimension 6: Build confidence on the use of digital technology

During the first 18 months during the digital foundation phase, Ministry of Digital Economy and Society (MDES), formally Ministry of Information and Communication Technology (MICT) will be taking care of infrastructure improvement and development. As a technological infrastructure possibility, the ministry is going to implement a number of new ICT initiative projects. These are new Wi-Fi network expansion with at least 10,000 hot spots nationwide to increase the coverage serving areas, expand broadband Internet to

village level, promote new business to business tourism online service platform for SMEs named Tourism Thailand Open platform, and initiate at least 1,500 new entrepreneurship incubation programs for Tech Start-up.

As new digital ecosystem platform, it has a plan to promote smart city for 4 provinces, where Phuket and Chiang-Mai provinces will be pilot provinces at this stage. In addition, as social and public services possibility, at least 600 prototype community-based digital centers (Tambon level) will be constructed and to transform pilot 79 traditional government services platforms to smart services platforms (digital platforms) to serve businesses and individuals. These project implementations are the first move to change Thailand to DIGITAL THAILAND and be as an essential piece of initiative from technological side to transform our country to be Thailand 4.0.

Next to digital foundation phase, DIGITAL THAILAND I-focusing on inclusive growth and development will be followed with a 5 years implementation period. The goal of this phase is for everyone to access and use digital technology for economy and social life. It will start transforming to digital-oriented country.

Phase 3 is called DIGITAL THAILAND II. This is a full country transformation phase, which will be happening within 10 years of its theme. The country will be driven by digital technology and innovation. Some key measurements of this phases are full use of digital technology by businesses, have capability to compete in global market, access to digital technology equally by all, and wide adoption of digital public services where technologies are used in every process of government operational services to improve quality of life.

Phase 4 is named Global Digital Leadership, which transforms and changes country's positioning to developed country in 20 years. All digital technologies will be utilized to keep the country sustainable.

Thailand 4.0 implementation

Thailand 4.0 scheme can be applied to leading industries to enhance product development and services innovation. Introduction of emerging technologies

and innovation adoption will increase service competencies, market competitiveness, and value of products and services. Finally, these will increase national income and stimulate economy of the country. Examples of technology and innovation adoption in leading industries are demonstrated as follows:

- 1) **Food, agricultural and biotechnology industries:** Emerging technologies and biotechnology will be applied to increase yield and productivity of food products. In term of agriculture, Smart farming concept is used by applying smart sensors, IoT devices, and ICT to help agriculturists and farmers to monitor crops and agricultural products. These will enhance both quality of life and quality of work.
- 2) **Healthcare industry with medical technology:** Advanced diagnosis technologies and ICT will be applied in this industry to enhance quality of services. In term of services adoption, Digital Health platform enables the use of various digital technologies to support clinical practice, reduce diagnosis time as well as accuracy and precision improvement. In Thailand, currently, there are many emerging medical technologies supporting medical professionals such as telehealth and tele-medicine, advanced diagnosis modalities like online computed tomography (CT) and magnetic resonance imaging (MRI), positron emission tomography (PET) scan, smart mobility in the form of wearable devices for personal care and pre-diagnosis purposes, and health information technology such as electronic medical record (EMR) and laboratory information system (LIS). Those technology adoptions generate revenue stream and increase professional service capability in this sector.
- 3) **Manufacturing industry:** A parallel theme named Industry 4.0, drives all manufacturers to adopt ICT and innovation to enhance productivity and accuracy. These technologies

include machine-to-machine communication (M2M), IoT, embedded system, advanced robot control system, artificial intelligence (AI), and machine learning system. Details will be elaborated in Thailand Industries 2025 (T.I. 2025) session.

Government initiatives

The Thai government is developing a national e-payment system comprising Thailand 4.0 and Digital Economy Master Plan 2016 which has been operating since the middle of 2016. Actually, Any ID, the first module which is a collaboration between the Ministry of Finance and “the Bank of Thailand, will enable anyone to transfer money and make financial transactions using their ID card, mobile number or email address. All companies will be required to register with the Commerce Ministry to be equipped with the EDC system.

Thailand’s payment environment is changing as more people adopt smartphones, use online and mobile banking, and the financial infrastructure becomes more supportive of electronic payments, including mobile. Key drivers of mobile payments include broad smart-phone adoption, developed financial infrastructure, and consumer interest in payment innovation. Although mobile payment availability is currently limited in Thailand, consumers are eager to try digital wallets and other new technologies. Barriers evaluated include preference for cash, security concerns and consumer behavior.

Thailand has 110 million mobile subscribers, expected to rise to 150 million in 2016 (according to NBTC). This gain will be fuelled by the continued growth of mobile data users and the arrival of machine-to-machine communications or the Internet of Things. Thailand has more than 40 million mobile internet users and only 35 million desktop internet users. It is a mobile-first country.

Smartphone adoption

Availability of affordable smart phones in recent years has fueled a shift from feature

phones to smart phones across Southeast Asia, including in Thailand. Smart phones are becoming an increasingly ubiquitous and essential part of daily life for Thais. In Q1 2015, 76.5% of the 4.3 million handsets sold in Thailand were smart phones. According to Nielsen’s 2014 Smartphone Insights study, 58% of Thais owned smart phones in 2014, up 9% from 49% in 2013 and is projected to reach 100% by 2018. The survey by Nielsen also found that smart phone adoption is more prevalent among the affluent, younger and urban consumer segments, not unlike adoption in the U.S. Similarly, Google found that 64% of Thais used smart phones in 2014.

Availability of affordable smart phones in recent years has fueled a shift from feature phones to smart phones in Thailand. Thailand’s mobile industry consists of three leading mobile network operators (MNOs): Advanced Info Service (AIS), DTAC, and True-Move. Most mobile subscriptions are prepaid (85%) and a smaller percentage is postpaid (15%). Android has 74% of the smart phone operating system (OS) market share, far ahead of Apple iOS with 17%. Widespread availability of faster mobile network service (3G/4G) has allowed Thais to use a broader range of features and capabilities on their smart phones, including mobile banking and commerce.

Financial infrastructure helps to promote electronic and mobile payments

The Bank of Thailand’s (BOT) objectives include developing payment systems infrastructure and formulating policies that promote safety and efficiency in the national payment systems. In conjunction with the expanding financial infrastructure in Thailand, the BOT in 2011 issued its Payment Systems Roadmap 2012-2016 that promotes broader use of electronic payments, including mobile, as one of its key projects. The BOT has been working with financial institutions (FIs), businesses, and government agencies to encourage use of electronic payments in both the public and private sectors through development of standard processes, regu-

latory modifications and other economic incentives.

Thailand has a highly developed financial sector with bank branches and ATMs widely available. According to the World Bank, 78% of the country’s population over 15 years of age had a bank account in 2014. Despite the prevalence of cash payments, the number of credit and debit cards issued has been increasing rapidly, and credit cards are beginning to penetrate the low-income market. Debit cards are replacing ATM cards. The growth in point-of-sale (POS) terminals is resulting in broader merchant acceptance of payment cards. Additionally, several large banks now offer mobile POS services that work with plug-in card readers attached to Android and iOS mobile devices (e.g., Krungri Bank’s Quick Pay and Kasikorn Bank’s K-Merchant on Mobile), making it easier for small businesses to accept card payments and reduce cash.

Consumer interest in payment innovation

A growing number of Thais conduct banking transactions via the mobile channel. Mobile banking enrollment rose steadily between 2010 and 2013, representing a CAGR of 31%. Data on mobile banking activity was limited until the BOT revised its definition to distinguish between online and mobile banking in 2014, resulting in more FIs reporting their mobile banking data. The number of enrolled bank accounts increased 435% from 1.2 million in 2013 to 6.2 million in 2014. Mobile banking transaction volume and value also increased during this period. Most large banks now offer mobile banking services, and many have apps for Android and iOS devices. Similar to FIs in the United States, basic features include checking account balance and activity, fund transfers, bill payment, and branch/ATM locator. The 2014 McKinsey Asia Personal Financial Services Survey found that 15% of Thais used mobile banking in 2014, an increase from 9% in 2011, with usage skewing towards affluent and younger consumers. In comparison, in the U.S., use of mobile banking among mobile phone users with a bank account was much

higher – 39% in 2014, an increase from 21% in 2011.

Mobile technologies drive mobile payments

The Thai market is embracing multiple technologies for mobile payments, such as QR codes, near field communication (NFC) and in-app solutions. For example, Uber launched its mobile app for taxi and rideshare service in Bangkok in early 2014. Starbucks implemented its QR code mobile payment app at all 215 locations across Thailand in March 2015. In July 2015, LINE mobile messaging app launched a mobile payment feature called LINE Pay that allows users to register their credit and debit cards to make payments at affiliated online and physical POS stores. Some retailers, including Tesco Lotus, Big C, Family Mart, Tops and Starbucks, are equipped with contactless POS terminals that can accept mobile NFC payments, although not all are NFC-enabled yet.

Thai consumers are interested in mobile payments

Consumers are interested in making mobile purchases and trying new technologies, such as digital wallets and contactless mobile payments using NFC. Thais are open to trying new mobile payment technologies. More than half (57%) of respondents in Deloitte's 2014 Global Mobile Consumer Survey said they would use an in-store mobile payment solution if available. Additionally, over three-quarters of the same respondents indicated they would be "somewhat" or "definitely" likely to use digital wallets (77.4%) and mobile NFC payments (76.4%) if the technologies were available, even though fewer than 7% of respondents currently use either method.

According to Visa's 2014 Consumer Payment Attitudes Study, 61% of Thai consumers are "aware of" and 66% "prefer" to use contactless payments, indicating a strong consumer desire to use new payment technologies. However, less than one percent of credit and debit cards are contactless and only two percent of POS terminals are NFC-enabled, limiting consumer opportunities to make NFC payments in Thailand. Visa has been working with FIs and merchants to

expand contactless issuance and acceptance, and partnered with McDonald's in 2014 to launch contactless readers in their restaurants across Thailand.

Increasing mobile financial services in Thailand

Mobile users in Thailand are now able to conduct money transfers across three leading mobile networks, thanks to the collaboration of mobile money systems among operators. Starting from 1 December 2015, mobile users can directly transfer money across the three mobile networks to a receiver simply by entering the receiver's mobile number without a bank account. The maximum amount of transfer is limited to 10,000 baht per transaction, with maximum transfers capped at 30,000 baht per day. Operators will charge a fee of five baht per transaction, good until the year-end. Thailand has 5.5 million e-wallet users. Of the total, 4 million use AIS's mPay service, and the rest use True Move's True Money service. DTAC plans to roll out its e-wallet service, called Jaew Wallet. The mobile payment service through the three operators is expected to be worth 90 billion baht this year. A report by the Thai Bankers' Association estimates e-payments will allow the country to save 100 billion baht a year incurred from cash transactions after

its five-year "Payment Roadmap" through 2019 was completed. MasterCard provides security and authentication systems including interoperability networks under this collaboration, while Thanachart Bank provides the settlement system. Universal e-wallet could also be expected to widen the opportunities for mobile commerce, particularly among users who do not want online purchases to have any link to a bank account or credit card.

Different types of market players are taking the lead in pioneering services, developing relationships with customers and capturing revenues. These players include financial institutions, mobile operators, technology companies and large merchants as below.

For instance, the technology company such as "Line Pay service" is now available in Thailand. Apart from Japan, Line will focus on countries where it has a strong mobile user base, including Thailand, Taiwan province of China and Indonesia. Thailand 33 million Line users, while there are 205 million users globally. The service received an e-payment license from the Bank of Thailand. Line earns revenue from stickers, games, music and digital content for television streaming, as well as the e-commerce marketplace, business-to-business marketing and mobile payment

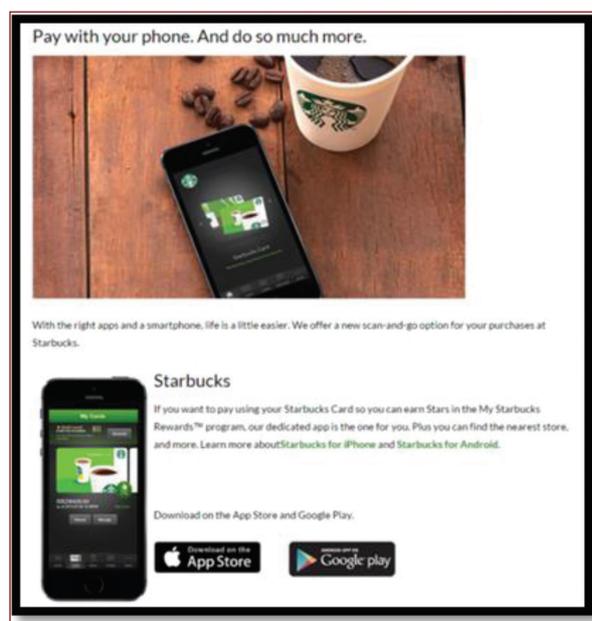


Figure 1: Starbucks' mobile payment service

services. To access Line Pay, users register their personal information and credit or debit card number in the Line Pay app. Goods and services can be bought using a bank account with pre-deposited cash for purchases.

Another example for the large merchants: Three technology companies have collaborated to provide the first cloud-based mobile payment platform in Thailand that allows users to process credit card payments on their smart phones. MFEC PLC, Simply Tapp from the US and Japan's TIS Inc have jointly developed the NFC-based mobile payment service, called the Asian payment cloud project. SimplyTapp has created Host-Card Emulation (HCE) technology, which enables NFC-enabled devices operating on the Android system to use mobile phones to accept credit card payments via NFC-ready point-of-service terminals. Visa and MasterCard have supported HCE technology since last year. Up to 65% of Android-based devices globally use SimplyTapp's HCE technology. HCE can eliminate the dependency on mobile operators as the technology returns control of payment issuance back to the card issuers. Currently, NFC mobile payment requires users to change their SIM card, causing inconvenience to users and eroding the adoption of mobile payment services. Thailand has 10,000 NFC-enabled point-of-service terminals. NFC-ready mobile handsets account for 20-25% of total Android-based smart phones.

The second module to follow will be an expansion of the Electronic Data Capture (EDC) software that collects and stores customer data. The country now has only 300,000 EDC units while it expects another 2 million EDC units required. EDC uses point-of-sale terminals or specialized software for online transactions to submit and validate transactions to a merchant account provider or some other transaction processor. E-payment is aimed at allowing people to access money transfer services even if they do not have a bank account, serving e-commerce, stemming loopholes in the tax system and directing subsidies to the underprivileged. To facilitate the national e-payment system, the amended draft on e-payment will seek cabinet approval.

The third module will link e-payments and the Revenue Department's taxation system, making tax collection more efficient, as the e-payment system will allow the government to receive transaction data.

The fourth module will help the government to subsidize all low-income earners directly by using only their ID cards. Finally, the fifth module will be a campaign offering incentives to make e-payments. The national e-payment plan is expected to be forwarded for cabinet approval.

By the way, the policy-makers and regulatory bodies are balancing two broad aims regarding mobile payments and related services:

- 1) Ensuring that any new financial services are regulated to protect consumers and prevent misuse; and
- 2) Encouraging the development of services that will bring significant economic and social benefits.

Thailand Industries 2025 – A parallel concept contributing to Thailand 4.0

Thailand Industries 2025 or T.I. 2025 is an industrial concept of Thailand, led by The Federation of Thai Industries (F.T.I.) to follow Industry 4.0 era. The objective is to upgrade existing Thai industries to world class leading industries for better competitiveness, targeted in the next 10 years. According to the T.I. 2025 plan, the goal is to transform at least 50% of manufacturers to comply with Industry 4.0, which operate and manage by not only automation system but also digital workflow while machine to machine communication (M2M), artificial intelligence, and Internet communication will be integrated as common practice in manufacturing processes. In addition, the production based on T.I. 2025 concept will evolve from mass production to mass customization to cope with dynamic market demands.

When the T.I. 2025 is successfully implemented, it will improve all productivity and process activities in manufacturing sector. These will support the growth of industry, and also contribute to the national scheme Thailand 4.0 in the future.

With respect to these aims – and considering the market context set out earlier – this section addresses the following challenges:

- The need for regulators to clarify their roles and collaborate with other regulatory bodies;
- Developing a regulatory framework to ensure safe and secure payments;
- Adapting regulatory approaches to fit the proper market contexts; and
- Creating an enabling environment for services to grow.



Figure 2: Money transfers across mobile networks

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State of ICT in Asia and the Pacific 2016 Uncovering the Widening Broadband Divide

Despite the widely reported phenomenal growth in Information and Communications Technology (ICT) in the Asia-Pacific region, a new study by the United Nations Economic and Social Commission for Asia and the Pacific (ESCAP), has found that broadband capabilities and access are highly concentrated in East and North-East Asia. The report titled, "State of ICT in Asia and the Pacific 2016: Uncovering the Widening Broadband Divide", also confirms that the gap between advanced and developing countries in fixed broadband access is indeed widening, and unless targeted policy interventions are put in place, the trend will continue to the detriment of future development opportunities.

The Report shows that 74.89 per cent of total fixed broadband subscriptions in Asia and the Pacific are concentrated in East and North-East Asia, followed by South and South-West Asia (9.77 per cent), North and Central Asia (7.68 per cent), South-East Asia (5.74 per cent) and the Pacific (1.93 per cent), according to the 2015 data. Findings indicate that over 52.3 per cent of global fixed broadband subscribers now come from ESCAP member States, a dramatic increase from 2005 when the region constituted only 38.1 per cent. The Report also found that in 2015, less than 2 per cent of the population had adopted fixed broadband in as many as 20 countries in Asia and the Pacific, widening the digital divide between high-income and low-income countries at an alarming speed.

United Nations Under-Secretary-General and Executive Secretary of ESCAP Dr. Shamshad Akhtar underlined that broadband connectivity is a critical foundation for the digital economy and the achievement of the Sustainable Development Goals in Asia-Pacific, and that ESCAP is working with member States to improve broadband access for countries in the region. "As a result of this digital divide, millions of people are shut out from transformative digital opportunities in education, health, business and financial services," said Dr. Akhtar. "In response to the widening gap, ESCAP is promoting the Asia-Pacific Information Superhighway (AP-IS) initiative, to increase the availability and affordability of broadband Internet across Asia and the Pacific, by strengthening the underlying Internet infrastructure in the region," she added.

In particular, the Report shows that e-commerce strongly correlates with access to fixed broadband connectivity, suggesting that enhancing ICT infrastructure connectivity would increase business-to-business e-commerce in the region. The Report also examined emerging trends in developing online content, differential patterns of mobile broadband expansion and usage, as well as the impact of regulatory quality and investment in broadband adoption. The study findings will serve as the basis for the inaugural ESCAP Committee on ICT, Science, Technology and Innovation to be held from 5 to 7 October 2016 in Bangkok, Thailand.

The report is available at:

<http://www.unescap.org/sites/default/files/State%20of%20ICT%20in%20Asia%20and%20the%20Pacific%202016.pdf>

Tech Events

2017

Jan 22-24
Pathumthani,
Thailand

3rd International Conference on Renewable Energy Technologies (ICRET 2017)

Contact: Conference Secretary
Tel: +86-28-86528758
E-mail: icret@iacsit.net
Web: <http://www.icret.org>

Jan 25-27
Bangkok,
Thailand

2nd International Conference on Herbal and Traditional Medicine (HTM2017)

Contact: HTM 2017 Secretariat Office
Faculty of Pharmaceutical Sciences, Khon Kaen University
123, Naimuang, Muang, Khon Kaen, Thailand, 40002
Tel: + (66) 43 202378
Fax: + (66) 43 202379
E-mail: htm2017@kku.ac.th
Web: <http://www.htm2017.com>

Feb 25-27
Hanoi,
Viet Nam

2017 3rd International Conference on Environment and Renewable Energy (ICERE 2017)

Contact: Ms. Mickie Gong
CBEEES Senior Editor
Asia-Pacific Chemical, Biological & Environmental Engineering Society (APCBEEES)
Tel: +852-3500-0137
E-mail: icere@cbees.net
Web: <http://www.icere.org>

Feb 25-28
Tehran,
Islamic Republic of Iran

IRAN RENEWABLE ENERGY & ENERGY SAVING EXHIBITION 2017

Contact: M&T Solutions Co.
Unit 2 No.15
East 3rd Golbarg alley, Fakhar Moghaddam st., Dadman Blvd.
Shahrak e Gharb, 1468936311 Tehran, Islamic Republic of Iran
Tel: +98 21 4291 7000
Fax: +98 21 4291 7100

Feb 27-Mar 2
Bangkok,
Thailand

International Conference on Sustainable Agriculture and Bioeconomy 2017

Contact: Technical Training Unit
National Center for Genetic Engineering and Biotechnology (BIOTEC), 113 Thailand Science Park,
Phahonyothin Rd., Khlong Nueng
Khlong Luang, Pathum Thani 12120, Thailand
Tel: (66) 2564 6700 ext. 3379-3382; Fax: (66) 2564 6574
E-mail: info@agbio2017.com
Web: <http://www.biotec.or.th>

Mar 25-27
Singapore

2017 International Conference on Green Energy and Applications (ICGEA 2017)

Contact: Ms. Joy Xu
Conference secretary
Tel: +86-136-2777-7774
E-mail: icgea@young.ac.cn; Web: <http://www.icgea.org>

Mar 27-29
Kuala Lumpur,
Malaysia

Global Conference and Expo on Vaccines Research (Vaccines Research-2017)

Contact: Secretariat
Tel: +91-779-979-0001
E-mail: vaccines@scientificfederation.com
Web: <http://scientificfederation.com/vaccines-2017/>

Apr 05-07
Daegu,
Republic of Korea

GREEN ENERGY EXPO 2017

Contact: Energy EXPO Secretariat
(702-712) 90, Yutongdanji-ro(St.)
Buk-gu, Daegu, Republic of Korea
Tel: +82 53 601-5371; Fax: +82 53 601-5372

Apr 12-14
Kuala Lumpur,
Malaysia

SOLAR ASIA 2017

Contact: UBM Malaysia
A-8-1, Level 8, Hampshire Place Office
157 Hampshire, 1 Jalan Mayang Sari
50450 Kuala Lumpur
Malaysia
Tel: +60 3 2176 8788
Fax: +60 3 2164 8786

Apr 24-26
Kuala Lumpur,
Malaysia

2017 7th International Conference on Environment and Industrial Innovation (ICEII 2017)

Contact: Ms Eve Lee
CBEEES Senior Editor

Asia-Pacific Chemical, Biological & Environmental Engineering

Society (APCBEEES)
Tel: +852-3500-0137
E-mail: iceii@cbees.org
Web: <http://www.iceii.org>

Apr 25-27
New Delhi,
India

Windergy India 2017

Contact: Secretariat
Tel: +91 (44) 43015773
E-mail: info@windergy.in
Web: <http://www.windergy.in>

Apr 26-27
Kuala Lumpur,
Malaysia

5th International Conference on Innovation and Entrepreneurship 2017

Contact: Academic Conferences and Publishing International Limited - 33 Wood Lane, Sonning Common,
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Tel: +44 (0)118 9724148
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Jun 08-11
Kobe, Japan

The Asian Conference on Sustainability, Energy & the Environment 2017

Contact: The International Academic Forum
Sakae 1-16-26 - 201
Naka Ward, Nagoya, Aichi,
Japan 460-0008
Web: <http://iafor.org>

Jun 23-24
Kuala Lumpur,
Malaysia

15th International Conference on Envirotech, Cleantech and Greentech (ECG)

Contact: World Association for Scientific Research and Technical Innovation (WASRTI)
SF-45, JTM, Manglam, Jaipur - 17, Rajasthan, India
Tel: +91-9001087697
E-mail: info@wasrti.org
Web: <http://wasrti.org>

Jul 13-15
Bangkok,
Thailand

Sustainable Development Conference 2017: Green technology, renewable energy and environmental protection

Contact: Tomorrow People Organization
Dusana Vukasovica 73,
11000 Belgrade, Serbia
Tel/Fax: + 381 62 680 683
E-mail: contact@tomorrowpeople.org
Web: <http://www.sdconference.org>

Aug 16-18
Guangzhou,
China

GUANGZHOU INTERNATIONAL SOLAR PHOTOVOLTAIC EXHIBITION 2017

Contact: Guangzhou Grandeur Exhibition Services Co., Ltd
Room 2303-2305, The 4th Tower
Dong Jun Plaza, No.836 of Dong Feng Dong Road
Yuexiu District
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China
Tel: +86 2022074185
Fax: +86 20-82579220

Sep 01-30

ICEF - INTERNATIONAL CLIMATE & ENVIRONMENTAL FAIR 2017

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1159-2 Chipyeong-dong
Seogu, Gwangju-si 502-828
Republic of Korea
Tel: +82 62-611-2000; Fax: +82 62-611-2009

Sep 20-22
Noida, India

RENEWABLE ENERGY INDIA EXPO 2017

Contact: UBM India Pvt. Ltd.
Times Square Unit No.1 & 2
B Wing 5th Floor Andheri-Kurla Road
MarolAndheri (E)
Mumbai 400059
India; Tel: +91 22 66122600
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- Manufacturing of bio-coal

- ISLAMIC REPUBLIC OF IRAN

- Biotechnology for wastewater treatment system

Managing business risks



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<http://www.archive.india.gov.in>

Types of business risks

Business risks are of a diverse nature and arise due to innumerable factors. These risks may be broadly classified into two types, depending upon their place of origin.

- Internal Risks are those risks which arise from the events taking place within the business enterprise. Such risks arise during the ordinary course of a business. These risks can be forecasted and the probability of their occurrence can be determined. Hence, they can be controlled by the entrepreneur to an appreciable extent.

The various internal factors giving rise to such risks are:-

- **Human factors** are an important cause of internal risks. They may result from strikes and lock-outs by trade unions; negligence and dishonesty of an employee; accidents or deaths in the industry; incompetence of the manager or other important people in the organisation, etc. Also, failure of suppliers to supply the materials or goods on time or default in payment by debtors may adversely affect the business enterprise.
- **Technological factors** are the unforeseen changes in the techniques of production or distribution. They may result in technological obsolescence and other business risks. For example, if there is some technological advancement which results in products of higher quality, then a firm which is using the traditional technique of production might face the risk of losing the market for its inferior quality product.
- **Physical factors** are the factors which result in loss or damage to the property of the firm. They include the failure of machinery and equipment used in business; fire or theft in the industry; damages in transit of goods, etc. It also includes losses to the firm arising from the compensation paid by the firm to the third parties on account of intentional or unintentional damages caused to them.
- External risks are those risks which arise due to the events occurring outside the business organisation. Such events are generally beyond the control of an entrepreneur. Hence, the resulting risks cannot be forecasted and the probability of their occurrence cannot be determined with accuracy.

The various external factors which may give rise to such risks are:

- **Economic factors** are the most important causes of external risks. They result from the changes in the prevailing market conditions. They may be in the form of changes in demand for

the product, price fluctuations, changes in tastes and preferences of the consumers and changes in income, output or trade cycles. The conditions like increased competition for the product, inflationary tendency in the economy, rising unemployment as well as the fluctuations in world economy may also adversely affect the business enterprise. Such risks which are caused by changes in the economy are known as 'dynamic risks'. These risks are generally less predictable because they do not appear at regular intervals. Also, such risks may not necessarily result in losses to the firm because they may also contain an element of gain for the firm. For instance, due to market fluctuations, a well known product of a firm may either lose its demand or may occupy a larger market share.

- **Natural factors** are the unforeseen natural calamities over which an entrepreneur has very little or no control. They result from events like earthquake, flood, famine, cyclone, lightning, tornado, etc. Such events may cause loss of life and property to the firm or they may spoil its goods. For example, Gujarat earthquake caused irreparable damage not only to the business enterprises but also adversely affected the whole economy of the State.
- **Political factors** have an important influence on the functioning of a business, both in the long and short term. They result from political changes in a country like fall or change in the Government, communal violence or riots in the country, civil war as well as hostilities with the neighbouring countries. Besides, changes in Government policies and regulations may also affect the profitability and position of a enterprise. For instance, changes in industrial policy and Trade policy annual announcement of the budget amendments to various legislations, etc. may enhance or reduce the profits of a business enterprise.

Thus, business risk takes a variety of forms. In order to face such risks successfully, every businessman should understand the nature and causes of these risks as well as the various measures which must be taken in order to minimise them.

Methods of handling business risks

Risks in any business are inevitable and they cannot be eliminated completely. But an entrepreneur can control and minimise their negative consequences by adopting a suitable risk management strategy. The various methods that may be used for handling business risks are as follows:

- An entrepreneur can avoid some of the risks by analysing the potential results (losses or gains) of the activity that gives rise to those risks. The risk is worth taking if the outcome ultimately benefits the firm. Otherwise, such an action should be avoided as far as possible. The risk may be avoided by substituting the risky process with a relatively safer alternative.
- If the entrepreneur cannot avoid the risk, he should try to control and minimise the losses arising from the risk. This can be done through efficient planning and proper risk management techniques. The main techniques that can be employed by a firm are as follows:
 - Many business risks arise due to errors in planning. Thus scientific forecasting and marketing research of future economic conditions can help the management to make appropriate plans for the enterprise in advance. This will make them aware of likely opportunities and threats to the business environment in future. Accordingly, the entrepreneur can make required changes in its products, prices of the products, its distribution channels and sales promotion techniques.
 - A firm can reduce the losses arising from technological obsolescence through continuous technological research and development in the organisation. Thus, it can develop new and remunerative products before the present products become obsolete.
 - Credit screening and control through careful screening of the customers; prompt collection of the outstanding debts and tight inventory control will also help the firm to reduce the amount of risks.
 - Various safety programmes like:
 - Fire fighting equipment and sprinkler system will help in preventing the losses caused by fire
 - Burglar alarms, night watchman, and safety vaults will help in reducing thefts, burglary, etc
 - Cold storage or refrigeration will help in preservation of perishable products of the firm and thus reduce the damages caused to the products
 - Special packing will help in reducing any spoilage, breakage or leakage of the goods in transit or storage
 - Proper pest control methods will also help in reducing the damages caused to the products
 - Safe work environment including adequate lighting, covering of damaged floors as well as proper medical care facilities will help in reducing the number of accidents in the factory.
 - Risk of competition can be reduced through collective action by the competing firms which may agree to restrict output, allocate markets or charge uniform prices.
- Proper Government action through appropriate policies and regulations can also help in stabilising the economic environment and thus reducing the business risks.
- An entrepreneur must assume the possibility of certain risks which are inherent in any form of business organisation. Such risks can be handled through proper planning and adopting two possible strategies. These are:-
 - Shifting the risks to the people who are skilled in managing them and are willing to bear them. The risks may be transferred or shifted through:-
 - **Hedging:** It is a method of risk transfer accomplished by buying and selling for future delivery. It is a form of forward trading to minimise losses due to changes in prices. Under it, the possibility of loss which occurs because of price fluctuations, is shifted during the time gap between purchase and sale of a commodity. It involves entering simultaneously into two contracts of an opposite though corresponding nature, one in the spot or cash market and the other in the future market. The purpose of hedging is to protect the trade profit from adverse fluctuations in commodity prices.
 - **Underwriting:** A public company issuing shares and debentures may face the risk of loss due to the failure to sell the entire issue of securities. Such risk can be shifted to an underwriter which is the financial intermediary between the company issuing securities and the ultimate investors. It provides several benefits to a company:-
 - It relieves the company of the risk and uncertainty of marketing the securities.
 - Underwriters have an intimate and specialised knowledge of the capital market. They offer valuable advice to the issuing company in the preparation of the prospectus, time of floatation and the price of securities, etc. They also provide publicity service to the companies which have entered into underwriting agreements with them.
 - It helps in financing of new enterprises and in the expansion of the existing projects.
 - It builds up investors' confidence in the issue of securities. The association of well-known underwriters lends prestige to the company and the investors feel that the issue is sound enough for profitable investment. Also, the securities underwritten by reputed underwriters receives better response from the public.

- The issuing company is assured of the availability of funds. Important projects are not delayed for want of funds.
- It facilitates the geographical dispersal of securities because generally, the underwriters maintain contacts with investors throughout the country.

For more details visit our Section on 'Underwriting'

- **Subcontracting:-** is an inter-firm relationship, where a small firm may produce different components, intermediate inputs and final output or it may provide various assembling activities, etc for the parent firm. Such small firms are generally known as the subcontractors. The need for subcontracting arises when a firm undertakes a business which extends over a long period of time or which requires the specialised services of several experts. In such a situation, the firm may face risks resulting from rise in prices of materials, labour or other imports. Such risks may be shifted to other firms through subcontracting. For instance, a building construction firm may engage subcontractors for timbers, glasses, electric wiring, plumbing, cement, etc.
- Sharing the risks with other people so as to minimise the burden on the firm. Generally pooling of the investment of a large number of persons into the organisations helps in spreading the risks over a large number of shareholders. However, insurance is the most important and prevalent device for risk sharing.

'Insurance' may be defined as a contract in writing under which one party agrees to indemnify the other party against a loss or damage suffered by it on account of an uncertain future, in return for a consideration called 'premium'. The person/business who gets its life/property insured is called 'Insured/Assured'. The agency which helps in entering into an insurance arrangement is called 'Insurer' or 'Insurance company'. The agreement or contract which is put in writing, is called a 'policy'. An insurance policy provides the following benefits to a business concern:

- **Protection:** it provides protection against risk of loss and a sense of security to the businessmen.
- **Diffusion of risks:** as the burden of loss is spread over a large number of people.
- **Credit standing:** of the firm is enhanced as the businessman can easily transfer some of his risks to an insurance company.
- **Continuity and certainty of business:** if all the risks were to be borne by the businessmen themselves, the business operations would have been uncertain and halting in character.
- **Better utilisation of the capital of the firms:** as the Insurance companies take over the risk, it enables the business firm to invest and optimally utilise its capital.

Translation tool for patent documents

The World Intellectual Property Organization (WIPO) has developed a ground-breaking new "artificial intelligence"-based translation tool for patent documents, handing innovators around the world the highest-quality service yet available for accessing information on new technologies. WIPO Translate now incorporates cutting-edge neural machine translation technology to render highly technical patent documents into a second language in a style and syntax that more closely mirrors common usage, out-performing other translation tools built on previous technologies.

WIPO has initially "trained" the new technology to translate Chinese, Japanese and Korean patent documents into English. Patent applications in those languages accounted for some 55% of worldwide filings in 2014. Users can already try out the Chinese-English translation facility on the public beta test platform. The high level of accuracy of the Chinese-English translation is the result of the training of the neural machine translation tool, which compared 60 million sentences from Chinese patent documents provided to WIPO's PATENTSCOPE database by the State Intellectual Property Office of the People's Republic of China with their translations as filed at the United States Patent and Trademark Office.

WIPO plans to extend the neural machine translation service to French-language patent applications, with other languages to follow. The PATENTSCOPE database integrates with other translation engines freely available on the internet and continues to use existing statistical-based translation technology for languages where it performs well. WIPO has shared its translation software with other international organizations, including the United Nations conference management service, Food and Agriculture Organization, International Telecommunication Union, International Maritime Organization, World Trade Organization, and The Global Fund to Fight AIDS, Tuberculosis and Malaria.

For more information, contact:

Media Relations Section
 World Intellectual Property Organization (WIPO)
 Tel: (+41 22) - 338 81 61 / 338 72 24
 Fax: (+41 22) - 338 81 40
 Web: <http://www.wipo.int>



Records management

SME Corporation Malaysia

<http://www.smecorp.gov.my>

Records management, or 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. Records management 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 records management 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 records management in an organisation. The practice of records management 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.
- 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.

Records management principles and automated records management 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 records management 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 records management 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 record

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 organisations 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 records management 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. 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.

Market Validated Technologies Directory

The Market Validated Technologies Directory is a compendium of a tedious and comprehensive market validation exercise on selected R&D outputs from seven public universities. The universities are Universiti Sains Malaysia (USM); Universiti Malaya (UM); Universiti Kebangsaan Malaysia (UKM); Universiti Putra Malaysia (UPM); Universiti Teknologi Malaysia (UTM); Universiti Islam Antarabangsa Malaysia (UIAM) and Universiti Teknologi MARA (UiTM). The exercise involved 358 R&D outputs with a two-fold objective: validate market for and marketability of R&D outputs before the products (R&D Outputs) are offered to industry for commercial undertakings. The Market Validation exercise came about as the result of the introduction of Market Validation Fund (MVF) under Budget 2012 initiatives. The Fund's mandate is to "ensure commercial viability of products (R&D outputs) through market validation".

For more information, contact:

MVF Unit
 Malaysian Technology Development Corporation
 Level 8-9, Menara Yayasan Tun Razak
 Jalan Bukit Bintang
 55100 Kuala Lumpur, Malaysia
 Tel: 603 – 2172 6000 / 6117
 Web: <http://www.mtdc.com.my>



Patent rights and obligations in Viet Nam

ASEAN Intellectual Property Association

<http://www.aseanipa.org>

Patent term and maintenance/renewal

Vietnamese patents become effective on the date of issuance and end 20 years computed from the filing date for inventions (subject to annuity payment), without any renewal term. The patent for utility solution enjoys the term of ten years from the filing date. The patent for industrial design is effective from the granting date, lasts for five years from the filing date, and can be renewed for two further five year terms (subject to payment of renewal fee).

The patent owner of a Patent for Invention or Patent for Utility Solution is required to pay annuity fees in order to maintain its validity. In order to renew the validity of an Industrial Design Patent, its owner shall pay renewal fees.

Annuities are not required for pending patent application(s). The first annuity should be paid on the date of grant of patent while the payment of the succeeding annuities must be made within the six-month period prior to the anniversary of the grant date. A late payment of annuity is available within a grace period of six months counted from the due date of annuity, subject to an extra fee amounting to 10% of said annuity for each month overdue. No provision on the restoration of the validity of a patent is addressed in the IP laws and regulations.

Rights and obligations of patent owners

Patent rights

A patent owner shall be granted the right to use or allow others to use the patented invention or industrial design. The patentee also has the right to prevent others from using the patented invention or industrial design without his/her own authorization and to dispose thereof. The use of an invention means carrying out the following acts: manufacturing the patented product; applying the patented process; exploiting the patented product or a product obtained by the patented process; circulating, advertising, offering for sale, stocking for circulation of and importing the above mentioned product. The use of an industrial design means carrying out the following acts: manufacturing products with an appearance embodying the patented industrial design; and circulating, advertising, offering for sale, stocking for circulation of and importing the above mentioned products.

Obligations of the patent owners

The patent owner has obligation to: (1) pay remuneration to the inventor(s); (2) pay the annuity or renewal fee for maintenance or renewal of the patent; and (3) use or license the patented invention or industrial design to another person upon decision of the

State administrative authority (compulsory license). For a patent for invention, the patent owner shall be under obligation to permit the owner of the dependent invention using his/her dominant (basic) invention, provided that the dependent invention has been proved to have made an important technical advance in comparison with the dominant invention and to have high economic value. In case the owner of the dominant invention fails, without legitimate grounds, to satisfy the request made by the owner of the dependent invention, the State competent authority may, without permission of the owner of the dominant invention, grant a license to exploit the dominant invention to the owner of the dependent invention.

Limitations to patent rights

The patent rights as mentioned above shall be limited by prior user's rights, compulsory license, and other acts.

Prior user's rights

The exercise of the prior user's right to invention or industrial design shall not be considered as an infringement of rights of the owner of the patented invention or industrial design. Where a person who, before the filing date or priority date (if any) of an invention or industrial design application, was using or had made substantial preparation toward the using of an invention or industrial design independently created but identical with the invention or industrial design claimed in the application, the said prior user shall be entitled to continue the use after the patent is granted, within the extent and volume of use or substantial preparation toward the using already made. The prior user shall not be entitled to enlarge the extent and volume of use unless it is so permitted by the owner of the patented invention or industrial design. The prior user's right shall not be allowed to be transferred except for the case it is transferred together with the business establishment where the prior user's right is exercised.

Compulsory license

The right to use an invention shall, without permission of the patentee, be granted to another entity or individual upon decision of the State competent authority if (i) the use of the invention is intended for the public interest, non-commercial purposes, national defense, security, prevention and treatment of disease, for people's nutrition, or meeting other urgent needs of society; (ii) the patentee fails to fulfill the obligation of using the invention after the expiration of four years from the date of filing of the patent application and three years from the granting date

of the patent for invention; (iii) the person who wants to use the invention fails, within a reasonable period of time for negotiation on reasonable considerations and commercial conditions, to reach an agreement with the patentee on a license to use such an invention; or (iv) the patentee is regarded as performing an act of anti-competition prohibited under the competition law and regulations.

The right to use the invention under the compulsory license granted by a decision of a State competent authority shall meet the following conditions:

- a. The right to use shall be non-exclusive;
- b. The right to use shall only be limited to such a scope and duration sufficient to attain the purpose for which the compulsory license was granted, and predominantly for the supply of the domestic market;
- c. The licensee of the compulsory license shall not assign the right to use the patented invention to another person, except where the assignment is made together with his/her business establishment and sub-license others to use the patented invention;
- d. The licensee of the compulsory license shall pay the patentee/licensor adequate remuneration, taking into account the economic value of the allowed use, in compliance with the remuneration frame provided for by the Government;
- e. The patentee of the dominant invention shall also be entitled to grant a license to use the dependent invention on reasonable terms and conditions; and
- f. The licensee of compulsory license to use the dominant invention shall not be entitled to assign such right, except with the assignment of the entire right to the dependent invention.

Other cases

The following shall be exempted from patent infringement:

1. Use of the invention or industrial design for personal needs or non-commercial purposes, or for the purposes of evaluations, analysis, research, teaching, testing, pilot production or for collecting data to carry out procedures to obtain a production license, import or product marketing permit;

2. Use of the invention or industrial design only for the purpose of maintaining the operation of a foreign vehicle in transit or only temporarily entering into the territory of Vietnam;

Who may file and where to file patent applications

The right to file a patent application for invention or industrial design generally belongs to inventors who have created the invention or industrial design by his/her own efforts and expenses. In case an invention or industrial design is created by the inventors during the course of employment or hire, the entitlement to file patent applications for such invention or design shall belong to the entities or individuals who have invested finance and material facilities to the inventors through employing or hiring, unless otherwise agreed by the parties (the employee invention). In this case, the employees shall enjoy some moral rights over the invented technology in addition to some remuneration. Moral rights of employee-inventor(s) are to be named as inventor in relevant patent letters as well as in any documents in which the invented technology is published or introduced. The remuneration for the employees is stipulated as 10% of benefits obtained from using the invention, and 15% of the sum amounted from each royalty for granting a license to use the invention, unless otherwise agreed by the parties. In addition, persons entitled to file an application may assign that right to other organizations or individuals through written contract or inheritance in accordance with the law.

The right to file patent applications for inventions/industrial designs made by using the State budget belongs to the State. All applications must be lodged with the National Office of Intellectual Property (NOIP), which has been entrusted to be the State administrative authority under the jurisdiction of the Ministry of Science and Technology. Vietnamese entities and individuals, foreign individuals permanently residing in Vietnam, and foreign entities having an industrial or commercial establishment in Vietnam may file patent applications directly or through an IP agency licensed to practice before the NOIP. Foreign individuals not permanently residing in Vietnam and foreign entities having no industrial or commercial establishment in Vietnam shall file applications for patent rights through a licensed IP agency. As of May 2015 there are 158 local IP agencies licensed to practice in Vietnam before the NOIP.

Asia Pacific Energy Portal

The United Nations Economic and Social Commission for Asia and the Pacific (ESCAP) recently launched an innovative new online portal that will provide unprecedented access to information on the energy policies of countries in Asia and the Pacific, and advance the sustainable energy agenda in the region. The Asia Pacific Energy Portal offers member States powerful tools, including highly interactive data visualizations that enable rapid trends identification as well as policy tracking and search.

The unique combination of data and policy information in one application will help improve analysis of the energy situation, policies and their development impact. Alongside the portal, ESCAP also launched the first annual *Regional Trends Report on Energy for Sustainable Development in Asia and the Pacific*. The Report provides an additional platform for member States to share their experiences through case studies regarding the energy sector and its future development.

For more information about the portal, access:

<http://www.asiapacificenergy.org>



IPR-related disputes in the Republic of Korea: appeals & trials

Korean Intellectual Property Office

<http://www.kipo.go.kr>

The trial system for IPR-related disputes is a three instance procedure which consists of the Intellectual Property Trial and Appeal Board (IPTAB), the Patent Court, and the Supreme Court. The aim of these institutions is to promote and strengthen the protection of IPRs while guaranteeing fair and prompt settlements of IPR-related disputes. Specific explanations on the IPTAB and the trial system/procedure can be found below.

Introduction to the IPTAB

The IPTAB was established through an amalgamation of the former Trial Board and Appellate Trial Board. It was launched concurrently with the Patent Court on March 1, 1998. The IPTAB is the court of first instance for the settlement of intellectual property-related disputes and is independently operated within KIPO. Since its inauguration, the IPTAB has increased the number of administrative patent judges, strengthened oral hearings, and focused on enhancing administrative patent judges' expertise, fairness, and efficiency

Organization of the IPTAB

The IPTAB consists of 11 trial boards, a Trial Policy Division, and a Litigation Division. A trial board is composed of about 9 administrative patent judges who are in charge of conducting the trials. Meanwhile, the Trial Policy Division is responsible for receiving documents, formalities examination, etc., and the Litigation Division is responsible for litigation proceedings. As mentioned above, the 11 trial boards consist of about 9 administrative judges including the chief administrative patent judge. A trial board makes decisions based on a majority vote out of three administrative patent judges. For matters of grave concern, the board may expand the vote to five judges including the President of the Intellectual Property Trial and Appeal Board.

Significance of a patent trial

A 'Patent Trial' refers to a procedure in which the Intellectual Property Trial and Appeal Board makes an administrative judgment for the settlement of an applicant/agent's patent-related dispute or dissatisfaction with the rejection of a patent application, etc. A Patent Trial functions as the first-instance trial in the Three-Instance Patent Litigation System. Only after receiving a ruling from the Intellectual Property Trial and Appeal Board can an applicant/agent appeal to the higher courts, that is, the Patent Court or the Supreme Court.

Types of appeals and trial examinations

1. Ex Parte Cases

Trial against ruling of refusal or revocation (Patent Law Article 132, Clause 3)

- When an applicant has received a decision of rejection or revocation from an examiner, that person may demand an appeal within 30 days of the date of receipt of the certified copy of the examiner's decision. A provision for exception is established in cases where a person resides in an area that is remote or difficult to access. The President of the Intellectual Property Trial and Appeal Board may extend the time limit to 2 months for the benefit of a person in this situation.

With respect to a patent application filed on or after July 1, 2009, the applicant may make a request for reexamination or trial, selectively, following a decision of rejection; however, the applicant is not allowed to make a request for reexamination once a request for trial has been submitted (Article 67-2 of the Patent Act).

When a patent application has been reexamined at the request of the applicant and a decision of rejection is made by the examiner, the applicant may appeal against such decision of rejection by filing a request for trial.

- Under the reexamination before trial system, a patent application must be reexamined upon submission of amended specifications within 30 days after the filing of a request for trial. However, as a request for reexamination system has been introduced, even if there has not been a request for trial, a patent application with the attached amendments to specifications or drawings may be reexamined by the examiner upon request of the applicant.

Trial against decision to reject amendment:

- When an applicant receives a decision of rejection on the basis of his/her amendments, he/she may demand an appeal within 30 days from the date of receipt of the certified copy of the decision.
- The 2001 Revised Patent Law provides that the then existing appeal against the examiner's decision to reject the amendment be repealed and only an appeal against a decision of rejection be allowed; this is in order to expedite the proceedings of examination and hearing (Article 51 of the Revised Patent Law, Clause 3, 2001, 7. 1).

Trial for correction (Patent Law Article 136)

- A patent holder may demand a trial for corrections to specifications or drawings for the following reasons only:
 - ① to narrow a claim;
 - ② to correct a clerical error; or
 - ③ to clarify an ambiguous description.
- However, this provision shall not apply where an opposition to the patent is pending.
- This trial is intended to protect an invention by providing the opportunity for a patentee to make corrections on the condition that there are not any unexpected losses or damages incurred upon any third parties.
- When a trial decision stating that the corrected specifications or drawings of a patented invention become final and conclusive, the patent application, the laying-open of the decision and the registration of the establishment of the patent right shall be deemed to have been made on the basis of such corrected specifications or drawings.
- Under the present provision, a trial for invalidation can be requested independently of a trial for correction.
- When a decision that a correction of the specifications or drawings is to be invalidated becomes final and conclusive, the correction shall be deemed never to have been made.

Trial for invalidation of correction (Patent Law Article 137)

- An interested party or examiner may demand a trial for the invalidation of a correction, where the specifications or drawings of a patented invention have been corrected in violation of Article 136.
- When a decision that a correction of the specifications or drawings is to be invalidated becomes final and conclusive, the correction shall be deemed never to have been made.

Inter parte cases

Invalidation trial of a patent (Patent Law Article 133)

- Due to a mistake of an examiner or appeal examiner, some patents which should not have been granted may exist. In such cases, an interested party or examiner may demand a trial to invalidate the patent. For a patent containing two or more claims, a demand for a trial of invalidation may be made for each claim.

- The reasons for invalidation of the patent are generally the same as reasons for the rejection of a patent application.
- A trial for invalidation of a patent may be demanded even after the expiration of the patent right. Where a trial decision invalidating a patent has become final and conclusive, the patent right shall be deemed never to have existed; however, where a patent is invalidated by any reason that arose after the granting of a patent, the patent right is deemed not to have existed from the time when such a reason originated.

Trial to Confirm the Scope of a Patent Right (Patent Law Article 135)

A patentee or an interested person may demand a trial to confirm the scope of a patent right. When a trial is demanded to confirm the scope of a patent right, the confirmation shall apply to each claim if the patent contains two or more claims.

Invalidation Trial of Registration for Extension of Term of Patent Right (Patent Law Article 134)

Refers to the quasi-judicial administrative procedure to invalidate the registration for extension of the term of a patent right due to any defect in the registration measure.

Trial for Granting Non-Exclusive License (Patent Law Article 138)

- When a patentee requires the use of the patent right of a prior patentee to operate his/her patented invention, or when the prior patentee refuses to grant permission to use the patent right without justifiable reasons, the later patentee may request a trial for the granting of a non-exclusive license. To make such a request, it is required that the patented invention of the later patentee should constitute a substantial technical advance in comparison with the patented invention or registered utility model of the prior patentee.

Reminder

A non-resident (a person who has neither an address nor a place of business in the Republic of Korea), in accordance with Article 5(4) of the Patent Act, may not initiate any patent-related procedure such as application, trial, etc., unless he/she is represented by a patent administrator (a patent agent who has an address or a place of business in the Republic of Korea). When a request for a trial is made against him/her, there may be problems receiving the copy of the written request for a trial and other documents without a patent administrator, and this often brings about difficulties such as the lapse of a right.

Innovation and SME Financing in Selected Asian Economies

This publication highlights the different policy measures taken by the governments of seven Asian economies to stimulate innovation among SMEs. It contributes to the current discourse on the importance of financing innovations to create a conducive environment for long-term SME growth.

Contact: Asian Productivity Organization, Leaf Square Hongo Building, 2F, 1-24-1 Hongo, Bunkyo-ku, Tokyo 113-0033, Japan. Tel: 81-3-3830-0411, Fax: 81-3-5840-5322, E-mail: apo@apo-tokyo.org, Web: <http://www.apo-tokyo.org>



Modes of financing for start-ups

Small Industries Development Bank of India (SIDBI)

<http://smallb.sidbi.in>

Finance is required by a business enterprise at almost every stage of the business life cycle. MSMEs often find it difficult to arrange adequate finance for their operations as well as for expansion and growth. These enterprises can raise finance by various methods. Below are some of the ways to raise long term and short term capital.

Sources of long term capital

Reinvestment of profits

Profitable companies do not generally distribute the whole amount of profits as dividend but, transfer certain proportion to reserves. This may be regarded as reinvestment of profits or ploughing back of profits. As these retained profits actually belong to the shareholders of the company, these are treated as a part of ownership capital. Retention of profits is a sort of self financing of business. The reserves built up over the years by ploughing back of profits may be utilised by the company for the following purposes:

- Expansion of the undertaking
- Replacement of obsolete assets and modernisation
- Meeting permanent or special working capital requirement
- Redemption of old debts

The benefits of this source of finance to the company are:

- It reduces the dependence on external sources of finance
- It increases the credit worthiness of the company
- It enables the company to withstand difficult situations
- It enables the company to adopt a stable dividend policy
- It increases the debt raising capacity of the company

Loans from commercial banks / financial institutions

Medium and long term loans required for setting up projects can be obtained from banks and/or financial institutions for all viable projects. Similarly, funds required for modernisation and renovation schemes can be borrowed from them. Such loans are generally secured by mortgage of the Company's properties, pledge of shares, personal guarantees etc.

Public deposits

Companies often raise funds by inviting their shareholders, employees and the general public to deposit their savings with the company. The Companies Act permits such deposits to be received for a period up to 3 years at a time. Public deposits can be raised by companies to meet their medium-term as well as short-term financial needs. The increasing popularity of public deposits is due to:

- The rate of interest the companies have to pay on them is attractive.
- These are easier methods of mobilising funds than banks, especially during periods of credit squeeze
- They are unsecured

Risk capital

Risk capital denotes the provision of capital where the provider reduces the risk burden of the entrepreneur, and in turn bears some part of the overall risk involved in a productive activity. As per a definition widely used in India – The term 'risk capital' includes equity as well as mezzanine/ quasi equity financial products that have features of both debt and equity. Risk Capital is an important instrument for not only start-ups and innovative / fast growing companies but is also critical to those companies looking at growth. Risk capital substitutes promoter's contribution, thereby reducing the capital to be brought by the entrepreneurs. Under such cases, Risk capital is one of the most viable options for raising capital for MSMEs. Some of the major risk capital options available for MSMEs include Venture Capital, Angel Investment and Public Listing.

Issue of shares

It is the most important method. The liability of shareholders is limited to the face value of shares, and they are also easily transferable. A private company cannot invite the general public to subscribe for its share capital and its shares are also not freely transferable. But for public limited companies there are no such restrictions. There are two types of shares :-

- Equity shares: the rate of dividend on these shares depends on the profits available and the discretion of directors. Hence, there is no fixed burden on the company. Each share carries one vote.
- Preference shares: dividend is payable on these shares at a fixed rate and is payable only if there are profits. Hence, there is no compulsory burden on the company's finances. Such shares do not give voting rights.

Issue of debentures

Companies generally have powers to borrow and raise loans by issuing debentures. The rate of interest payable on debentures is fixed at the time of issue and the debentures have a charge on the property or assets of the company, which provide the necessary security. The company is liable to pay interest even if there are no profits. Debentures are mostly issued to finance the long-term requirements of business and do not carry any voting rights.

Sources of short term capital

Trade credit

Companies buy raw materials, components, stores and spare parts on credit from different suppliers. Generally suppliers grant credit for a period of 3 to 6 months, and thus provide short-term finance to the company. Availability of this type of finance is connected with the volume of business. When the production and sale of goods increase, there is automatic increase in the volume of purchases, and more of trade credit is available.

Factoring

The amounts due to a company from customers, on account of credit sale generally remain outstanding during the period of credit allowed i.e. till the dues are collected from the debtors. The book debts may be assigned to a bank and cash realised in advance from the bank. Thus, the responsibility of collecting the debtors' balance is taken over by the bank on payment of specified charges by the company. Book debts may be assigned by the seller to a FACTOR, who will provide about 80 - 85 % or more of the value of the book debt, as advance to the seller. The FACTOR will also undertake the task of collecting the amount representing the debt (credit sales) from the debtors. Factoring is an important avenue of raising short funds against the receivables for the MSME units. The charges payable to the FACTOR is treated as cost of raising the funds

Discounting bills of exchange

This method is widely used by companies for raising short-term finance. When the goods are sold on credit, bills of exchange are generally drawn for acceptance by the buyers of goods. Instead of holding the bills till the date of maturity, companies can discount them with commercial banks on payment of a charge known as bank discount. The rate of discount to be charged by banks is prescribed by the Reserve Bank of India from time to time. The amount of discount is deducted from the value of bills at the time of discounting. The cost of raising finance by this method is the discount charged by the bank.

Bank overdraft and cash credit

It is a common method adopted by companies for meeting short-term financial requirements. Cash credit refers to an arrangement whereby the commercial bank allows money to be drawn as advances from time to time within a specified limit. This facility is granted against the security of goods in stock, or promissory notes bearing a second signature, or other marketable instruments like Government bonds. Overdraft is a temporary arrangement with the bank which permits the company to overdraw from its current deposit account with the bank up to a certain limit. The overdraft facility is also granted against securities. The rate of interest charged on cash credit and overdraft is relatively much higher than the rate of interest on bank deposits.

Science Policy Information Network

The Science Policy Information Network (SPIN) is a revolutionary cluster of databases equipped with powerful graphical and analytical tools that has been devised for decision-makers and specialists in science, technology and innovation (STI). SPIN is a sophisticated information system that includes:

- A detailed inventory in Spanish and English of each national innovation system in the region, with a description of their institutional structure and details of their main programmes, priorities, performance, planning and strategies for international co-operation;
- A database encompassing all the relevant legal frameworks in each country;
- An inventory with detailed descriptions of more than 900 different technical and financial science policy instruments implemented by the 33 countries in the region, divided into nine categories by objective and strategic goal, into 11 categories by type of facility and into 18 categories by type of beneficiary;
- A database containing 170 descriptions of national and international organizations and other NGOs which provide technical and financial co-operation in science and technology. These institutions are classified by area and type of co-operation, geographical focus and type of beneficiary;
- A powerful geo-referenced analytical software (Stat Planet) in Spanish and English which includes more than 450 temporal series, some of them ranging from 1950 to the present time. These time series encompass different groups of indicators: economic, social, governance, gender, environmental, ICT and STI. The Stat Planet software also allows for an analytical estimation of correlations between pairs of indicators. The evolution of different indicators can also be studied over time and compared with other regions or countries to allow decision-makers and specialists to detect different patterns in the data;
- A digital library specializing in STI with over 800 titles produced by UNESCO; and
- A tool allowing a full country report containing all SPIN information to be exported in the form of a PDF file.

For more information, access:

UNESCO
7, place de Fontenoy 75352 Paris 07 SP France
1, rue Miollis 75732 Paris Cedex 15 France
Tel: +33 (0)1 45 68 10 00
Web: www.unesco.org



Financing SMEs and entrepreneurs 2016

An OECD Scoreboard

Organisation for Economic Co-operation and Development

<http://www.oecd.org>

Financing for small and medium-sized enterprises (SMEs) has turned the corner from the downswing seen during the global financial crisis, but overall credit conditions remain challenging and access to external finance continues to be much tighter for SMEs than larger firms, according to a new OECD report.

Financing SMEs and Entrepreneurs 2016: An OECD Scoreboard underlines that SMEs remain over-reliant on bank financing and points out the need for a diversification of financing sources and instruments. The Scoreboard provides comprehensive data on debt, equity, asset-based finance, solvency and the framework conditions for SMEs and entrepreneurs, along with an overview of policy measures to ease SMEs' access to finance in 37 countries. The OECD presented the report to G20 Finance Ministers and Central Bank Governors in Washington as part of wider discussions on developing policies to boost diversification of financing instruments, a key priority of China's G20 Presidency.

"Finance is one of the keys for unlocking the potential of small firms to innovate, upgrade and become more productive," OECD Secretary-General Angel Gurría said during a presentation of the Scoreboard with Zhou Xiaochuan, Governor of the People's Bank of China, just prior to the G20 Finance Ministers meeting on 14-15 April in Washington. "The OECD's new SME Scoreboard shows that while access and conditions to traditional credit for SMEs have improved since the worst point of the global economic crisis, governments can and should do more to tackle the longstanding obstacles to SME financing," Mr Gurría said.

Governor Zhou said: "SMEs and entrepreneurs can play an active role in achieving stronger and more inclusive growth, and it is now time to show our commitment to enabling the development of alternative funding options." He welcomed the new OECD Scoreboard, which he said would support efforts to develop policy recommendations on diversified financing for SMEs during China's G20 Presidency. "The OECD Scoreboard is a valuable tool to support G20 work, and to monitor trends and the implications of financial reforms for small and medium-sized enterprises."

The fifth annual edition of the OECD Scoreboard highlights developments in SME financing over the 2012-14 period. On the positive side, it shows that the outstanding stock of SME loans rose in 16 out of 27 countries, and new lending in 2014 surpassed 2013 levels in most countries. Similarly, credit conditions eased and interest rates on new loans to SMEs declined in 2014 in the majority of countries studied.

On the negative side, the interest rate spread between loans to SMEs and those to larger firms continued widening. This suggests

that the risk perception of SME lending has increased over time. This perception appears out of synch with new data showing a clear downward trend in SME bankruptcies, which declined during 2014 in 20 out of 25 countries for which full data was available.

A special chapter in this year's Scoreboard focuses on how so-called Business Angel investors can help bridge the financing gaps for firms with high risk-return profiles during the early stages of development, and notes their importance in providing business advice, mentoring and networking opportunities. It also underlines the need to improve the evidence base to enable a better understanding of the potential of Business Angel investment to finance SMEs, and support the design of appropriate policy making.

Highlights

- Lending to SMEs improved in 2014. For most OECD countries, economic growth increased between 2012 and 2014, and financial conditions were overall favourable in the majority of participating countries, impacting SME lending favourably.
- Credit conditions generally eased in 2014, but remain overall challenging for many SMEs.
- The interest rate spread remained positive for all participating countries over the entire 2007-14 period, with SMEs consistently facing higher average interest rates for loans than large firms.
- SME bankruptcies showed a clear downward trend in contrast to previous years.
- Recent trends in non-performing loans (NPLs) are mixed, and NPLs could pose a threat to the economic recovery in some economies.
- Venture capital (VC) investments and leasing volumes showed encouraging signs of recovery, but remain below pre-crisis levels in most countries.
- The use of some alternative financial instruments continues to grow, but often from a small base.
- Evidence suggests that business angel investing plays an important role in financing young, innovative and high-growth firms.
- Loan guarantees remain the most widely used policy instrument used by governments to facilitate SME access to finance.
- SME finance remains high on the political agenda, and governments are developing new policy initiatives

Innovation and business



Business Portal of India

<http://www.archive.india.gov.in>

Importance or benefits

In the ever-changing world, innovation is the only key which can sustain long-run growth of the country. More and more firms are realizing the importance of innovation to gain competitive advantage. Accordingly, they are engaging themselves in various innovative activities, ranging from manufacturing processes, product improvement, brand building initiatives to customer satisfaction. Today, business environment has become very dynamic with more demanding customers and intense market competition. To meet this, firms are creating new products, solutions and services that provide a radically better experience for the consumers.

Innovation is not only about technology, but is also about understanding and exploring untapped user needs that require to be addressed in an efficient manner. It must occur at every stage of a product or solution development and release cycle. Thus, managing innovation is fast becoming priority in a global business environment.

Firms which innovate tends to survive and grow to a greater extent. The most successful individuals, managers and team leaders in latest business world are the ones who are not only innovative in their own work, but who encourage and assist others to be innovative in every aspect of their work.

Some of the key innovation areas are: product development and improvement; manufacturing processes; creating entirely new set of products; etc. In area of supply chain management, innovations help in making the supply chain more responsive, flexible and efficient. Supply chain innovation can be used to reduce costs, offer better assortment of customer centric products, decreasing time to market and driving growth.

Innovation is the main idea in shaping corporate life and helping companies to adopt various strategic options. It helps to reduce total cost of production; increase income avenues; maintain efficient operating systems; etc. It enables to see potential acquisitions not only on cost basis, but also as a means of accelerating profitable top-line revenue growth and enhancing capabilities. It also expands R&D base of the country and brings latest technologies into the country. It also provides an edge in being able to enter new markets faster and deeper.

Thus, the term 'innovation' is rightly referred to as changes to products, services, processes or business models. To continue their growth and to attain newer heights, Indian firms need to recognise the importance of 'innovation' for maintaining their competitive edge and fuelling further growth. Innovation may be linked to performance and growth through improvements in efficiency, productivity, quality, competitive positioning, market share, etc.

Problems and challenges

Innovators face problems and challenges mainly in the areas of financial assistance and marketing of their innovation. In other words, it involves:

- Securing the right kind of finance is key to delivering innovation. Prevailing asymmetry between inventors and investors is required to be bridged. Financing systems for backing up early-stage innovations with risk capital are required. Also, provisions for exiting from non-profitable innovations also need to be made.
- Innovations created at the expense of considerable investment of resources, demand a matching Intellectual Property Rights (IPR) regime.
- The legal framework for protecting IPR is in place but the infrastructure for capturing and protecting IPR is still evolving in India.
- New approaches, programmes and policies are essential for unleashing India's innovation potential.
- Competitiveness innovation cluster has emerged as a successful global concept, in which academia, research and industry partner under viable and equitable pattern, are the way forward.

Innovations that fail are often potentially good ideas but have been rejected or postponed due to budgetary constraints, lack of skills or poor fit with current goals. Failures should be identified and screened out as early in the process as possible. Early screening avoids unsuitable ideas devouring scarce resources that are needed to progress more beneficial ones. While learning is important, high failure rates throughout the innovation process are wasteful.

The causes of failure have been widely researched and can vary considerably. Some causes will be external and others will be internal. Internal causes of failure relate to those associated with the innovation process itself. Common causes of failure within the innovation process in most organisations can be divided into five types:

- Poor goal definition
- Poor alignment of actions to goals
- Poor participation in teams
- Poor monitoring of results
- Poor communication and access to information

Gaining full benefits of innovation requires an effective and efficient framework across a wide range of policy areas, calling for an integrated approach and cooperation between business, governments and society.



Innovation promotion in Malaysia

Malaysia Digital Economy Corporation

<http://www.mscomalaysia.my>

1-InnoCERT Programme

1-InnoCERT certification programme is initiated by SME Corp. Malaysia to promote and develop innovative companies in Malaysia as endorsed by the Jawatankuasa Tindakan Penyelarasan Inovasi Negara and the National Innovation Council, chaired by the Prime Minister on 29th October 2009. It is aimed at fostering innovative enterprise through harnessing and intensifying home-grown innovations and R&D.

The main objective of the certification is to encourage entrepreneurs to venture into high technology and innovation-driven industries. With more SMEs participating in such activities, it will eventually lead to them being more competitive and would help in Malaysia achieving its objective in becoming a high income nation by the year 2020.

The certification awarded under the Programme identifies and verifies innovative companies through an internationally-recognised innovation standard (OECD Oslo Manual V3) and the certification process is developed from similar process practised in Korea's Innobiz (Innovation SME) Certification Programme. Certified companies under the programme will be given a fast-track access when applying for incentives to fund and market their products and services as offered by the government.

Application criteria for SMEs

1. SMEs incorporated under the Companies Act 1965 / Registration of Business Act (1956) and fulfil the new definition of SMEs (Guideline on New SME Definition (click));
2. At least 60% of the equity held by Malaysians;
3. Valid business; acquire business license from the Local Authority and operating in a valid business premise;
4. At least two (2) years in business (able to provide 2 years Audited Financial Statement); and
5. Product and services must be commercialised for at least two (2) years.

Technology Innovation for Globalisation Fund (TIG)

Technology Innovation for Globalisation Fund (TIG) is aimed at assisting local MSC Malaysia Status Companies to accelerate the development and commercialisation of innovative, market driven product/solutions/services for global market.

About TIG

- Is based on competitive bidding fund. Fund is awarded to the best bidder(s).
- Supports all technology areas but funding preference is given to proposed projects related to these technology areas such as Big Data Analytics, IoT, Cloud, eCommerce, Security, Games, 3D Printing, Mobile Technology/Computing or combinations of two or more of the said technology areas.
- Is a performance-based fund, i.e. applicants spell out realistic and achievable technical and commercial targets. Disbursements of TIG are 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).
- Supports end-to-end funding as it covers product development and commercialisation costs.

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 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.

Multilingual Terminology Database

The World Intellectual Property Organization (WIPO) launched a new database providing free access to a wealth of multilingual scientific and technical terminology. Through its web-based interface, WIPO Pearl promotes accurate and consistent use of terms across different languages, and makes it easier to search and share scientific and technical knowledge. The database initially includes terms found in applications filed via WIPO's Patent Cooperation Treaty (PCT) and will eventually include collections from other areas of WIPO, such as trademarks, industrial designs, and terminology found in other treaties administered by WIPO.

For further information, please contact:

Media Relations Section
World Intellectual Property Organization (WIPO)
Tel: (+41 22) - 338 81 61 / 338 72 24
Fax: (+41 22) - 338 81 40
<http://www.wipo.int>

Tax incentives for green industry in Malaysia



Malaysian Investment Development Authority (MIDA)

<http://www.mida.gov.my>

Green technology incentive includes more qualifying activities

To strengthen the development of green technology, the Government will continue to provide incentives in the form of investment tax allowance for the purchase of green technology assets and income tax exemption for the use of green technology services and system.

The incentives which were announced in Budget 2014 will cover broader scope of green technology activities in the areas of energy, transportation, building, waste management, and supporting services activities. It also facilitates the transition of the expired (by 31 December 2015) tax incentives relating to renewable energy (RE) and energy efficiency (EE) projects under the Promotion of Investment Act (PIA), 1986.

Tax incentive for green technology project

Investment Tax Allowance (ITA) of 100% of qualifying capital expenditure incurred on a green technology project from the year of assessment 2013 (date on which the first qualifying capital expenditure incurred is not earlier than 25 October 2013) until the year of assessment 2020.

The allowance can be offset against 70% of statutory income in the year of assessment. Unutilised allowances can be carried forward until they are fully absorbed.

Green technology project related to renewable energy, energy efficiency, green building, green data centre, and waste management can qualify for this tax incentive. Please refer to the Guideline for Application for Incentives and/or Expatriate Posts for Green Technology (GT) at www.mida.gov.my for more details on qualifying activities and eligibility criteria.

Tax incentive for green technology services

Income tax exemption of 100% of statutory income from the year of assessment 2013 until the year of assessment 2020. Green technology services related to renewable energy, energy efficiency, electric vehicle (EV), green building, green data centre, green certification and verification, and green township can qualify for this tax incentive.

Tax incentive for purchase of green technology assets

Investment Tax Allowance (ITA) of 100% of qualifying capital expenditure incurred on green technology asset from the year

of assessment 2013 (date on which the first qualifying capital expenditure incurred is not earlier than 25 October 2013) until the year of assessment 2020. The allowance can be offset against 70% of statutory income in the year of assessment. Unutilised allowances can be carried forward until they are fully absorbed.

The purchase of green technology assets as listed in MyHijau Directory can qualify for this tax incentive. Please refer to www.greendirectory.my for the list of assets which have been certified by the Malaysia Green Technology Corporation (MGTC) as MyHijau and approved by the Ministry of Finance (MoF).

Incentives for establishment of Waste Eco Parks (WEPs)

Waste Eco Park (WEP) aims to promote waste recycling, recovery and treatment activities by the industries and provides a sustainable solution to waste management problem. This will encourage investments in facilities and infrastructure towards holistic waste management activities.

In order to promote the activities, there are incentives available for WEP Developer, WEP Manager and WEP Operator (companies operating in the WEP).

WEP developer

Income Tax Exemption of 70% on statutory income derived from rental of building, waste receiving and separation facility and waste water treatment facility located in the WEP effective from Year of Assessment (YA) 2016 until YA 2025.

WEP manager

Income Tax Exemption of 70% on statutory income derived from services activities related to management, maintenance, supervision and marketing of the WEP effective from YA 2016 until YA 2025.

WEP operator

Income Tax Exemption of 100% on statutory income for a period of five (5) years, derived from the qualifying activities undertaken in the WEP; OR Income Tax Exemption equivalent to 100% of qualifying capital expenditure (Investment Tax Allowance) incurred within a period of five (5) years. The allowance can be offset against 70% of statutory income for each assessment year.



National Ecolabelling Programme in the Philippines

Philippine Center for Environmental Protection and Sustainable Development, Inc. (PCEPSDI)

<http://www.pcepsdi.org.ph>

The National Ecolabelling Programme - Green Choice Philippines (NELP-GCP) is one of the country's initiatives to exercise the fundamentals of sustainable development. It aims to change the behavioral patterns in consumption and production that tend to misuse, abuse, and degrade our environment.

This voluntary third-party environmental declaration, which is guided by principles and procedures of ISO 14024, gained its legal footing when Republic Act 9003, "The Ecological Solid Waste Management Act of 2000," was signed by Her Excellency President Gloria Macapagal Arroyo. RA 9003 states under Article 4, Section 27 that "the Department of Trade and Industry shall formulate and implement a coding system for packaging materials and products to facilitate waste recycling and reuse".

NELP-GCP envisions that environment friendly products or services are being produced and distributed in the country.

NELP-GCP has granted the Seal of Approval to green products under the categories of laundry detergent, cement, natural infill material, engine oil, ceramic tile, water-based paint, LED light, paper handtowel, tissue papers, induction lamp, electronic ballast, organic liquid disinfectant, fiber cement board and photocopier. Also, the programme has developed and approved the environmental criteria for certain products and services, including tissue paper products, household batteries, engine oils, printing and writing paper products, crayons, fire extinguishers, cement, fluorescent lamps, electronic ballasts, paints, writing instruments, paper envelopes, paper boards, inkjet and toner cartridges, desktop and laptop computers, multi-function printing devices, printers, photocopiers, facsimile machines, liquid disinfectants, bath

soaps, hair shampoos, fiber cement board, liquid dishwashing products and food services.

Moreover, President Arroyo signed Executive Order 301 (EO 301), "Establishing a Green Procurement Program for All Departments, Bureaus, Offices and Agencies of the Executive Branch of Government," on 29 March 2004. EO 301 mandates the executive branch of government to create a program that will green its supply chain. The implementation of said policy is expected to jumpstart the demand for green products, at least for government purchasing activities.

NELP-GCP, through its administrator, Philippine Center for Environmental Protection and Sustainable Development, Inc. has also partnered with the Philippine Green Building Council, a group campaigning to green the building industry in the country by implementing a rating system. NELP-GCP will serve as a clearing house of information regarding the authenticity of the environmental claims of the construction and building materials used. This will form part of the criteria for certifying a building "green."

NELP-GCP also recognized the need to organize a group that would promote and patronize eco-labelled products and services. The members of said group will serve as the warm bodies who would create the demand for environmentally preferable products and rally behind the creation and enforcement of green purchasing policies.

Ecolabelling and green purchasing, as fundamental tools in influencing the patterns of production and consumption, must be sustained as these are among the key steps towards the path of green business practices.

Asia Pacific SE4All Hub

The Asia Pacific SE4All Hub is led by the Asian Development Bank (ADB), the United Nations Development Programme (UNDP) and the Economic and Social Commission for Asia and the Pacific (ESCAP), with the Hub Secretariat hosted at ADB Headquarters in Manila, Philippines. The three organizations will help catalyze major new investment opportunities to speed-up the transformation of the world's energy systems, pursue the elimination of energy poverty, and boost prosperity. The Hub will leverage on the existing structures of ADB, UNDP and ESCAP energy programs and integrate the strengths of all three development partners. It looks to grow its partnerships and consolidate efforts to promote Sustainable Energy for All in Asia and the Pacific region.

For more information, contact:

Senior Climate Change Specialist (Clean Energy)
Sustainable Development and Climate Change Department
Asian Development Bank
E-mail: jacharya@adb.org
Web: <http://www.se4all.org/hubs/asia-pacific-hub/>

TECHNOLOGY OFFERS

HUNGARY

Treatment of meat industrial waste

Our partner, a Hungarian SME has developed a new procedure for the pre-treatment and two-stage thermal treatment of meat industrial solid phase or sludge waste for rapid reduction of odor emission furthermore suppressing pathogens in the early stages of total treatment period before the composting. The aim of the technology is to provide a composted end-product, which can be potentially used for soil-improvement and conditioning with high total organic matter, total N, total P, total K content.

Sector

Agriculture & Agro-industry

Area of Application

- Waste treatment and recycling industry
- Food processing industry
- Meat industry
- Plant nutrition
- Agrochemistry

Advantages

- The pre-treatment of meat industrial wastes induces significant reduction of indicator number of total coliform number during storage
- The complex controlled composting procedure results in an environmentally friendly product for plant nutrition and soil improvement
- Via controlled treatment composted meat industrial product has significantly higher organic matter, total N, total P content than manures from conventional mesophilic and thermophilic digesting procedure
- The compost product is an organic source for revitalization of mine spoils and municipal solid waste landfills during recultivation

Environmental aspects

Waste utilization

Transfer Terms

Consultancy; Commercial agreement

Transdermal medical gas delivery technology

The technology is capable of delivering all kinds of noble and medical gases through non-invasive means. The company's first application of this technology is with CO₂ gas. The physiological change with dry CO₂ balneotherapy naturally occurs in the human body when CO₂ is delivered into the microcirculation in the skin. In the blood stream CO₂ enables hemoglobin in red blood cells to release more oxygen and automatically deliver the O₂ to tissues where the body needs it. The delivery of medical gases is used for treating high blood pressure, non-healing wounds such as critical limb ischemia, and other arthritic and micro circulatory conditions.

Sector

Biotechnology

Area of Application

- Spas, skin care and wellness centers, bath houses, and alternative treatment centers, with limited therapeutic claims
- Medical clinics, home healthcare service providers, nursing homes, elder care centers, retirement homes, etc., with targeted medical claims.
- Mass end user market, targeted medical claims.
- Sport centers, teams, sport medical centers and sports related service providers, with targeted medical claims.
- Veterinary products, professional veterinary and home veterinary markets with targeted medical claims.

Area of Application

The technology is completely mechanical and no electricity is needed for operation, has no moving parts and therefore requires almost no maintenance. The device provides treatment at the point of care (effected body parts) or full body treatment. It is small (size of a shoe box) and portable, completely safe and user friendly. It is fast, requiring only about 3 minutes for preparation for a first time user and 20 minutes for the treatment. Absolutely no training or special knowledge is needed to operate it. The technology has "instant" measurable health effects after the first treatment. It costs quarter of the price of rival technologies.

Development Status

Commercial prototype

Transfer Terms

Technology licensing; Research partnerships

For the above two offers, contact:

Contact:

Laser Consult Ltd (Hungary)
H-6701, PO Box 1191
Szeged
Hungary

Biofungicidal formulation

We have developed an innovative biofungicidal formulation. The formulation is neem oil based which contains some natural components.

Sector

Agriculture & Agro-industry

Area of Application

Agriculture

Advantages

- It Controls the areal as well as soil borne bacterial and fungal pathogens of the crops and fruits.
- Increases the growth and yield of crops and fruit plants
- Reduces the pest and insect attack in next crop sown in field.
- Easy method of preparation of the formulation at very low input cost.

INDIA

Environmental Aspects

Eco-friendly

Development Status

Fully commercialized

Legal Protection

Patent

Technical Specifications

- The formulation is neem oil based which contain some natural components.
- Controls the arial as well as soil borne bacterial and fungal pathogens of the crops and fruits.
- Increases the growth

Transfer Terms

Joint venture; Technical services; Technology licensing; Research partnerships

Contact:

Hiran Biotech

Research and Developemnt Division

66 Turner Road Cantt., Kanpur 208004, U.P., India

Tea catechins as anti-aging compounds

The present invention relates to the preparation of consumable composition for oral administration that contains tea catechins. The composition prepared by the process of this invention is useful in providing controlled release of catechins contained therein.

Sector

Biotechnology

Area of Application

Application includes antiaging agents

Environmental Aspects

Environment-friendly

Development Status

Laboratory model

Legal Protection

Patent

Transfer Terms

Consultancy; Technical services; Technology licensing

Contact:

Amity University

Sector-125, Noida

Distt Gautam Buddha Nagar, Uttar Pradesh

India

Pin: 201303

Titanium dioxide nano needles

The 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 =10 can be produced with very good control over the morphology of the resulting TiO_2 .

Sector

Biotechnology

Area 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 doesn't need heat treatment to from 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

Contact:

National Chemical Laboratory, CSIR

A208, PAML Building,

Dr Homi Bhabha Road,

Pune 411007

India

Retort pouch technology

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 one year at ambient temperature.

Sector

Food processing

Area 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, Matsyapuri, Willingdon Island
Cochin 682029
India

Health care wheat flour

Health care wheat flour produced from wheat under a new mechanical and very hygienic process contains high percentage of fiber and vitamin – E. Around 400 grams of flour can be produced out of one kilogram of wheat. The rest of wheat can be used to produce maida. The health care wheat flour can be used to prepare chapatti and similar items. Chapatti made with health care flour will be soft, tasty and bowel friendly. The flour is free from additives and preservatives.

Sector

Food processing

Country

India

Area of Application

Food processing

Advantages

A product very rich in fiber and vitamin – E. Hygienically produced after perfectly cleaning wheat.

Environmental Aspects

Cleaner production

Development Status

Commercial prototype

Transfer Terms

Turnkey

Contact:

Department of agriculture
Innova Reserach Centre Pvt Ltd
Ochanthuruth, Kochi, 682508, India

Waste plastics into industrial fuel

We offer plants for converting non-recyclable waste plastics into industrial fuel. Fuel quality is far superior to the conventional industrial fuels such as furnace oil or light diesel oil. ALL types of plastics can be processed. We can also supply technology. Serious

customers can get their waste plastics tested on our Demo Plant. Plants as small as 1 TPD up to 30 TPD can be supplied. Plants are custom made to specific requirements. Municipal bodies, industries involved in generation of non-recyclable plastic scrap, plastic scrap dealers who have access of non-recyclable cheap plastic scrap, entrepreneurs most welcome.

Sector

Chemicals

Area of Application

Converting waste plastics (non-recyclable cheap plastic scrap) into industrial fuel

Advantages

Disposal of non-recyclable waste plastics keeps environment clean, gets excellent monetary returns, for the industries that have their own plastic scrap generation can generate fuel at a very low price.

Environmental Aspects

1. Cleaner production
2. Waste utilization
3. Energy efficiency
4. Systems integration

Development Status

Pilot plant; Commercial prototype

Legal Protection

Trade Mark; Patent

Technical Specifications

Plants having capacity as low as 1 TPD of plastics offered. No upper limit on higher capacities.

Transfer Terms

1. Consultancy
2. Joint venture
3. Technology licensing
4. Turnkey

Contact:

Atharva ProcTek
Pune 411052
India
E-mail: response@aproctek.com

Sodium silicate from rice husk ash

Sodium Silicate is made from rice husk ash which has very high silica content by digesting with sodium hydroxide and by further processing.

Sector

Chemicals

Area of Application

Sodium Silicate finds wide application in soaps, detergents, adhesives and so on.

Environmental aspects:

1. Cleaner production
2. Waste utilization
3. Energy efficiency

Development Status

Fully commercialized

Transfer Terms:

1. Consultancy
2. Joint venture
3. Turnkey

Contact:

Auro Associates (India)
 B-12, Dhanlaxmi Complex, Nr. Samta Society, Subhanpura,
 Baroda 390021
 India

Manufacture of potassium nitrate

Potassium chloride is allowed to react with nitric acid forming potassium nitrate & hydrochloric acid. Potassium nitrate is main product & hydrochloric acid is by-product.

Sector

Chemicals

Area of Application

Potassium nitrate is used in Fireworks, Glass, Agrochemical, Pharma, R&D, Preservatives etc.

Advantages

Cost advantage

Transfer Terms

Consultancy

Target Countries

India

Contact:

M/s K J Technologies (P) Ltd.
 D1/2, Alagaputhur-Vadappakkam,
 Krishnapuram (Post),
 Kumbakonam (Taluk),

*Thanjavur (Dist),
 Tamilnadu-612401
 India.*

Cashew processing for rural communities

Consultancy can be offered for any location or any country in cashew processing at small scale which is better for rural communities using environment friendly techniques of lowest cost, still confirming to the highest standards of the finished product.

Sector

Agriculture & Agro-industry

Area of Application

Cashew cultivated locations, Cambodia, Myanmar, Tanzania, India, Sri Lanka are geographical locations and any location where the labour cost is low.

Advantages

This Technology is suitable for developing countries where cashew is grown and trading directly as a raw material. Processed cashew fetches a better price in the global markets.

Environmental Aspects:

1. Cleaner Production
2. Energy efficiency

Development Status

Fully commercialized

Technical Specifications

Have competency by working in the field for 15 yrs

Transfer Terms

1. Consultancy
2. Technical services
3. Turnkey

Contact:

W.A.Dhanapala,
 43, Isurupedesa, Malkaduwawa, Kurunegala
 Kurunegala
 Sri Lanka
 Zip/Pin Code: 60000

Directory of Outstanding ASEAN SMEs

The "Directory of Outstanding SMEs in ASEAN", listing over 800 SMEs in ASEAN priority integration sectors (PIS), has been launched to complement the publications on innovative and outstanding SMEs and SME Guidebook towards the AEC 2015. The Directory included SMEs who have achieved notable success in their various fields after overcoming difficulties, embracing opportunity to sustain their business growth and adopting best practices that promote business growth, quality, productivity, innovation and technology, brand awareness, corporate social responsibility and export penetration. It is categorized into 12 priority integration sectors, namely agro-based/ processed food, automotive, transportation, logistics services, electrical and electronic equipment, e-ASEAN/ICT, fisheries, healthcare, rubber-based, textile/apparel, tourism and wood-based products, among others.

For more information, contact:

*The ASEAN Secretariat
 Public Outreach and Civil Society Division
 70A Jalan Sisingamangaraja
 Jakarta 12110, Indonesia
 Tel: (62 21) 724-3372, 726-2991; Fax: (62 21) 739-8234, 724-3504
 E-mail: public@asean.org
 Web: http://www.aseansme.org*

TECHNOLOGY REQUESTS

INDIA

Magnetized fertilizer from fly ash

An Indian firm is interested in the technology for production of magnetized fertilizer from fly ash. The company wants the technical know-how for this technology and wish to receive technical and price quotes for the same.

Sector

Agriculture & Agro-industry

Area of Application

Agriculture industry

Project Type

Start-up

Contact:

Mr. Suhas Buddhe

Biocare India Pvt Ltd.

Biocare House, M. A. 23, Laxminagar, Nagpur – 22
India

Tel: +91-712 - 2224344

Telefax: +91-712 - 5611766

E-mail: info@biocareindia.biz

Stevia technology

An Indian entrepreneur requires details on Stevia cultivation and processing technology. They need an economic viability report along with other details from potential consultants.

Sector

Agriculture & Agro-industry

Area of Application

Agriculture, Herbal industry

Project Type

Start-up

Contact:

Mr. M.Shakti Kanungo

E-mail: manojshakti1@hotmail.com

De-hydration & canning of fruits & vegetables

We would like to make a project of de-hydration & canning of fruits & vegetables for the juice & ready to make a dish.

Sector

Agriculture & Agro-industry

Area of Application

Juice, Ready to make a dish, Additive for the various kind of sources, fruit bar, etc.

Project Type

Start-up

Estimated cost (US\$)

300,000

Target Countries

India

Contact:

Gujarat Chamber of Commerce and Industry (GCCI)

Plot No.-14, Haribhakti Ind. Estate, Dabhoi Road, Pratap Nagar,
Vadodara 390004

India

Post-harvest techniques for Spirulina

An Indian firm is interested to acquire the technical know-how on post-harvest techniques such as harvesting, drying and packing through machines. The firm is proposing to cultivate Spirulina using Open Pond Type method in 1080 Square Meters. They would like to have assistance on technical know-how and also in installing machinery for post-harvest processing of Spirulina.

Sector

Agriculture & Agro-industry

Area of Application

Food processing, Agro industry

Project Type

Start-up

Contact:

Mr. K.P.Ganesan

E-mail: kpg030567@yahoo.com

Spirulina (Blue Green Algae)

We need consultancy for manufacturing Spirulina dry powder, tablets and capsules.

Sector

Agriculture & Agro-industry

Area of Application

Pharmaceuticals and Food supplements

Project Type

Start-up

Target Countries

1. Indonesia
2. Malaysia
3. Mauritius
4. Nepal

Contact

Actech information system ltd

Nehru Place

New Delhi 110019

India

Liquid biofertilizer production technology

An Indian firm is interested in the know-how and licensing of the liquid biofertilizer production technology.

HUNGARY

Sector

Biotechnology

Area of Application

Agriculture, Biotechnology

Project Type

New idea

Contact:*Mr. Jugal Kishore Nayak**E-mail: jugalnayak@rediffmail.com***Biofertilizer**

An Indian Non Governmental Organization based in Village Thamana, Uttarakhand, would like to start up a venture in Bio-Fertilizer industry. They need more information on the know-how of manufacturing aspects of biofertilizer and also about the cost factor.

Sector

Biotechnology

Area of Application

Agriculture and Agroindustry, Biotechnology

Project Type

Start-up

Contact*Mr. Preetam Singh Lingwal**Village:Thamana**Pauri Garhwal**Uttarakhand,**India**E-mail: preetam.lingwal@gmail.com***Ethanol production plant**

We are looking for a potential partner who can provide small scale ethanol production plant.

Sector

Biotechnology

Area of Application

Ethanol from sweet sorghum/sugarcane

Studies

1. Techno Feasibility Report

2. Techno Feasibility Report

Project Type

New idea

Estimated cost (US\$)

300,000

Target Countries

India

Assistance From Partner

Complete plant on turnkey basis and equity partner

Contact*Yugal Green Urja Solution Private Limited**F-103, IRWO Classics, Rail Vihar, Sector 57**Gurgaon 122004**India***Biotechnology for wastewater treatment system**

We are wastewater service providers; we also research and develop the new technology for water, wastewater and waste treatment. We need new idea of technology to develop our strength in this wastewater field, include cleaning canal, remove sediment in waterway, biogas, microbiology detector and treated system quality.

Sector

Biotechnology

Country

Thailand

Area of Application: Biotechnology, Engineering, New technology

Studies

Environmental Impact Studies (EIA/EIS)

Project Type

Expansion/Modernisation

Estimated Cost (US\$)

86,000

Contact:*Utility Business Alliance**21st Tower 16th floor, Viphavadee-rangsit Rd., Jompol, Jatujak**Bangkok 10900**Thailand***ASEAN SME Service Center**

The ASEAN SME Service Center serves as the portal or gateway to facilitate SMEs throughout ASEAN region and beyond to reach business services provided by SME service providers from public, private, academic institution non-profit organization, and other sectors; in a convenient, comparable, and centralized manner. These SME services include finance, investment, sales & marketing, quality improvement, research & development (R&D), science & technology (S&T), capability development, licenses, registration & permit, utilities, and others.

For more information, access:

<http://www.aseansme.org>



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