Strengthening innovation-driven inclusive and sustainable development

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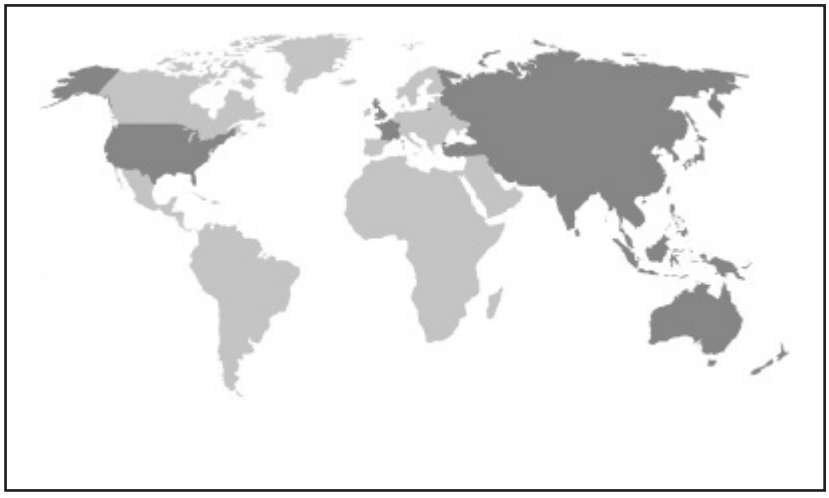
APCTT
Asian and Pacific Centre for Transfer of Technology

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

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

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

- Research and analysis of trends, conditions and opportunities;
- Advisory services;
- Dissemination of information and good practices;
- Networking and partnership with international organizations and key stakeholders; and
- Training of national personnel, particularly national scientists and policy analysts.



The shaded areas of the map indicate ESCAP members and associate members

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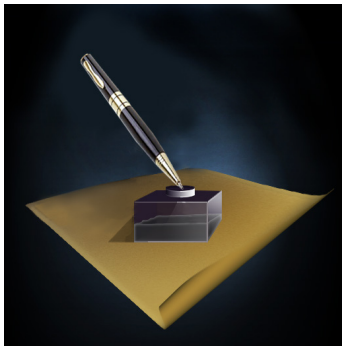

Introductory note

Big Data are commonly described as high volume, velocity and variety of data. If such data are properly processed and visualized, they could be used to enhance the insight and decision-making processes. Key sources of big data are: publicly available data on the web (e.g. patents information, public health data, trade and market information), data on the ownership and usage data of mobile phones, personalized data from social networks (e.g. Facebook, Twitter, WhatsApp), satellite imagery data on weather, disasters and natural resources, traffic loop data, cloud and data warehouse appliances. The primary ownership of big data varies widely across entities such as technology companies, cell phone companies, government departments, municipalities and civil society organizations. The global community is increasingly recognizing the potential usages of Big Data for sustainable development. Big data, if collected systematically and carefully considering the issues of privacy, could be used to produce vital statistics for evidence-based policy making thus contribute to the progress and achievements of 2030 Sustainable Development Goals (SDGs). Therefore, it is imperative for policy makers and researchers to develop strategies on how to benefit from big data innovations for inclusive and sustainable development.

Countries need to have enhanced capacity to access valuable data to support the SDGs and transform these into effective applications and visualizations to enable decision making and appropriate actions. Towards this objective, national policy makers, statisticians and development practitioners could examine and understand the potential use of diverse types of big data as well as the issues and limitations of their usage for producing relevant statistics and indicators. There is also a need to strengthen knowledge and skills for working with such data for national policy making and strategy development.

Effective usage of big data for public purposes would require governments to promote public-private data sharing partnerships, generate analytical tools and approaches, and drive broad adoption of useful big data across the governance system. For optimal utilization of big data, efforts are required to bring together researchers, practitioners, and activists on a common platform to promote big data revolution through collaborative research, capacity building, and community engagement. One such platform called 'SDG Data Science Lab' is being promoted by the Economic and Social Commission for Asia and the Pacific (ESCAP) and the Statistical Research Institute of Statistics Korea. The platform will be accessible to all stakeholders who wish to share and experiment with different types of big data in a safeguarded online environment.

Responsible usage of Big data for better public policy should be promoted. It is important to ensure data protection and privacy, and data ethics concerning the use of big data, collected for the purposes of developing and implementing national policies and programmes. In this context, the United Nations Guidelines for the Regulation of Computerized Personal Data Files, adopted by the UN General Assembly resolution 45/95, takes into account both existing international instruments and relevant regulations, rules and policies of member organizations concerning data privacy and data protection.

This special issue of Asia-Pacific Tech Monitor discusses the challenges, opportunities and strategies to harness and use big data for achieving sustainable development in the Asia-Pacific countries.

Michiko Enomoto
Head, APCTT-ESCAP

Technology Market Scan

INTERNATIONAL

Technology Bank for LDCs

United Nations officials hailed the establishment of the Technology Bank for the Least Developed Countries (LDCs), which will go a long way in addressing one of the major challenges facing the world's poorest nations. The Bank, to be headquartered in Gebze, Turkey, also marks the achievement of the first target of the 2030 Agenda for Sustainable Development, namely SDG 17.8.

The establishment of the Technology Bank was a priority under the Istanbul Programme of Action adopted in 2011, which represented the vision and strategy for the sustainable development of LDCs. Its importance was confirmed in the 2015 Addis Ababa Action Agenda, adopted at the Third International Conference on Financing for Development, and then again in the 2030 Agenda for Sustainable Development.

The Bank is expected to broaden the application of science, technology and innovation in the world's poorest countries. It will improve technology-related policies, facilitate technology transfer and enhance the integration of the LDCs into the global knowledge-based economy. It will also serve as a knowledge hub, connecting needs, resources and actors; facilitate the access of LDCs to existing technology-related projects; and foster joint initiatives with relevant organizations and the private sector.

With the signing of the host country and contribution agreements, the Turkish Government has committed to provide the Bank with $2 million annually for five years, and also provide personnel and premises in Gebze, which is located outside of Istanbul. It is also planning to implement joint projects with the Bank.

http://www.un.org

ASIA-PACIFIC

CHINA

Efforts to support innovation

China will roll out a series of measures to boost innovation, according to a circular issued by the General Office of the State Council. A total of 13 reform measures will be carried out in eight comprehensive innovation pilot areas, including the Beijing-Tianjin-Hebei region, Shanghai and the Pearl River Delta, and then further promoted nationwide.

According to the circular, the government will enhance the support for innovation by small and medium-sized enterprises by offering one-stop investment and financing information. One-stop service for patent examination, rights protection and verification will also be offered to enterprises, said the circular.

In the meantime, the government will streamline the procedures for foreigners to apply work permits in China, and encourage foreign students to find career opportunities, start their own businesses and apply for work and residence permits. The circular also stressed the need to accelerate the transformation of military production into civilian use.

http://www.chinadaily.com.cn

China's patent operations

The number of China's patent operations stood at more than 170,000 in 2016, a year-on-year increase of nearly 20 percent, according to the latest data from the Patent Information Annual Conference of China 2017 held in Beijing from Sept. 5 to 6.

Patent operations include patent transfer, license and pledge. Intellectual property (IP) is playing an increasingly important role in China's exchange with other countries in fields like economy, trade, science and technology, and culture, Shen Changyu, head of the State Intellectual Property Office, said at the opening ceremony. "China will continue to boost international IP cooperation and facilitate the building of an inclusive, balanced and efficient international IP standard," Shen said.

From establishing its IP system in 1980s, China has become the country that has filed the most patent applications, said Yoshiyuki Takagi, assistant director general of the World Intellectual Property Organization.

http://news.xinhuanet.com

Technology transfer system by 2025

China is looking to complete its national technology transfer system by 2025, said an outline on the system published Tuesday by the State Council, China's cabinet. Also, by 2020, a national technology transfer system that adapts to new circumstances is to be established. Improving the system is key to domestic innovation, economic and social development, and to supporting China's efforts to become a leading power in science and technology. A more unified and open technology market and exchange network on the national level should be set up, the outline noted.

Channels for technology transfers should be expanded to increase the influence of the transfer system. For instance, sci-tech achievements from military departments shall be accessible to civilian departments, and vise versa, while cross-regional transfer should be encouraged.

The outline also asked for a better policy environment and stronger logistical support to ensure efficient operation.

http://www.china.org.cn

INDIA

Rebate on patent fee

More domestic and foreign startups will now be able to access the fast-track mechanism for filing patents, which will drastically cut down the time taken to obtain these rights. The government has introduced a more liberal definition for startups to ensure that many more of them can become eligible for benefits, including lower fees, under the latest patent framework.

Under the new definition, any entity in India recognised as a startup by the competent authority under the Startup India initiative will be eligible. In order to encourage patent filing, the government has amended the Patent Rules 2003. The rules notified on September 2, will allow startups to avail of a rebate in patent fees. "A foreign entity, fulfilling the criteria for turnover and period of incorporation or registration as per Startup India Initiative" would be extended the patent filing

benefits meant for startups, according to the notification.

Over the past year, the definition of startups, as notified by the Department of Industrial Policy and Promotion, has been refined to include changes such as the inclusion of job opportunities as an important criterion. Startups were earlier defined as companies that are only five years old with a maximum turnover of Rs 25 crore per year and working towards innovation.

With the rules revised, startups will be eligible for an 80% rebate on patent fees. The DIPP will bear the facilitation cost on behalf of startups and provide rebates in the statutory fee for the filing of applications. For the expedited patent registration, the startups have to pay double the fees against thrice the amount for other companies. Under the faster clearance route, the application fee for individuals and startups is Rs 8,000, while for established and older companies it is about Rs 60,000. To avail of intellectual property rights-related benefits, a startup is required to obtain a Certificate of Recognition from DIPP.

The amended rules seek to cut the time taken for granting patents to two-and-a-half years from five to seven years immediately and to one-and-a-half years by March 2018.

http://timesofindia.indiatimes.com

Software patent rules

The Indian Patent Office has again issued guidelines on examination of computer-related inventions (CRIs) such as software programmes. The aim of this document is to provide guidelines for the examination of patent applications in the field of CRIs by the Indian Patent Office so as to further foster uniformity and consistency in the examination of such applications.

"The objective of this document is to bring out clarity in terms of exclusions expected under section 3(k) so that eligible applications of patents relating to CRIs can be examined speedily," the guidelines said. According to the Section 3(k) of the Indian Patents Act, a mathematical or business method or a computer programme *per se* or algorithms are not inventions. Various representations have been received regarding these guidelines which were first published in August 2015. Associations strongly opposed them, saying the norms were detrimental to the domestic IT sector.

The guidelines were then put in abeyance and re-issued in February last year. But associations again raised issues, after which an expert committee was set up to look into them. "After taking all the views into consideration, the guidelines for examination of CRI have been streamlined," the committee said.

http://www.thehindu.com

MALAYSIA

NANOVerify programme

NanoMalaysia Bhd, a company limited by guarantee under the Ministry of Science, Technology and Innovation, aims to make the NANOVerify Programme mandatory for nanotechnology product manufacturers by year-end. Chief Executive Officer, Dr Rezal Khairi Ahmad, said at the moment, NANOVerify, the first nanotechnology products/processes certification in Malaysia, was still regarded as a voluntary certification programme.

NANOVerify, launched in 2015, is a joint programme between Sirim QAS International Sdn Bhd and NanoMalaysia, which awards the NANOVerified mark for companies which apply for certification for the processes/products with claims of nano-elements in the range of 1-100 nanometre. Rezal said with the NANOVerified mark, it could also enable a certified company to increase its corporate image, gain customers" trust and subsequently, promote its sales. Likening NANOVerify to the halal certificate accredited by Malaysian Islamic Development Department (Jakim), he did not discount the possibility of the former emerging as a global benchmark for nano products in the future. "It is possible for it to follow in Jakim's footsteps which has successfully made its halal certificate widely recognised by Muslims all around the world within 20 years' time," he said.

Rezal, who is also a member of Asia Nano Forum, said currently, Malaysia has partnered with Taiwan, UK, Russia, Thailand and Iran to recognise each other's nano certificate. "All the six nations are the members of the forum and each has its own respective nano verification programmes. "We are now looking at how to standardise and create a cross-countries accepted nano certificate to open up a bigger market for each other," he said. He said Malaysia was expected to sign an agreement on nano verification with Iran next year, after a similar deal was inked with Taiwan late last year.

Recently, NanoMalaysia also announced that it would collaborate with a Russian company to set up an investment platform for nanotechnology businesses by year-end, which enabled Malaysia's manufactured nano products to penetrate the European market. Meanwhile, nano fertiliser provider, Microwell Bio Solutions Sdn Bhd, an indirect subsidiary of state-owned Johor Corp, is eyeing to expand its market share to 30 per cent in the country over the next five years.

http://www.dailyexpress.com.my

PHILIPPINES

Agricultural free patent act

The Senate has unleashed trillions of pesos worth of capital after it removed restrictions on agricultural free patents issued to farmers and make agricultural land titles immediately available for trade to help spur development of the agricultural sector. This followed the recent unanimous approval on third and final reading by the Upper House of Senate Bill No. 1454 ("Agricultural Free Patent Reform Act of 2017).

Sen. Richard J. Gordon, chairman of the Senate justice and human rights committee, sponsored and authored the measure, while Senators Paolo Benigno Aquino IV and Cynthia A. Villar served as co-authors. Gordon said that the bill sought to "make agricultural land titles immediately tradeable and bankable, provide farmer entrepreneurs the much-needed access to credit, and create capital to make investments, create jobs, increase productivity, and reduce poverty in rural areas."

"This bill will do much to address our unbalanced development and give agriculture a much-needed shot in the arm. Trillions (of pesos) in dead capital will be unleashed in the market in the form of credit and livelier investments," he said. Gordon said that the bill would primarily amend the Commonwealth-era Public Land Use Act and "abolish provisions that prevent banks from lending to farmers against agricultural patents."

Enacted in 1936, the Public Land Use Act entitles any Filipino who has "continuously occupied and cultivated, either by himself or through his predecessors in interest, a tract or tracts of agricultural public lands subject to disposition" to have an agricultural free patent issued to him, for the same land not exceeding 24 hectares.

http://news.mb.com.ph

REPUBLIC OF KOREA

R&D policy to focus on long-term 'vision'

The Republic of Korea is seeking to focus on a long-term vision that can raise the overall competitiveness of the country as it utilizes its research and development budget, the ICT ministry said. The plan was announced during a gathering of Ministry of Science and ICT policymakers and President Moon Jae-in.

In accordance with the goal, the ministry will now have the right to conduct a prefeasibility study related to the R&D budget, and be less dependent on the Ministry of Strategy and Finance. Also, both ministries will now have the right to decide the spending limit of the budget they control.

The decision comes amid growing criticism that the government's decision on allocating the R&D budget has been focused too much on generating profit in the short term instead of looking toward the future. Scientists and experts have argued that the budget should be allocated to support projects that can last for years. Also, the ICT ministry said it will map out detailed plans to create new jobs to capitalize on the changes as the world is transformed by the "fourth industrial revolution."

The Moon administration has been advancing various projects to deal with the latest revolutionary changes that is characterized by a fusion of cutting-edge technologies, such as big data and the Internet of Things. The government hopes that innovative ideas will become actual businesses through science and technology, while generating new opportunities by converging different industries.

The ministry will act as an "enabler" to the changes by drafting the detailed plan by the end of this year, an official said. The ministry said technologies, such as IoT and AI, are forecast to generate business opportunities and profits worth 560 trillion won ($484 billion) by 2030. "The ministry also launched a task force team so that core policies in science technology and the ICT sector can be implemented," ICT Minister You Young-min said. The ministry said it wants to push forward projects to help ordinary people understand the fourth industrial revolution so that they can get a better grasp of changes under way.

http://www.koreaherald.com

R&D spending gains 8%

Major Republic of Korean companies' spending on research and development rose nearly 8 percent on-year in the first half of the year, with tech giant Samsung Electronics Co. shelling out the most, a market tracker said. The combined R&D expenditures by the top 500 companies by sales stood at 20.9 trillion won ($18.5 billion) in the January-June period, up 7.8 percent from a year earlier, according to CEO Score. The tally covers only 217 companies out of the total, which have disclosed their R&D expenditures and exclude financial institutions.

The surveyed companies posted 782.5 trillion won in combined revenue in the first half, which increased 6.9 percent from the same period a year ago. Their total R&D spending took up 2.68 percent of sales, up 0.02 percentage point from a year earlier.

Samsung Electronics, the world's largest smartphone and memory chip maker, was the top R&D spender with 7.9 trillion won, followed by LG Electronics Inc. with 2 trillion won and chip giant SK hynix Inc. with 1.2 trillion won. NCsoft Corp., a South Korean online gamemaker, had the highest ratio of R&D spending to sales at 26 percent, trailed by the country's top Internet portal operator Naver Corp. with 25 percent and major drugmaker Hanmi Pharmaceutical Co. with 17 percent.

http://www.koreaherald.com

SINGAPORE

Initiatives to spur innovation

The Singapore government has announced three initiatives to spur innovation through tech transfer, talent development and smart capital. This includes the launch of an enhanced IP framework, the National IP Protocol, to encourage public agencies to work closely with enterprises, who can develop them into products and services that create economic and social value for Singapore.

The National IP Protocol will grant public agencies the flexibility to grant exclusive licences, non-exclusive licences, and even assign IP to industry – with the end-goal of facilitating commercialization. It will also continue building the government's community of IP experts skilled in taking publicly-funded innovations to market. The aim is to enhance the innovative capacity of the country's companies, and create more opportunities for public-private partnerships, including research spinouts, joint labs with industry and industry-academic consortia, according to Mr. Heng Swee Keat, the minister for finance for Singapore.

The National IP Protocol is part of the enabling technology transfer drive. As part of this, around US$12 million is to be invested into new cybersecurity projects aimed at strengthening Singapore's cybersecurity research and development (R&D) capabilities and developing cyber tools and technologies that can be readily adopted for public and industry use. Nine research projects have been awarded a total of US$11.6 million under a grant call by the National Cybersecurity R&D Program 1 to

develop capabilities in key technology areas to meet Singapore's cybersecurity needs. Another six projects have been awarded close to US$0.45 million under a seed grant call by the Singapore Cybersecurity Consortium to spur the commercialisation of cybersecurity technologies. These efforts aims to strengthen Singapore's cyber defences, and prepare its critical infrastructure and digital services against rising global cyber threats.

On the smart capital element, the National Research Foundation and Temasek are working on new commercial entities to build and invest in deep tech startups arising from research and development conducted in Singapore. This will complement other government support schemes for startups by connecting technical and academic innovators to smart capital.

On the cultivation of technopreneurial talent, the minister announced two initiatives by its tertiary institutions. The first is the National Lean LaunchPad, a national entrepreneurial training program for researchers adapted from the renowned i-Corps programme by the US National Science Foundation. Over 10 weeks, research scientists and engineers learn about the technology commercialization process, including customer discovery and market validation, by directly engaging with potential users and customers. These crucial skills in evidence-based validation and business model refinement will give researchers a better chance of developing their innovations into prototypes, real-world products and even companies. One example is a startup from NUS' pilot program, known as Cardiogenomics, which developed a cardiac risk assessment algorithm to predict coronary artery disease risk. Through the Lean LaunchPad experience, the team moved out of the lab to conduct interviews with patients, doctors and hospitals to test their business assumptions, leading them to re-define their customer segments and service delivery. The team has since developed the risk assessment service and test-kit CardioCAD, which is being used in some specialist clinics in Singapore.

The second initiative is called Pollinate, a collaboration between Ngee Ann Polytechnic, Singapore Polytechnic and Temasek Polytechnic. Pollinate is an incubator targeted at startups and campus teams from polytechnic students and their alumni who are ready for growth hacking and market adoption.

http://www.thenextsiliconvalley.com

SRI LANKA

First SME incubator and national policy

Sri Lanka unveiled its first ever SME incubator this week and vowed its third generation economic reforms shall be led by innovation, technology transfer and SMEs. "We need to change our traditional mindset and think anew," said Prime Minister Ranil Wickremesinghe in Makandura Industrial Zone of the Ministry of Industry and Commerce, addressing the launch event of Sri Lanka's first ever Incubator and Technology Transfer Centre (ITTC) for SMEs, a joint collaboration between National Enterprises Development Authority (NEDA), Wayamba University and supported by Malaysian Technology Development Cooperation.

"There are a little more than one million registered SMEs and MSMEs in Sri Lanka providing employment to three people on average" said Minister of Industry and Commerce Rishad Bathiudeen, and added: "We believe that SMEs are more than 70 percent of the total number of enterprises in the economy providing 45 percent of the employment and contributing to 52 percent of the Gross Domestic Production (GDP). NEDA has been taking many initiatives to develop this sector.

"The Commerce Ministry and NEDA have introduced the National SME Policy and National SME Authority and we are handing over the first National SME Policy the Prime Minister at this event. Work is also progressing on the first ever SME authority of Sri Lanka. This authority will facilitate the development of this sector. It will not be a regulator but will help the micro enterprises to grow to small scale and small enterprises to grow up to medium and larger enterprises. In fact NEDA has been actively working to develop not only SMEs but even works to create new SMEs.

"The SME incubator launched today is the first ever SME incubator in Sri Lanka and this is not just an incubator. It is also the first ever technology transfer centre for Sri Lankan SMEs. Sri Lanka's SME sector is active across many sectors but few are in tech. This centre will focus on helping to establish technology SMEs across the country. The Malaysian Technology Development Cooperation has given us their expertise and supported us to establish Sri Lanka's first SME incubator."

Chairman of NEDA Omar Khamil said that the incubator is part of the third generation economic reforms of the Unity Government. "As our Prime Minster said, our reforms are led by innovation, technology and SMEs" he said. The Ministry of Industry and Commerce has invested Rs 60 million for this pioneering tech incubator.

http://www.dailymirror.lk

VIET NAM

Technology transfer law

The National Assembly of Vietnam passed a revised law on Technology Transfer on June 19, covering regulations on technology transfer activities within Vietnam, from abroad into Vietnam and from Vietnam to foreign countries. It also specifies the rights and obligations of organisations and individuals engaged in technology transfer activities; technology appraisal of investment projects and technology transfer contracts. The law comes into effect on July 1, 2017.

Vietnam News reported Dr. Trần Văn Tùng, Deputy Minister of Science and Technology saying that the law aims to prevent the import of outdated technologies and encourage adoption of latest advances, so as to help Vietnamese enterprises increase their production capacity and enhance their competitiveness in both domestic and foreign markets.

The previous version of the Law on Technology Transfer came into effect in 2006. The amendments aim to develop supply

and boost demand in the science and technology markets. A national database on information technology will be established. Human resources will be trained for intermediary organisations. The draft also mentioned building technical infrastructure and supporting the operation of national technology transaction bureaus. It involves raising the capacity of organisations and individuals providing consultancy and brokerage services to exploit information on technology, intellectual property, results of scientific research and technological development at home and abroad.

VietNamNet Bridge highlighted the tax incentives to be received by firms importing machinery, equipment, materials, and means of transport into Vietnam that have yet to be produced in the country, and which will be directly used for research and development (R&D) activities, technological innovations, and technology transfer within Vietnam.

The law seeks to address barriers faced in the commercialisation of scientific research and technological development. It encourages research institutions and organisations to collect market information, understand societal needs and engage in joint research activities with enterprises. It proposes mechanisms of capital support, loan guarantee and interest rate support for enterprises investing in technical infrastructure for technology decoding. Under the law, policies covering the definition of ownership rights and the rights to use assets developed through scientific research, will be issued to support start-ups.

The law will strengthen the coordination among state management agencies in technology appraisal of investment projects and help in restricting and preventing the import of backward technology into Vietnam. A mechanism for compulsory registration of technology transfer, especially for the transfer of technology from abroad into Vietnam, would create a filter for state management agencies to inspect. The control is expected to help prevent fraud, duplication and wastage of resources.

http://www.opengovasia.com

SME support law approved

More than 83 per cent of members in Vietnam's National Assembly yesterday voted to approve a Law on Support for small and medium-sized enterprises (SMEs). The support will include access to credit, tax incentives, production space, technology application and transfer, market expansion, provision of information, consultancy and legal aid, and personnel development.

The law sets out SME principles, contents and resources, as well as the responsibilities of related agencies, organisations and individuals. It also covers micro-enterprises and operations with fewer than 200 salaried employees. To be covered, they must show total investment capital not exceeding 100 billion dong (Bt149 million) or total revenue from the previous year not exceeding 300 billion dong.

The law requires that support provided respects market rules and is in line with international treaties to which Vietnam is a signatory. The support given must be transparent in terms of content. The law will take effect next January 1.

http://www.nationmultimedia.com

ASEAN-EU Cooperation in Science, Technology and Innovation

SEA-EU-NET

The "SEA-EU-NET" project has been set up to expand scientific collaboration between Europe and Southeast Asia in a more strategic and coherent manner. The project increases the quality, quantity, profile and impact of bi-regional Science and Technology (S&T) cooperation between Southeast Asia and Europe. "SEA-EU-NET 2" is the second project that has been set up to expand scientific collaboration between Europe and Southeast Asia (SEA) in a more strategic and coherent manner. The four-year long project was launched in October 2012, involves 21 institutions from the two regions and is coordinated by the Project Management Agency at the German Aerospace Center (DLR). SEA-EU-NET 2 is deepening collaboration by:

- Continuing and intensifying the bi-regional dialogue between EU and ASEAN S&T policy makers on Senior Officials level as well as creating an annual exchange forum for researchers, innovation stakeholders, policy makers and private business to improve EU-SEA cooperation and exchange through the series of the ASEAN-EU Science, Technology and Innovation Days.
- Jointly tackling societal challenges in the fields of health, food security and safety, metrology as well as water management with relevance to both regions by organizing events, providing fellowships for SEA researchers and conducting studies on future collaboration potentials.
- Informing the Southeast Asian research community on the Horizon 2020 programme as well as increasing the level of Southeast Asian participation in Horizon 2020.
- Completing detailed analytical work on the current state of EU-SEA S&T relations and innovation potentials and developing recommendations on how to strengthen the relationship and feeding these into the official dialogue process.
- Extending the dialogue on EU-SEA S&T cooperation to include a wide range of stakeholders by connecting to already existing networks and dialogues.

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https://sea-eu.net

INTERNATIONAL

Solar cell with high efficiency

A collaborative project between the U.S. Department of Energy's National Renewable Energy Laboratories and researchers from two Swiss centers has tested a range of multi junction cells in tandem configuration, and achieved efficiencies of up to 35.9%. These researchers from the U.S. Department of Energy's National Renewable Energy Laboratories (NREL), the Swiss Center for Electronics and Microtechnology (CSEM) and the École Polytechnique Fédérale de Lausanne (EPFL) have been testing a variety of materials based on III-V elements, in stacked, tandem configurations with silicon bottom cells.

As their latest progress a dual-junction solar cell, combining an NREL-engineered gallium arsenide (GaAs) top cell and a silicon heterojunction cell developed by CSEM, was measured at 32.8%, while a triple junction cell also incorporating a layer of indium gallium phosphate (GaInP) achieved 35.9% efficiency.

Efficiency of 32.8% represents a new record high for dual-junction III-V/Si solar cells, breaking the same research group's previous record of 29.8% set in 2016. "This achievement is significant because it shows, for the first time, that silicon based tandem cells can provide efficiencies competing with more expensive multi-junction cells consisting entirely of III-V materials," says NREL scientist Adele Tamboli. "It opens the door to develop entirely new multi-junction solar cell materials and architectures."

NREL goes on to note that, if costs for a III-V solar cell cannot be brought down to these levels, then cheaper materials will need to be sought. The researchers still stress though, that this breakthrough serves as proof of concept for the use of silicon cells in tandem with other high efficiency materials, and the researchers mention that CSEM is also studying the use of perovskite to optimize solar's cost/efficiency ratio.

https://pv-magazine-usa.com

ASIA-PACIFIC

INDIA

New technology to manufacture biofuel

Researchers at Indian Institute of Technology (IIT) Kharagpur have developed a new technology that will make biofuel manufacturing process cheaper, quicker and pollution-free. The 'soil-to-soil' manufacturing technology developed at the P.K. Sinha Centre for bio-energy at IIT-Kgp is in the process of being patented, an IIT-KGP spokesperson said.

"2gm bioethanol can be produced from various naturally available ligno-cellulosic components. But to do so it needs to be treated chemically. Because of chemical treatment the process contributes to polluting the environment," professor in Department of Agricultural and Food Engineering, Dr. Rintu Banerjee said. Lignocellulose refers to plant dry matter (biomass). "We have replaced this chemical treatment with enzymes which degrade the lignin specifically there by making the manufacturing process pollution free," Banerjee said.

"The technique that we are suggesting will ensure relatively quicker production of biofuel and that the process is completely green thereby not creating any secondary pollution. This, we feel can change the future of biofuel manufacturing in India and make it more cost effective," Banerjee said.

http://www.livemint.com

Device mimics leaf to create fuel

Scientists have developed an artificial leaf that absorbs sunlight to generate hydrogen fuel from water, an advance that may provide clean energy for powering eco-friendly cars in the future. The ultra-thin wireless device mimics plant leaves to produce energy using water and sunlight. "It is known that hydrogen generation from renewable resources will be the ultimate solution to our energy and environment problems," said Chinnakonda S Gopinath, a senior principal scientist at the Council of Scientific and Industrial Research (CSIR)-National Chemical Laboratory in Pune.

The device consists of semiconductors stacked in a manner to simulate the natural leaf system. When visible light strikes the semiconductors, electrons move in one direction, producing electric current. The current almost instantaneously splits water into hydrogen - which researchers believe is one of the cleanest forms of fuel as its main byproduct is water.

In view of pressing energy and environmental issues, it was important to produce hydrogen from natural resources such as sunlight and water, Gopinath said. "In the present work, we have made an attempt to generate solar hydrogen. The preparation method reported is simple and practicable and hence there is a very good possibility of scaling it up," he said.

The research, published in the *Scientific Reports*, an online, open-access journal from the publishers of Nature, states that the device of an area of 23 square centimetres could produce 6 litres of hydrogen fuel per hour. The work has been produced in the lab so far and a lot was still needed on the project, he said.

http://www.business-standard.com

Catalyst to make biofuel

Scientists from the Indian Institute of Technology (IIT) Jodhpur, have shown that oil extracted from algae can be converted into diesel by using sand from Rajasthan. "We have developed a catalyst using sand, nickel and cobalt to convert algae oil into diesel," said Dr Rakesh Kumar Sharma, head of chemistry department at the IIT, who pioneered the study. Dr Vineet K Soni, a post-doctoral fellow, assisted Dr Sharma on the project.

"What we have developed is low cost because sand is abundant and nickel and cobalt are cheap metals. We have shown at the laboratory level that the cost of biodiesel produced using this technology will be half the current price of the fuel," the scientist said.

The two scientists, who worked on the innovation, received rave reviews at the 'Bioenergy Urja Utsav' in Pune organized by the Union Ministry of Petroleum last week. Dr Sharma said he has published the innovation in American Chemical Society's Sustainable Chemistry and Engineering, a top international journal of chemistry, in May this year

Will this innovation work only with sand from Rajasthan? Dr Sharma said sand has two types of structure at the nano level — pillar and layered. "Rajasthani sand can be tuned for both types of structures. For the current study, pillared clay has been used. We filled nano particles of nickel and cobalt between those pillars to make the catalyst. So this will work with any sand which has pillar structure," he explained.

http://www.hindustantimes.com

JAPAN

Electricity from ocean currents

Scientists have developed a new turbine that can harness energy from ocean currents to produce low-cost and sustainable electricity. Researchers from the Okinawa Institute of Science and Technology Graduate University (OIST) in Japan began a project titled "Sea Horse," which aims to harness energy from the Kuroshio ocean current that flows from the eastern coast of Taiwan and around the southern parts of Japan.

It uses submerged turbines anchored to the sea floor through mooring cables that convert the kinetic energy of sustained natural currents in the Kuroshio into usable electricity, which is then delivered by cables to the land. The initial phase of the project was successful. However, the OIST researchers also desired an ocean energy source that was cheaper and easier to maintain.

Tetrapods concrete structures shaped somewhat like pyramids that are often placed along a coastline to weaken the force of incoming waves and protect the shore from erosion - "Thirty per cent of the seashore in mainland Japan is covered with tetrapods and wave breakers," said Tsumoru Shintake from OIST.

Replacing these with "intelligent" tetrapods and wave breakers with turbines attached to or near them, would both generate energy as well as help to protect the coasts, researchers said. "Using just one per cent of the seashore of mainland Japan can generate about 10 gigawats of energy, which is equivalent to 10 nuclear power plants," Shintake said. In order to tackle this idea, the OIST researchers launched The Wave Energy Converter (WEC) project in 2013. It involves placing turbines at key locations near the shoreline, such as nearby tetrapods or among coral reefs, to generate energy. Each location allows the turbines to be exposed to ideal wave conditions that allow them not only to generate clean and renewable energy, but also to help protect the coasts from erosion while being affordable for those with limited funding and infrastructure.

The turbines themselves are built to withstand the forces thrust upon them during harsh wave conditions as well as extreme weather, such as a typhoon. The blade design and materials are inspired by dolphin fins - they are flexible, and thus able to release stress rather than remain rigid and risk breakage. The supporting structure is also flexible, "like a flower. The stem of a flower bends back against the wind," Shintake said.

The turbines too bend along their anchoring axes. They are also built to be safe for surrounding marine life - the blades rotate at a carefully calculated speed that allows creatures caught among them to escape. Researchers have completed the first steps of this project and are preparing to install the turbines for their first commercial experiment. The project includes installing two WEC turbines that will power LEDs for a demonstration.

http://www.firstpost.com

Flexible, water proof solar cell

Scientists have developed a new type of water-proof solar cell which can provide electricity even after being soaked in water or stretched and compressed. The finding could open the way for wearable solar cells, which will provide power to devices such as health monitors incorporated into clothing, researchers said. These could include sensors that record heartbeats and body temperature, for example, providing early warning of medical problems, they said.

Researchers, including those from the University of Tokyo in Japan, developed extremely thin and flexible organic photovoltaic cells, coated on both sides with stretchable and waterproof films, based on a material called PNTz4T. They deposited the device in an inverse architecture onto a one-micrometre-thick parylene film. The ultra-thin device was then placed onto acrylic-based elastomer and the top side of the device was coated with an identical elastomer, giving it a coating on both sides to prevent water infiltration.

The elastomer, while allowing light to enter, prevented water and air from leaking into the cells, making them more long-lasting than previous experiments. The researchers then subjected the device to a variety of tests, finding first that it had a strong energy efficiency. To test its resistance to water, they soaked it in water for two hours, and found that the efficiency decreased by just 5.4 per cent.

To test the durability of the solar cell, they subjected it to compression, and found that after compressing by nearly half for twenty cycles while placing drops of water on it, it still had 80 per cent of the original efficiency. "We were very gratified to find that our device has great environmental stability while simultaneously having a good efficiency and mechanical robustness," researchers said. The study was published in the journal *Nature Energy*.

http://www.firstpost.com

REPUBLIC OF KOREA

Solar cell out of flourine

A group of Republic of Korean scientists have developed highly stable and cheap solar cells made out of flourine, a state-run institute said. The team led by Kim Jin-young from the Ulsan National Institute of

Science and Technology (UNIST) developed the edged-selectively fluorine functionalized graphene nanoplatelets with structure of perovskite solar cells that can achieve a stability of 82 percent.

A perovskite solar cell is a type of cell which includes a perovskite structured compound, considered a next-generation technology with the potential of achieving even higher efficiency. However, low instability and high production costs have been cited as factors that block such technology from becoming commercially viable.

"This study overcame weakness of perovskite solar cells that have high efficiencies but low stability," Kim said, adding that the technology would help the commercialization of the solar cells. Their findings were published in the latest edition of the journal, "*Nano Letters*."

http://english.yonhapnews.co.kr

EUROPE

GERMANY

Multicrystalline solar cell

Fraunhofer Institute for Solar Energy Systems ISE has achieved a record conversion efficiency for lab-sized multicrystalline solar cells of 22.3%. Fraunhofer ISE said that its researchers had succeeded in decreasing the efficiency gap with monocrystalline solar cells, pushing beyond the magical threshold of 22%, confirming greater prospects of multicrystalline materials and solar cells reaching their maximum potential.

As a starting material, the researchers used hyperpure polysilicon from Wacker Chemie with an optimized plasma texture dubbed, 'Tunnel Oxide Passivated Contact Technology (TOPCon),' developed at Fraunhofer ISE for back side contacting. The TOPCon technology is known for applying electrical contacts over the entire rear surface of the cell without patterning, which reduces charge-carrier losses and leads to higher electrical efficiencies.

Martin Hermle, Department Head of Advanced Development of High-Efficiency Silicon Solar Cells at Fraunhofer ISE said, "The key to our success was the holistic approach which enabled us to optimize all steps, from the crystallization up to the individual solar cell fabrication processes. The close and continual cooperation between the characterization, crystallization and the solar cell technology research teams at ISE allowed us to reduce the loss mechanisms step by step and successfully develop an optimized process chain."

The new world record solar cell will be presented at the European Photovoltaic Solar Energy Conference (EUPVSEC) on September 28, 2017 in Amsterdam by Dr. Jan Benick in his talk "Approaching 22% Efficiency with Multicrystalline n-Type Silicon Solar Cells."This record was said to have been achieved within the 'multiTOP' project, which ran until March 2017 and was financed by the German Federal Ministry for Economic Affairs and Energy BMWi.

https://www.pv-tech.org

NORWAY

Cheaper biofuel from trees

Filling your gas tank with biofuels made from soybeans or corn is controversial. But researchers at the Norwegian University of Life Sciences have developed an approach that could result in a cheaper, more effective way to fuel your car. In an article published this week in the journal Nature Chemical Biology, a research group at the Norwegian University of Life Sciences (NMBU) describes a key process in an enzyme discovered at the university in 2010. This process could lead to a new and cheaper way of making biofuel from trees.

In 2010, researchers at NMBU discovered a new method of breaking down the cellulose in trees and plants. At the time, the method was hailed as a breakthrough in part because it was much faster than previous methods. The discovery was based on a brand new class of enzymes called LPMOs. Today, LPMOs are widely used in modern bioethanol production. The enzymes make the breakdown of cellulose from wood and other plant residues much more effective. This creates what is called second-generation bioethanol. Nevertheless, commercial companies that want to use the method face major challenges. The problem is that LPMOs can be unstable and difficult to control in a large-scale industrial context.

The new method that NMBU researchers discovered does not need oxygen to work. Instead, it can use cheap and readily available hydrogen peroxide. By controlling the supply of hydrogen peroxide, it has also become much easier to stabilize and control the entire process. The researchers believe that this will allow the conversion of cellulose to sugar on a much larger scale than before. Part of the surprise in the researchers' findings is that they go against the conventional understanding among biochemists regarding how LPMOs break down cellulose.

According to a press release from NMBU, scientists have in fact discovered a whole new type of chemistry in the breakdown of cellulose. They believe this approach can be used in biofuel production, and have already started discussing collaborative projects with industrial partners.

http://sciencenordic.com

SPAIN

Efficient production of hydrogen

A team of Scientists from the Universitat Jaume I de Castelló, the Institute of Chemical Technology of the Universitat Politècnica de València-CSIC and the University of Zaragoza, coordinated by Professor José Antonio Mata of the UJI, have created and patented an innovative process for efficient production, storage and safe transportation of hydrogen for use in fuel cells via the use of chemical reagents. The new technology is based on the use of liquid hydrogen organic carriers (LOHC). The Researchers have explored different hydrogen-bearing organic liquids in order to attain a novel hydrogen storage system

based on a chemical coupling reaction between an alcohol and a hydrosilane catalyzed by a ruthenium compound supported in graphene.

With respect to the already established systems, the contributions of the new process are multiple. Firstly, it is a chemically versatile process because various combinations of alcohols and hydrosilanes can be used. Secondly, the process can be carried out very fast and elevated temperatures are not required because the Researchers have also developed ruthenium catalysts that are extremely efficient for this reaction. Thirdly, the process is reversible as the product formed in the coupling between an alcohol and a hydrosilane is a silyl ether that can be transformed further into the original product by a reductant.

Among its key benefits, it forms an energy system whose only by-product is water and, at the same time, it is reversible, by enabling users to store and produce hydrogen according to requirement. It can be easily customized to non-static energy generation and employ systems, such as automobiles; the use of silane-alcohol as LOHC allows operation at low temperatures in achieving the gas and the technology avoids the safety problems of hydrogen storage.

There are four large blocks involved in the overall energy generation process. The first one is production and its challenge would be to achieve hydrogen from alternative energies such as wind or solar, in a quasi-sustainable method; as that would be desirable that the by-products derived were obtained in an industrial center where the generation was fully controlled. In the second (transportation) and third (distribution) blocks, which do not require any innovation in the scientific or industrial field, the proposed system could employ the existing infrastructure for both transportation and distribution of petroleum products. The fourth block contemplates the chemical reaction for achieving hydrogen and its use in fuel cells. The initial results showed that the reaction is very fast and can occur even at room temperature, which corresponds to sufficient kinetics for the production and immediate use of hydrogen.

http://gearsofbiz.com

NORTH AMERICA

USA

Solar power to produce clean fuels

Researchers at the Lawrence Berkeley National Laboratory have developed a new system that can generate fuel using solar power. The new system represents reaching another milestone in efforts to use renewable energy to produce sustainable fuels. Researchers based their efforts on several previews endeavors, many of which involved mimicking photosynthesis in order to turn sunlight into electrical power. This electricity is then used to trigger chemical reactions.

According to researchers, this new system is the first of its kind that has successfully demonstrated that it can convert these fuel precursors into actual, usable fuels. Currently, the fuels that the new system is able to produce are ethanol and ethylene. Researchers note that these fuels are generated at energy conversion rates that rival naturally occurring processes.

http://www.hydrogenfuelnews.com

Solar-thermal conversion

Researchers at Columbia Engineering, along with colleagues at the Department of Chemistry at Columbia University, and Stanford University have developed a new, scalable, and low-cost "dip and dry" method for fabricating a solar absorber (SSA) that can harness and convert sunlight to heat for use in a wide range of energy-related applications, from heating water and generating steam to residential heating. The team, led by Yuan Yang, explained the methods used in a paper published in the August 28, 2017, issue of *Advanced Materials*.

Working with instruments and facilities in Columbia Engineering laboratory space and the Columbia Nano Initiative (CNI), the researchers were able to fabricate metal-based plasmonic SSAs using an inexpensive process that can tune the SSAs to suit different operating conditions.

With its wide angle, the SSA addressed another long-standing problem faced by solar-absorbing surfaces: the ability to absorb sunlight throughout the day from sunrise to sunset. In tests, the resulting SSAs showed a significantly higher solar absorption at all angles (~97% absorption when the sun is above, ~80% when near the horizon) than existing designs.

https://www.renewableenergymagazine.com

Low-cost battery for storing renewable energy

A new low-cost, high-performance battery could provide an inexpensive storage solution for solar power, which is abundant during the day but must be stored for use at night. Developed by Stanford chemistry Professor Hongjie Dai and doctoral candidate Michael Angell, the battery is nonflammable and contains electrodes made from abundant aluminum and graphite. Its electrolyte's main ingredient, urea, is already industrially produced by the ton for plant fertilizers.

In 2015, Dai's lab was the first to make a rechargeable aluminum battery. This system charged in less than a minute and lasted thousands of charge-discharge cycles. The lab collaborated with Taiwan's Industrial Technology Research Institute (ITRI) to power a motorbike with this older version, earning Dai's group and ITRI a 2016 R&D 100 Award. However, that version of the battery had one major drawback: it involved an expensive electrolyte.

The newest version includes a urea-based electrolyte and is about 100 times cheaper than the 2015 model, with higher efficiency and a charging time of 45 minutes. It's the first time urea has been used in a battery. According to Dai, the cost difference between the two batteries is "like night and day." The team recently reported its work in *Proceedings of the National Academy of Sciences*.

http://news.stanford.edu

Utilising linked government data to monitor and support progress towards the UN Sustainable Development Goals

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Abstract

In 2015 the United Nations General Assembly set an ambitious vision of 17 Sustainable Development Goals to tackle human rights, sustainable development and climate change. Data is essential for monitoring the progress of member states towards these goals. The utilisation of linked government data not only has the ability to monitor the SDGs but also to support their progress. This article outlines how linked government data has been utilised and can facilitate implementation of data informed strategies and interventions, and shared responsibility for implementation of solutions to enable more effective progress towards the SDGs.

Sustainable development goals

In September 2015, a historic decision was reached by the 193 member states of the United Nations (UN) General Assembly that between 2015 and 2030, all nations would work towards an ambitious and transformational vision for our world via a set of commitments known as the UN Sustainable Development Goals (UN, 2015).

The 17 Sustainable Development Goals adopted under *Transforming our world: the 2030 Agenda for Sustainable Development* tackled human rights, sustainable development and climate change. They included targets designed to: end poverty and hunger; eliminate fear and violence; ensure good health and well-being for all; ensure equitable and universal access to quality education, health care and social protection; and achieve universal respect for human rights, dignity, equality and non-discrimination, as well as for race, ethnicity and cultural diversity.

Importantly, the vision singled out particular groups, envisaging a world that is just, equitable, tolerant, open and socially inclusive; in which the needs of the most vulnerable are met; where every child grows up free from violence and exploitation; and where every woman and girl enjoys full gender equality without barriers to their empowerment (UN, 2015).

The then UN Under-Secretary General, Dr Babatunde Osotimehin, described in 2016 how the opportunities, support and barriers we provide to a girl at the age of 10 in 2015 will impact on her potential and the life she will lead at the age of 25 in 2030 (State of the World Population 2016, UNFPA, 2016). He declared: "A 10-year-old girl's life trajectory will be the true test of whether the 2030 agenda is a success – or failure."

Given that more than half of the world's 10-year-olds are in the Asia-Pacific region, as a region we have a great responsibility, as well as a great opportunity, to positively support and influence the life trajectories of our young people (UNFPA, 2016).

Monitoring progress of sustainable development goals

Data is essential in determining whether we are making positive progress towards the Sustainable Development Goals (SDGs). Although there are only 17 defined SDGs, there are in fact 169 targets which require monitoring. This represents an enormous challenge to member states to ensure the data we collect on these targets and indicators are valid and accurate. Many countries throughout the world, including the Asia-Pacific region, collect government administrative data on many of these indicators. This includes birth registrations, hospital morbidity, death registrations, mental health, education, child protection, justice and police data. The data collected is an important resource for monitoring many of the targets that have been set for the SDGs, for example: reducing the rates of maternal mortality, neonatal mortality, and under 5-mortality; increasing the completion rates of primary and secondary schooling; and reducing all forms of violence against children.

While government administrative data has the potential to provide information relevant to numerous SDG indicators, this resource can be used more effectively when we are able to link the data across government agencies. The Developmental Pathways Project in Western Australia is an example of how linked government administrative data can be utilised for more effective monitoring – particularly of vulnerable groups – but also to enable more effective approaches to progressing SDGs.

Advantages of linking government data

Many of the SDGs are challenging issues that cannot be addressed by one solution alone. Examples of these are: poverty, educational difficulties, mental health issues, and violence against women and children. These issues are multi-causal, socially complex, and often cross the boundaries of individual government agencies (e.g. violence will often involve health, police, child protection, etc).

Progressing many of the SDGs will require multiple agencies working together to provide strategies at different points in the pathway of each goal. It was for a similar reason that the Developmental Pathways Project was established in 2005, enabling the linkage of data across agencies to monitor outcomes, and to encourage inter-agency strategies to address these issues (Stanley et al, 2011). The project has been able to link data from multiple agencies including those related to health, mental health, education, disability, child protection, justice, police, and housing (Figure 1).

Most importantly, the linked data includes no identifying information such as names, date of birth and address, thus preserving the privacy of individuals. The process of linkage is based on the separation principle, where the linkers only use identifying information (stripped of service information such as diagnoses, cause of death, police charge, etc) to link the data. Researchers and analysts receive only the service information, with a unique code representing the individual, and not the identifying information. This is integral to enabling the investigation of important issues and outcomes which can be incredibly sensitive (e.g. child abuse, mental health, drug use, etc), whilst ensuring the public's privacy is protected. There are strict ethics and governance procedures in place to ensure the confidentiality of the data and that it is utilised for the benefit of the community.

The overarching aims of the linked data have been to: monitor issues which often cross agency boundaries; enable the identification of outcomes for specific groups, including those most vulnerable; identify risk and protective factors for outcomes and points of earlier intervention; encourage strategies that focus on prevention and earlier intervention; evaluate policy and practice changes; and identify groups for whom services do or don't work best. Although the Developmental Pathways Project has its own specific aims, it is also a resource for other researchers who wish to use the linked data for research purposes.

Utilisation of linked data for monitoring and research on child maltreatment

The linked data has enabled important findings and recommendations which have been utilised by a range of government agencies. An example of the use of the linked data is in the area of the prevention of violence against children and improvement of child safety and well-being. By linking data regarding child maltreatment from the Department of Child Protection to Department of Health and mental health data, we have been able to monitor outcomes as well as risk and protective factors, to identify points of earlier intervention and prevention.

In an international study published in *The Lancet* in 2012, we used our data to monitor trends in child maltreatment as well as policy initiatives across six developed countries, including Australia, England, Canada, the United States, Sweden and New Zealand (Gilbert et al, 2012). We found that despite concerted policy initiatives, there was no consistent evidence of a decrease across different indicators of child maltreatment. While there was a reduction in violent deaths in children in some countries, it was not associated with a consistent decline in maltreatment-related hospital admissions. The results also found that in several countries there had been a rise in the numbers of children placed into out-of-home care, particularly among infants.

Data has also been used to monitor emerging issues such as infants born with neonatal withdrawal syndrome due to maternal substance use during pregnancy (O'Donnell et al, 2009). Neonatal withdrawal syndrome usually presents within a few days of birth and includes symptoms such as respiratory distress,

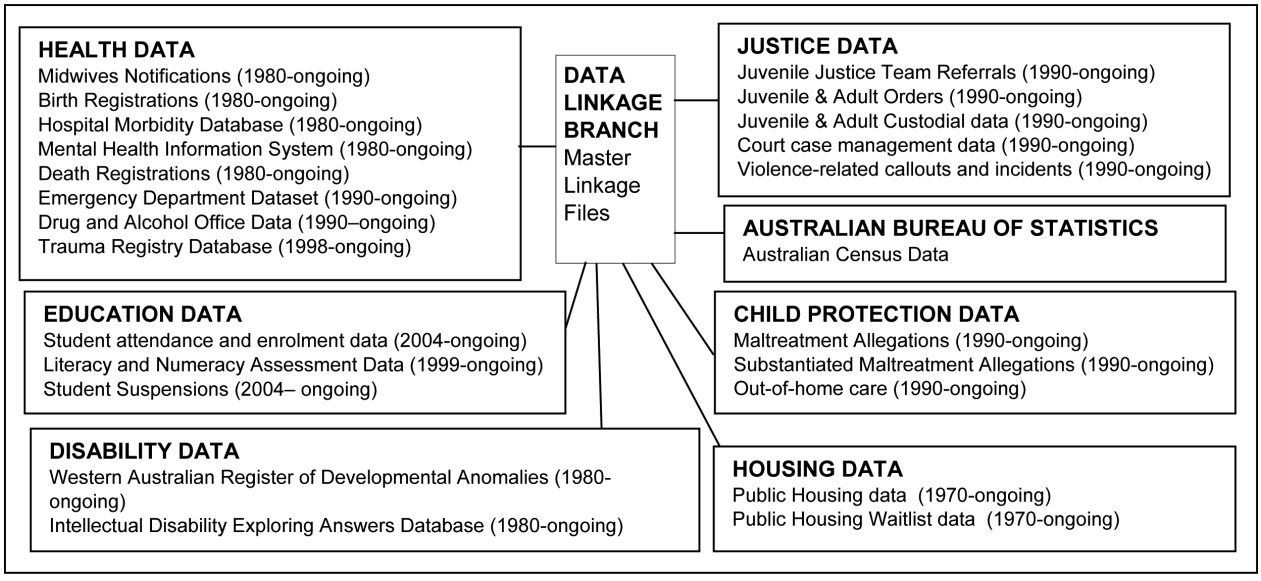

Figure 1: Linked government agency data

irritability, and feeding difficulties, resulting in a prolonged length of stay in hospital and intensive care. Maternal use of opiates and related substances during pregnancy is also associated with preterm births and poor fetal growth. Our research found a large rise in the rates of infants being born with neonatal withdrawal syndrome; however rates stabilised from 2002. Using linked data we also determined that infants born with neonatal withdrawal syndrome had a subsequent increased risk of child maltreatment (O'Donnell et al, 2009). This research led to an international study that looked at the rates of neonatal withdrawal syndrome across a number of countries (Davies et al, 2015). The study found that while rates increased and stabilised in Western Australia and England, they have risen in the United States and Ontario, Canada. This was thought to reflect better recognition and/or an increase in the use of prescribed opiate analgesics, such as methadone. These results highlight the need for prenatal and postnatal care of high risk mothers and their infants to promote improved outcomes.

Parents' mental health has been found to impact on their children in a number of areas including children's mental health, language development, behaviour and physical health. Research we have undertaken via the Developmental Pathways Project has found an increase in parental mental health issues over time, including an increase in the rate of mothers with a mental health diagnosis in the 12 months prior to birth (O'Donnell et al, 2013). The highest prevalence diagnostic groups were: substance-related disorders, depression and neurotic disorders; and adjustment and stress-related disorders.

Using the linked data, we were able to determine that mothers with a mental health contact had an increased risk of a child maltreatment allegation; and 48% of children involved in a child maltreatment allegation had a mother with a mental health contact (O'Donnell et al, 2015). In the cases of mothers who had had a mental health contact at any time prior to the maltreatment allegation, the allegations occurred, on average, when their children were aged four years; however in cases where mothers had a mental health contact during pregnancy, the allegations tended to arise sooner – on average when children were three years of age. All mental health diagnostic groups were associated with an increased risk of child maltreatment; however the highest risk was associated with mothers with an intellectual disability, organic disorder, disorders of childhood and psychological development, and substance-related disorders.

These findings underscore the need for targeted supports and services to be provided to families with a mental health issue in the early years. Australian organisations such as the Children of Parents with a Mental Illness (COPMI), which offers online resources for families such as specific parenting information and safety planning, are an example of the kind of support that can help tackle both the issues raised above, and the SDGs.

A group of children highlighted by the United Nations as requiring increased focus are children with disabilities. Children with disabilities are at higher risk of maltreatment than other children in our communities, therefore it is imperative that countries monitor and support this vulnerable group. Our research, using linked disability and child protection data, found that 29% of children with substantiated maltreatment had a disability (O'Donnell et al, 2013). Child maltreatment risk was highest for children with intellectual disability, conduct disorder, and other mental and behavioural disorders, and only slightly higher for children with birth defects/cerebral palsy. However for children with autism and Down syndrome, the risk of child maltreatment was lower than children without a disability. This research highlights the need for countries to be aware of the need for additional support for families of children with disabilities, both to meet their unique health and developmental needs and support parents in what can be a complex parenting environment with a range of challenging behaviours.

Geo-spatial mapping of administrative data

Linked administrative data can also facilitate monitoring at a geographic level. Systems of monitoring targets set for the SDGs need the capacity to evaluate outcomes on the basis of age, gender, socioeconomic group, ethnic origin, and place of residence, as key factors that predict vulnerability and disadvantage (Blas et al., 2008). Where people live can strongly influence their level of exposure to health-damaging factors, their vulnerability to poor outcomes, and the consequences of experiencing those poor outcomes (Marmot, Friel, Bell, Houweling, & Taylor, 2008). Place of residence can also significantly influence people's access to, experiences of, and benefits from, services aimed at addressing poor outcomes (Marmot et al., 2008). Geo-spatial mapping of data is therefore an important component of monitoring the health and wellbeing, educational achievement, and safety of children and young people.

Geographically-sensitive policy acknowledges the interconnections between the geographic distribution of services and the spatial patterns of risk and outcome (Dummer, 2008). Revealing these spatial patterns through data visualisation methods can inform our understanding of how area-level characteristics (e.g., school attendance rates, crime, health risks) may influence the arrangement of services in an area. The Developmental Pathways Project is currently developing an online interactive resource for Western Australia, which will map population-level administrative, census, registry, service, and survey data, aggregated at various levels of geography. Data included in the maps will be relevant to key indicators of development and wellbeing for children and young people, and services currently in place to support healthy development. This resource, termed the Child Development Atlas, will help identify areas of highest need and priority, facilitate monitoring of trends over time, and support a targeted focus for service delivery within specific jurisdictional areas. Resources such as the Child Development Atlas will increase our capacity for developing geographically-sensitive policy focused on achieving the targets set for the SDGs.

Mapping administrative data can also reveal spatial patterns in key indicators. For example, the Developmental Pathways Project recently contributed to the creation of maps for the Aboriginal and

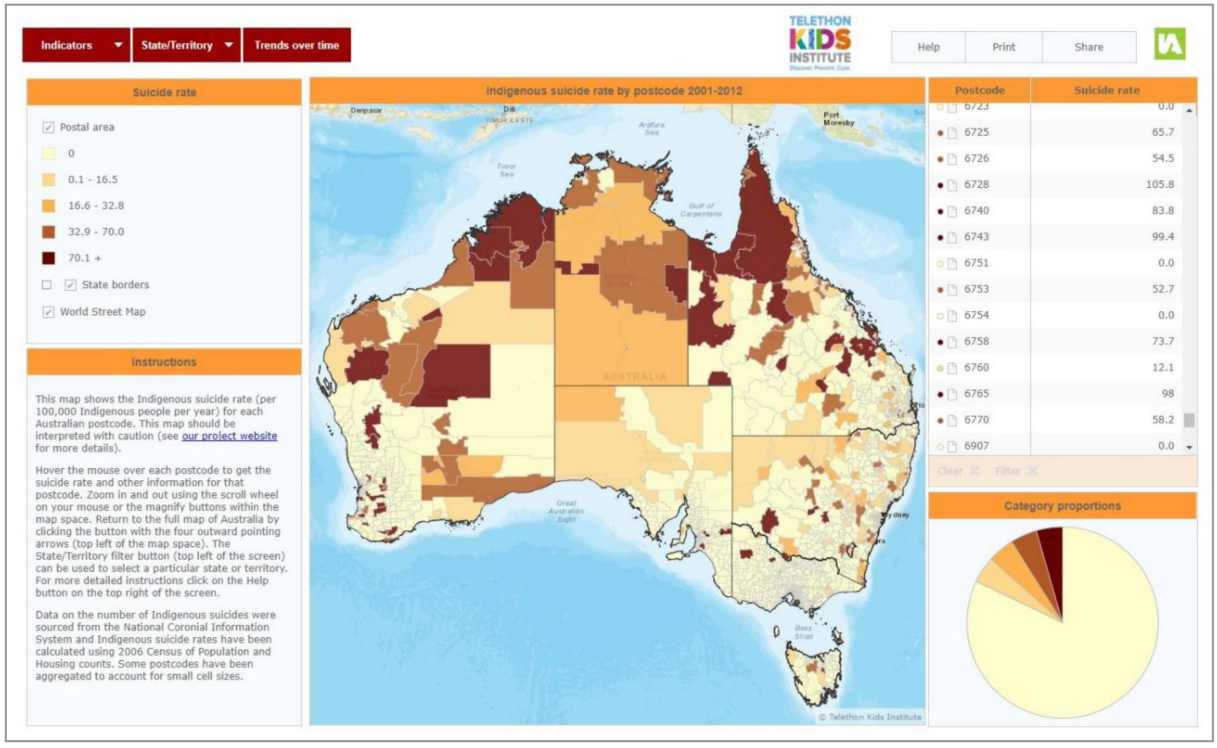

Figure 2: Example of administrative data mapping showing spatial profiles of suicides by Aboriginal and Torres Strait Islander peoples across Australia (Reproduced with permission from Farrant et al., 2015 https://www.telethonkids.org.au/our-research/early-environment/developmental-origins-of-child-health/aboriginal-maternal-health-and-child-development/atsispep/suicide-maps/suicides-by-regions/).

Torres Strait Islander Suicide Prevention Evaluation Project (ATSISPEP) using data from the National Coronial Information System (NCIS; Farrant, Sims, Shepherd & Walker, 2015). Suicide is one of the most common causes of death among Aboriginal and Torres Strait Islander peoples (Australian Institute of Health and Welfare, 2014, 2015). On average, over 100 Indigenous Australians end their lives through suicide each year, with the rate of suicide twice as high as that recorded for other Australians. The maps help to provide a visual insight into how the number and rate of Indigenous suicides can vary across different regions of Australia (Figure 2).

Addressing vulnerability is a complex and multi-faceted issue that requires the collective efforts of a number of different actors, to ensure all children and young people have access to safe, healthy, nurturing, and responsive living environments (Marmot et al., 2008). Efficient cross-sector coordination – and not isolated interventions – drives social change (Kania and Kramer, 2011). No single entity has the resources or authority to address the complex issues of vulnerability and disadvantage for children and young people.

Linked government data not only has the ability to monitor the SDGs but also to support their progress. A system of sharing data across agencies, in an easily comprehendible format (such as visual summaries), can facilitate inter-agency discussions about solutions, mobilisation of collective wisdom and expertise, and shared responsibility for implementation of solutions. Efficient collation of data across multiple agencies will facilitate the implementation of data informed strategies and interventions to enable more effective progress towards the SDGs.

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United Nations SDG Action Campaign

The United Nations SDG Action Campaign is a special initiative of the UN Secretary-General administered by the UN Development Programme (UNDP) and mandated to support the UN system-wide and the Member States on advocacy and public engagement in the SDG implementation.

Building on innovative and impactful engagement techniques deployed since 2002, the UN SDG Action Campaign intends to create awareness about the 2030 Agenda, empower and inspire people across the world to achieve the Sustainable Development Goals (SDGs) while generating political will, and help make the Goals attainable by 2030.

The UN SDG Action Campaign's Global Campaign Center in Bonn, Germany is central to the UN's strategy of providing real-time cutting-edge advocacy support, big data expertise and analytics to Member States and partners across the globe, especially at the country-level.

The UN SDG Action Campaign commits to:

- Engage stakeholders and individuals to support member states and UN Country Teams in the SDGs implementation through direct people's engagement
- Encourage public ownership of the SDGs in every country through creative and innovative communications, campaigning and policy advocacy
- Sponsor people-driven processes to strengthen accountability mechanism and monitor SDG progress through generation/collection of data, evidence, and sentiment about the impact of the SDGs

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Challenges and opportunities of urban big-data for sustainable development

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Abstract

Cities are the most critical arena for advancing sustainable development and there is a growing enthusiasm of and recognition for the potential of applying urban big-data towards solving urban sustainability challenges. However, while the promise of urban big-data is real, there is currently a wide gap between its full potential and its realization. This article offers a brief overview of different sources of urban big-data and gives examples of emerging applications for urban sustainability in the area of urban mobility and urban energy management. Furthermore, a discussion on the socio-technical challenges of urban big-data is presented. To advance the sustainability applications of urban big-data, policymakers, practitioners, and businesses should view the emergence of these innovations through a lens of 'hospitality'. Through this lens, cities may strengthen institutions to govern the development of urban big-data, enhance a grassroots culture for diffusing emerging sustainability innovations, and invest in university-led research and education.

Introduction

Cities, particularly highly dense urban areas, are at the nexus of economic and cultural development, environmental degradation, and are central to our visions of sustainable futures. Currently, half and by 2050 more than two-thirds of humanity will live in cities, generating the majority of economic activity, innovation and cultural advancement (United Nations, 2015). At the same time, cities will create environmental pollutants, consume higher amounts of energy and increase our vulnerability to natural hazards. Decoupling environmental impacts from economic development, improving energy efficiency, and reducing the risks and vulnerabilities in cities present highly complex challenges to policymakers, business leaders, and urban citizens. It is therefore with certainty that the battle for sustainable development will be fought, won or lost, in cities. The significant role of cities is reflected across the Sustainable Development Goals (SDGs) and specifically in SDG 11, which aims to "make cities and human settlements inclusive, safe, resilient and sustainable".

One of the most significant objectives of the SDGs is an emphasis on the collection, analysis, and integration of data relevant to sustainable development. Reflecting this importance, the United Nations has called for a 'data revolution' to develop objective targets and scientifically grounded indicators to monitor progress, implement strategies, allocate resources, and increase the accountability of stakeholders toward sustainable futures. Towards this end, many sustainability researchers and practitioners view urban big-data as having a unique potential to develop, experiment with, and advance sustainable development in cities. The predictive analysis associated with big-data innovations has the potential to empower people and change how urban residents interact with each other, their surrounding environment, and urban infrastructures. However, the technological affordances associated with such innovations are in their infancy and their challenges and opportunities need to be better clarified and understood.

What is urban big-data?

Urban big-data results from massive amounts of dynamic and static data from urban infrastructures, facilities, organizations, and individuals which have been collected by urban governments, public and private enterprises, individuals, and citizen-scientists using a new generation of information technologies. These emerging technologies include, for example, radio-frequency identification (RFIDs), Internet of Things (IoTs), smart grids, and other future applications of information technologies to urban management. Urban big-data can be categorized into five main types: sensor systems, user-generated content, administrative data, private sector transactions data, and data from arts and humanities collections (Thakuriah et al., 2017). A summary of each type and example of the each urban big-data category is provided in Table 1.

Sensor systems refer to urban sensors that can generate data on the supply, demand, availability, and or inoperability of urban infrastructure which urban citizens interact with on a daily basis. These include, for example, transport systems, buildings, water utilities, vehicle movement, street lighting, and other remote sensing applications. These sensor systems can potentially be designed to communicate and interact with one another and achieve a future where the Internet of Things (IoTs) dynamically manages urban functions.

User-generated content refers to data created or crowd-sourced by urban citizens. Through the use of sensors or social media, individual urban citizens generate social, economic, and cultural data. These can be focused on feedback in solving daily urban problems, e.g., user generated urban traffic reports, or more long-term urban planning issues, e.g., development of pedestrian and commercial zones. User generated data can provide a live and rich source of data on urban activities and community behaviors.

Table1: Established and emerging sources of urban big-data

Type	Example
Sensor systems (infrastructure-based or moving object sensors)	Environmental, water, transportation, building management sensor systems; connected systems; Internet of Things
User-Generated Content ("social" or "human" sensors)	Participatory sensing systems, citizen science projects, social media, web use, GPS, online social networks and other socially generated data
Administrative (governmental) data (open and confidential micro-data)	Open administrative data on transactions, taxes and revenue, payments and registrations; confidential person-level micro-data on employment, health, welfare payments, education records
Private sector data (customer and transactions records)	Customer transactions data from store cards and business records; fleet management systems; customer profile data from application forms; usage data from utilities and financial institutions; product purchases and terms of service agreements
Arts and humanities data	Repositories of text, images, sound recordings, linguistic data, film, art and material culture, and digital objects, and other media

Source: Thakuriah et al., 2017

Administrative data refers to daily micro-data collected by urban governments. This may include data for example on sales tax, income tax, building licenses, real-estate transactions, and vehicle registrations. These administrative micro-data are usually of high quality and conducive to public data innovations as they become increasingly available through open-data initiatives. Despite common challenges associated with data governance and privacy, many cities throughout the world are supportive of open-data initiatives.

Private sector data refers to customer transaction data generated by companies. This may include customer profiles, marketing data, and data on consumption trends. Such data can be beneficial for understanding and predicting consumption demands of key urban resources such as water and energy.

Arts and humanities data refers to highly unstructured data that portray urban life through artistic expressions. These data sources include, for example, art, film, media repositories, images, and texts. Such data not only enhances the creativity but also importantly increases the capacity of researchers and practitioners towards more constructive public stakeholder engagement and diffusion of innovations.

Applications of urban big-data for sustainability solutions

The emphasis of urban big-data is not only on the importance of size and variety of the data obtained, but on what new insights can be achieved and how it can enhance existing tools and indicators relevant to urban sustainability. While there is no doubt that we are witnessing a significant growth in volume, variety, velocity, and veracity of urban data, how such data can be interpreted to address and facilitate innovations towards solving many of our sustainability challenges is less clear. The emergence of big-data therefore needs to be acknowledged with caution and avoided to be overused as a buzzword without any clear direction for solving pressing wicked urban sustainability problems. Two areas which urban big-data has major potential to solve persistent urban challenges and lead to sustainable transformations are urban mobility and urban energy management.

Urban mobility

New urban transportation approaches resulting from urban big-data analytics that encourage ride sharing, route optimization, and on-demand vehicles can significantly clean up traffic congestion and result in lowering air and noise pollution levels. In this avenue, Seoul Metropolitan Government's effort to develop new transportation routes for the city's late night commuters is a good example. During late night and early morning hours, Seoul's citizens, especially low-income workers, had difficulty in finding reliable, safe, and inexpensive transportation to commute to work. As night bus services were not in operation and few metered taxis available, people were forced to use expensive and illegal makeshift taxis which would at times even refuse to take on the late-night passengers. In response, city officials decided to establish new night bus routes for the burgeoning metropolis. However, the city officials were not certain of the most effective and optimized routes that would cater to public demand. In search of a solution, city officials analyzed late-night mobile phone call usage patterns to better understand common departure and destination points across the city's urban hubs and outer districts (Seoul Metropolitan Government, 2017). This urban big-data approach allowed city planners to develop a route map that could optimally serve the city's late night commuters.

Traffic congestion is one of the costliest challenges endemic in all cities which drastically increase the wasting of fuel, loss of productive work time, and air pollution. Urban big-data is enabling cities to find new solutions to tackle the wicked problem of traffic congestion through ride-sharing. In New York City, new regulations require all taxis, including private for-hire vehicles such as Uber, Lyft, and other companies, to release all ride data to the city's databases (TLC, 2017). This comprehensive database includes pickup and drop off locations, duration, fares, and other details of each passenger trip

within the city. This database will enable research on car-sharing approaches and transport optimization strategies based on the size, capacity, and travel time of the city's taxi fleet. Ride-sharing strategies can significantly reduce congestion, pollution, and fuel consumption. In this avenue, through the use of New York City's taxi transportation data, researchers have demonstrated that only 2,000 vehicles (only 15% of the city's taxi fleet) can potentially serve 98% of the city's taxi demand through ride-sharing and route optimization (Alonso-Mora et al., 2017). Such data-driven innovations are especially well suited to the emergence of future autonomous vehicles serving highly congested urban areas.

Urban energy management

Urban big-data can strengthen our capacity for sustainable transformations by increasing the ability to measure environmental flows and to employ environmental accounting of natural resources, energy, and pollutants. In highly dense urban regions, residential and office buildings are responsible for significant amounts of energy consumption and production of pollution. One of the most challenging aspects of improving the energy efficiency of a city has been the complex task of measuring energy use at the level of individual buildings. Towards this end, to gain more insight on how buildings are using energy and identify poorly performing buildings, cities around the world are legislating new data laws whereby building owners and managers are required to share their energy use data with city officials. New York City's Local Law 84 is one example of such legislation which currently requires large and from 2018 onwards mid-size buildings to evaluate and report both their energy and water usage (City of New York, 2009). By doing so, city officials can benchmark the energy efficiency of a city and compare buildings based on attributes such as age, size, and use type with their local peers and implement policies and incentives to maximize the building's energy efficiency with available technologies and practices. In the next step, cities are not only seeking more granular building energy use data, i.e., monthly, daily, and data from smaller size buildings, but also information on buildings assets. Building asset data refers to, for example, the age and model of the heating and cooling infrastructure of a building or insulation design and window configurations. These additional data can enhance the ability of city officials and energy saving businesses to target buildings with energy efficiency policies, practices, training, and technological diffusion strategies.

Challenges of urban big-data

The potential of urban big-data and its opportunities for policies and strategies relevant to sustainability is increasingly broadly recognized by both the public and private sectors. However, the analysis of data and its innovative applications have not yet reached a solid level of maturity. While the size and variety of data are increasing and urban policymakers and businesses are formulating strategies to support open-data initiatives; for many urban sustainability challenges, the data analysis and interpretation necessary for extracting actionable knowledge remain as clear bottlenecks. Furthermore, as the value of data significantly grows when it can be linked with other data, data-integration of the various types of urban big-data is still a major challenge. In this avenue, urban policymakers and businesses should be cautious in avoiding technological lock-ins and non-interoperability of urban big-data sources. Technological lock-in refers to a form of path dependence whereby a specific technological standard prevails and the city is locked-in to the standard even though new and better alternatives emerge in the market. The risk of technological lock-in is that a city may be locked-in to proprietary or black-box operating systems and lose control of critical urban data and information relevant to the management of urban infrastructures. Non-interoperability refers to the risk where an urban system's main infrastructure and databases are unable to communicate and exchange data with one another. The risk of non-interoperability is that a city would maintain, for example, different sensor networks solutions for its water, energy, and waste infrastructure, where each network could not communicate with the other in a standardized way. This would in effect reduce the value of the urban data generated by hindering critical data linkages. Therefore, urban policymakers and businesses should avoid creating dependence on very few technology providers and consider more support for open-source and inter-operable urban big-data practices.

In addition to technological challenges, the challenges of urban big-data from the viewpoint of public policy also need to be thoroughly considered. Given the infancy of urban big-data and its applications relevant to sustainability challenges, urban policymakers, practitioners, and businesses should approach urban big-data through what the late Claudio Ciborra termed as the lens of 'hospitality' (Ciborra, 2004). Through this lens, we are able to extend courtesy to the unknown and at times alien technological culture of urban big-data and therefore are able to implement its affordances and better understand its advantages and disadvantages. Towards this end, cities can be more hospitable, receptive, and open-minded to urban big-data and enhance its applications towards urban sustainability by establishing and strengthening mayoral institutions specific to the governance of urban big-data, enhancing a grassroots culture for applying big-data, and investing in university-led urban big-data research.

Developing urban institutions for the governance of urban big-data

At the heart of applying urban big-data towards sustainability are urban citizens and their daily life and business activities. This people-centric perspective requires urban policymakers to focus on what actors and stakeholders should be involved and what incentives and concerns would be important in the diffusion and application of big-data innovations. These issues are best approached by central mayoral or urban institutions which can govern, compile, legislate, standardize, and financially support urban big-data initiatives. In this avenue, New York City Mayor's Office of Data Analytics (MODA), London's City Data Team, and the position

of Chief Technology Officer in Amsterdam are pioneering institutions in governing the emergence of urban big-data innovations for sustainability practices. An increasing need for mayoral institutions to govern urban big-data is not surprising; as with other urban utilities such as water, electricity and natural gas, data can also be viewed as a utility requiring public control and regulation.

Through such institutions, the collective hospitality of a city towards the emergence of urban big-data can better accommodate and respond to its many challenges. These challenges may include data ethics, privacy, and potential frictions that urban big-data innovations may have with traditional urban dynamics and business models. Through such institutions, a city can also better address the interoperability of various infrastructures and sensors and provide leadership in legislation concerning data access, ownership, and support for open-data initiatives. Open-data facilitates knowledge sharing and promotes citizen participation, transparency, the reduction of information inequality, and grassroots democratic engagement among urban citizens (The World Bank, 2015). Open data is especially beneficial towards decreasing the risk associated with data accessibility and affordability and for fostering innovative solutions to social, economic, and environmental challenges of urban sustainability.

Enhancing a grassroots culture for applying urban big-data

The planning, design, and diffusion of urban big-data are often viewed in the capacity and responsibility of large information technology corporations. However, a top-down approach to the development of urban big-data may not successfully engage urban citizens and may weaken data openness, transparency, and inclusiveness. Indeed, cities must strike a delicate balance between heavyweight technological corporations and the general public, urban communities, and technically-skilled activists. Without such a balance, cities risk a repeat of urban conflicts setting central urban planners like Robert Moses against community activists such as Jane Jacobs (Townsend, 2013). Cities are inherently organic ecologies and urban sustainability should be viewed as challenges of organized complexity. As we have witnessed before, rationalistic, central, and top-down urban planning approaches are at times in conflict with the organic qualities of a city. The risk of such conflicts can also be expected through the emergence of urban big-data innovations.

Through a grassroots approach, information asymmetries between large information technology corporations and local communities can be minimized and emerging innovations better contextualized within the urban communities. By empowering urban citizens and local community businesses, the risk of disadvantaging segments of society without the knowledge or skills sets necessary to benefit from urban big-data innovations can also be minimized. Inclusive and grassroots approaches for urban big-data allows for the maximization of the collective intelligence of society, the promotion of pluralism, and digital democracies (Helbing and Pournaras, 2015). By enhancing a grassroots culture and strengthening common skill sets necessary for leveraging big-data applications, urban citizens can begin to crowdsource innovations and measure their progress in tackling urban sustainability challenges.

Investing in urban big-data research and education

Universities and research institutions should lead the 'hospitality' towards urban big-data and use cities as both laboratories and classrooms in applying the emerging technologies towards solutions for urban sustainability challenges. A critical challenge for urban big-data continues to be its transdisciplinarity and the lack of people with specialized skills and focus in the area. Common skills and knowledge relevant for advancing big-data for urban sustainability are for example statistics, database engineering, data mining, geographic information systems (GIS), spatial analysis, programming, and information systems design and management. By investing in research and education and university-industry collaboration in urban big-data, a new generation of transdisciplinary researchers and practitioners can be trained to innovatively leverage data towards tackling urban sustainability problems. Towards this end, the emerging field of urban informatics is gaining importance among educational institutions around the world. Urban informatics is a transdisciplinary field which focuses on the broad overlap of people, places, and technologies (Goodspeed, 2017). Pioneering educational programs and research laboratories in this field are the Center for Urban Science and Progress at New York University; Amsterdam Institute for Advanced Metropolitan Solutions; The Bartlett Centre for Advanced Spatial Analysis at the University College London; Senseable City Lab at the Massachusetts Institute of Technology; Urban Informatics Research Lab at the Queensland University of Technology; and The Beijing City Lab. These institutes focus on interdisciplinary research on the science of cities and are well placed in training future urban big-data specialists and piloting solutions to the social, environmental, and economic problems of urbanizations.

Conclusions

Cities are the most important arena in humanity's battle for sustainable development and as emphasized in the 11th SDG, our visions of sustainable futures cannot be achieved without significantly transforming how urban spaces are managed. In this avenue, the emergence of big-data innovations presents a unique opportunity to leverage large and varied urban data towards better decision making and strategies for tackling urban sustainability challenges. While the five categories of urban big-data, i.e., sensor systems, user-generated content, administrative data, private sector transactions data, and arts and humanities data, continue to increase in quality and availability, the challenge remains to explore their collective synergies and applications towards urban sustainability challenges. Two areas with significant potential for channeling big-data towards urban sustainability solutions are in urban mobility and energy management. Through targeted legislation and practices cities can benefit from urban big-data analytics and tackle the problems of urban

traffic congestion and excessive building energy use and pollution.

However, before the potential of urban big-data can be fully realized, many socio-technological challenges described in this article must be addressed. These challenges include not just the obvious technical data issues ranging from data acquisition to interpretation but issues of innovation management such as technological lock-ins and non-interoperability of urban big-data sources. Furthermore, the challenges of urban big-data from the viewpoint of public policy can be approached through a lens of 'hospitality', whereby policy-makers, practitioners, and businesses can be more receptive and open-minded towards the technology's emergence and its sustainability applications. Specifically, cities can strengthen institutions which can govern and guide the development of urban big-data, enhance a grassroots culture for applying and diffusing emerging sustainability innovations, and invest in university-led specialized research and education programs on urban big-data. Urban big-data has the potential to advance urban sustainability; however, big-data is not a magic bullet and it is imperative to encourage new perspectives on its challenges and opportunities towards the sustainable transformation of the management of cities.

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Role of Big Data in SDG Implementation

The Center for Strategic and International Studies (CSIS) Project on Prosperity and Development and the Japan International Cooperation Agency (JICA) Research Institute have launched a report titled, 'Harnessing the Data Revolution to Achieve the Sustainable Development Goals: Enabling Frogs to Leap,' which defines the data revolution and identifies challenges and opportunities that it presents for implementing the SDGs. The report reviews the necessary elements for an enabling environment to leapfrog data technologies, presents country case studies, identifies key challenges in executing the sustainable development data agenda, and provides recommendations for how the international community can play a constructive role in the data revolution. Among the leapfrog data technologies that could support data collection and the formulation of policy based on data are satellite mapping, wearable technology, and cellular technology, such as mobile banking.

To play a constructive role in the data revolution, the report recommends that the international community: focus on the foundation necessary to facilitate leapfrogs around all types of data; increase funding for capacity building as part of an expansion of broader educational development priorities; highlight, share and support government-driven approaches to data; increase funding for the data revolution and coordinate donor efforts; coordinate UN data revolution-related activities with an expanded Global Partnership for Sustainable Development Data (GPSDD); and secure consensus on data sharing, ownership and privacy-related international standards.

For more information, access:

https://www.csis.org

BIG DATA FOR SUSTAINABLE DEVELOPMENT

GLOBAL INITIATIVES AND NETWORKS

Compiled by

Asian and Pacific Centre for Transfer of Technology

Guidance Note on Big Data for SDGs

http://www.undg.org

This document sets out general guidance on data privacy, data protection and data ethics for the United Nations Development Group (UNDG) concerning the use of big data, collected in real time by private sector entities as part of their business offerings, and shared with UNDG members for the purposes of strengthening operational implementation of their programmes to support the achievement of the 2030 Agenda.

The Guidance Note is designed to:

- Establish common principles across UNDG to support the operational use of big data for achievement of the Sustainable Development Goals (SDGs);
- Serve as a risk-management tool taking into account fundamental human rights; and
- Set principles for obtaining, retention, use and quality control for data from the private sector.

The guidance described in this document acknowledges and is based on the UN Guidelines for the Regulation of Computerized Personal Data Files, adopted by the UN General Assembly resolution 45/95, and takes into account both existing international instruments and relevant regulations, rules and policies of UNDG member organizations concerning data privacy and data protection. This Guidance Note is based on standards that have withstood the test of time, reflecting the strength of their core values.

Global Partnership for Sustainable Development Data

http://www.data4sdgs.org

The Global Partnership for Sustainable Development Data is an open, multi-stakeholder network working to harness the data revolution for sustainable development. The Data4SDGs Highway helps access valuable data to support the SDGs and transform these into effective applications and visualizations to further enable action and decision making. The Global Partnership has also identified 12 key "plays" drawn from successful practices from the private sector and government that, if followed together, will help developers build better digital services in support of the SDGs.

Global Pulse

https://www.unglobalpulse.org

Global Pulse is a flagship innovation initiative of the United Nations Secretary-General on big data. Its vision is a future in which big data is harnessed safely and responsibly as a public good. Its mission is to accelerate discovery, development and scaled adoption of big data innovation for sustainable development and humanitarian action.

The initiative was established based on a recognition that digital data offers the opportunity to gain a better understanding of changes in human well-being, and to get real-time feedback on how well policy responses are working. To this end, Global Pulse is working to promote awareness of the opportunities Big Data presents for sustainable development and humanitarian action, forge public-private data sharing partnerships, generate high-impact analytical tools and approaches through its network of Pulse Labs, and drive broad adoption of useful innovations across the UN System.

Global Pulse functions as a network of innovation labs where research on Big Data for Development is conceived and coordinated. Global Pulse partners with experts from UN agencies, governments, academia, and the private sector to research, develop, and mainstream approaches for applying real-time digital data to 21st century development challenges.

Environment Live

http://environmentlive.unep.org

Environment Live provides the UN Member States open access to information and knowledge on the environment

at the global, regional and national levels. It supports Environmental Policy through Foresight, Outlooks and Assessments and providing Capacity Building for countries to achieve the Goals of Agenda 2030 and Sustainable Development. Environment Live provides up-to-date information for citizen-science, communities of practice and impact stories and case-studies on the environment and people.

Environment Live is a dynamic on-line platform for sharing contextualized data and knowledge to keep the environment under review. Environment Live principles promote open access to national data and knowledge connecting to open data portals, harvesting data from country websites and making it accessible and available. More than 3455 data flows from 193 countries are available in Environment Live and the platform is continuously updated. Environment Live offers countries multiple benefits e.g. increasing visibility of a country's progress and enhancing transparency facilitating interdisciplinary research and integrated research environmental assessments; advancing knowledge and enriching information-sharing.

SDG Data Science Lab

The United Nations Economic and Social Commission for Asia and the Pacific (ESCAP) and the Statistical Research Institute, Statistics Korea co-organized a Forum on Innovative Data Approaches to the Sustainable Development Goals (SDGs) from 31 May to 2 June in Incheon to explore the latest innovative data methods and find ways to use big data to monitor the SDGs. The Forum discussed the elements of a regional platform for sharing and scaling up innovations in big data and analytics in ESCAP. Dubbed "SDG Data Science Lab," the platform will be accessible to teams and individual researchers in governments, academia, the private sector, international and other organizations who wish to share and experiment with different types of big data in a safeguarded online environment. The platform also provides a valuable tool for ESCAP to support capacity building in government agencies and for other stakeholders interested in big data in the Asia-Pacific region.

Data-Pop Alliance

http://datapopalliance.org

Data-Pop Alliance is a global coalition on Big Data and development created by the Harvard Humanitarian Initiative, MIT Media Lab, and Overseas Development Institute that brings together researchers, experts, practitioners, and activists to promote a people-centered Big Data revolution through collaborative research, capacity building, and community engagement.

Big Data for Social Good

https://www.gsma.com/betterfuture/bd4sg/

To respond effectively and efficiently to the spread of infectious diseases, pollution, earthquakes and other disasters, governments and NGOs need to know where the impacted people are, in which direction they are moving and how the environment is changing. Mobile operators can help provide that information, while respecting individuals' privacy and safeguarding personal data. Through the Groupe Speciale Mobile Association (GSMA), mobile operators are establishing a common framework and ecosystem approach that can support strategic planning, decision-making and support preparedness and response to help people recover from a disaster, contain an epidemic and contend with environmental pollution. Backed by 19 operators accounting for over two billion connections in over 100 countries, the GSMA's Big Data for Social Good initiative is developing a consistent approach and processes mobile operators can use to share insights with public agencies and NGOs, while building an ecosystem to support timely planning and response.

Sustainable Development Goals Report 2017

The Sustainable Development Goals Report 2017 is the annual assessment of global and regional progress towards the Goals. The Report provides an overview of the world's implementation efforts to date, highlighting areas of progress and areas where more action needs to be taken to ensure no one is left behind. This year's report finds that while progress has been made over the past decade across all areas of development, the pace of progress has been insufficient and advancements have been uneven to fully meet the implementation of the SDGs. The report is based on latest available data on selected indicators of the global SDG indicator framework, prepared by UN DESA with inputs from a large number of international and regional organizations.

For more information, access:

https://unstats.un.org/sdgs/report/2017/

A RICH MAN'S WORLD: BIASES OF BIG DATA IN A DEVELOPMENT CONTEXT

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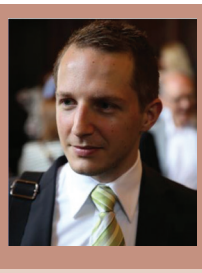


Abstract

Big data is becoming increasingly prominent within the 2030 Sustainable Development Agenda as new avenues for data generation and analysis open up. Analysing mobile phone records to inform development policy is one of the emerging options. Yet, because mobile phone records are the digital footprints of mobile phones used by a specific part of the population, they are unlikely to represent broader populations or the specific sub-groups that might be targeted by development policies and interventions. This article describes case studies from rural India and China to illustrate the variations among mobile phone users who would ultimately produce the digital signatures for big data analyses. Compared to the average population, phone users are more likely to be young, educated, wealthy men, whose behaviours, lives, and constraints are probably different from people who do not use mobile phones. This potential bias does not render big data unusable, but it will require the continued use of complementary conventional data in order to anchor it in local realities and to avoid systematic analytical biases. Big data can be an additional tool to inform development policy, but it cannot dictate policy on its own.

Introduction

The interest is growing to support the 2030 Sustainable Development Agenda through big data – the increasingly well-known application of new analytical procedures to large amounts of digital data produced intentionally and unintentionally. As you are reading this, the potential of big data is being explored through pilot projects around the world, research publications are being drafted, and national and international workshops are being convened at fora like the United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP).

Big data means many things to many people (Spratt and Baken, 2015), and its definitions range from large amounts of data (e.g. genetic databases, digital administrative data, satellite imagery) to a completely new data infrastructure and ecosystem. This article focusses on the sub-set of data produced through the operation of mobile phones because phones are now a days seen as "ubiquitous" in low- and middle-income countries and their data has been used in a number of cases that are relevant for big data and sustainable development (Pestre *et al*., 2016; Wesolowski *et al*., 2013). For example:

- **Natural disasters:** Pastor-Escuredo *et al*. (2014) measured the operation of mobile phone towers and the number of connected mobile phones during floods in Mexico. After relating their data to satellite images and census data, the authors conclude that this type of mobile network data could support crisis responses and disaster impact assessments.
- **Smart cities:** Jiang *et al*. (2013) used more than 800 million mobile phone geolocation records from 1 million phone users in Boston to reconstruct people's travel patterns within cities. Their work offers possible applications in urban land use and transport planning for fastgrowing cities around the world.
- **Spread of disease:** A popular example of social media data analysis is the study by Chunara *et al*. (2012), which used data from *Twitter* and the *HealthMap* platform (which aggregates public information alongside data submitted by users of a smart phone app). The researchers found that social media data can provide early information about disease outbreaks, which can help with the response to outbreaks and complement existing disease surveillance activities.
- **Poverty assessment:** Blumenstock *et al*. (2015) analysed 1.5 million call records maintained by mobile network operators to measure changes in economic wellbeing in Rwanda, arguing that these estimates are more timely and geographically more precise than conventional survey data. This could help policy makers to allocate financial resources for development more effectively across regions.

These examples suggest that big data could play a role in supporting the 2030 Sustainable Development Agenda. Mobile network operators have even offered their data specifically for development research, as in the case of Orange's "data for development" challenge (Boullé *et al*., 2014; Taylor and Schroeder, 2015). Yet, researchers have also warned repeatedly against the overenthusiastic adoption of big data because it could skew development policy and reinforce (digital) inequality within and across countries (Hilbert, 2016; Read *et al*., 2016; Shearmur, 2015; Spratt and Baken, 2015; Taylor and Schroeder, 2015). One facet of this problem – and the focus of this paper – is the questionable representativeness of the data that feeds into big data analyses (Chunara *et al*., 2012; Pestre *et al*., 2016; Shearmur, 2015; Wesolowski *et al*., 2013). By focusing on this specific challenge, my aim is not to debunk

big data, but to clarify some of its limitations alongside other policy tools.

Measurement challenges

The enthusiasm to use mobile phone data is high, and the aforementioned examples are only a fraction of the many applications that may inform sustainable development. It is tempting to declare the large volume of fine-grained mobile phone data to be superior to conventional data collection methods (Hilbert, 2016). For example, research by Boase and Ling (2013:514-515) and Blumenstock and Eagle (2010:8) compared user-generated mobile phone data with people's recalled mobile phone use in conventional survey questionnaires. Their conclusions that questionnaire data "generally do not compare favorably" to mobile phone records seems to suggest that mobile phone records are more accurate than survey data (Boase and Ling, 2013:515).

This need not be the case. Mobile phone records are shaped by the mobile users who produce these data. This can bias the conclusions we derive from big data analyses, irrespective of how large the data set is. For instance, it is important to know for measurement and interpretation whether we capture ownership or actual use of a mobile device or app (Aral *et al*., 2009; Aral and Walker, 2012), and whether we are able identify the actual owners and users.

It is easy to assume that mobile phone records relate directly to individual users, but a wide range of social sciences research has shown that the data produced by the operation of a single SIM card would not map very neatly onto the behaviour of a single phone owner, or user, or person who ultimately benefits from the phone use (Chipchase, 2006; Dey *et al*., 2011; Hahn and Kibora, 2008; Horst, 2006; Jeffrey and Doron, 2013; Ling, 2008; Ndiaye and Zouinar, 2014). People routinely share, borrow, hand down, help out with, or lose phones, or they use multiple phones for different purposes like business and social calls. In addition, mobile phone records easily miss a wide range of mobile phone uses, for example communication via instant messengers such as *Skype* or the use of in-built functions like calculators or music players. Not all of these uses and channels are necessarily relevant from a development perspective, but on the basis of phone records alone, it is difficult (if not misleading) to judge what types of mobile phone use matter to inform development policies and interventions.

Statistical techniques can help to reduce misrepresentation to an extent, but it is unlikely to remove it altogether because people who do not produce information using mobile phones may behave fundamentally different from those who do (Miller, 2010). (In a related study, my colleague Proochista Ariana and I made this point by analysing people's healthcare choices when they use a mobile phone; see Haenssgen and Ariana, 2017). If used out of context, it is therefore difficult to interpret the meaning of mobile phone records and what kinds of behaviours and lives they represent (Pestre *et al*., 2016). Big data analyses using mobile phone data may therefore be biased, and development strategies on this basis could potentially reach the wrong target groups (Wesolowski *et al*., 2012).

A potential bias need not be an actual one, and its impact will depend on the purpose of the analysis (e.g. Are we estimating individuals' living conditions; are we identifying the onset of a disease outbreak; or are we approximating population movements?). Pestre *et al*. (2016) argue that "sufficient ground truth data" is required to assess whether the data is biased, and whether corrections to the data analysis can rectify the problem. Ground-truthing big data matters especially in the context of the Sustainable Development Agenda, whose goals of equality and inclusion may be undermined if big data analyses represent and privilege those people who are already better off.

Case studies in rural India and rural China

Is there actually a mismatch between data and reality, or is this just a hypothetical problem? I carried out research in rural areas of India and China between 2013 and 2014 to understand what the gradual spread of mobile phones means for the local populations. I interviewed 231 people and surveyed 800 villagers across the two states of Rajasthan (India) and Gansu (China).

On the face of it, the extent of mobile technology access seemed favourable for mobile phone data analysis. Four out of five survey households in Rajasthan owned a

Mobile phone tower (rural Gansu)

mobile phone; and nine out of ten in Gansu. Because people shared and borrowed these phones, 96% in Rajasthan and 85% in Gansu reported that they have access to a phone. Amongst the phones to which people have access, nearly a third in Rajasthan and more than two-thirds in Gansu were Internet-enabled feature phones or smartphones.

This suggests that mobile phone use is widespread, and a few of my interviewees did indeed report intensive mobile phone use, for example, a 24-year-old woman in Gansu who is

> *"generally 24 hours a day online [on the phone]."*

Similarly, a 34-year-old man in Rajasthan reported that,

"I always do calculations in my phone. I also use the alarm, the calendar, and check the time in my phone. I use the Internet and Facebook as well. I listen to music and watch videos on the phone."

Savvy users thereby migrated gradually from traditional channels of communication like text messaging to new ones, like instant messaging – as shown for example by a 22-year old male smartphone owner in Gansu:

"I call directly or do QQ chat. Now I rarely send text messages, only a few messages per month"

Yet, such statements were not the norm. Beneath the surface, many people had difficulties accessing and using mobile phones. Intermittent mobile phone signals were the least of these problems. In the comparatively poor and remote areas of rural Rajasthan and Gansu, people would rather be cost-conscious and minimise phone expenses, which was reported by a 73-year-old man who owned a mobile phone but stated that,

"We don't call every single day because we are poor and we don't have money. Only some-times when we miss our friends or relatives, then we call. When we call, then we make only short calls, because it is a waste of money if we talk for a long time."

For people were not fully familiar with the various functions of a mobile phone, cost-consciousness took an extent that even prevented them from learning new functions. Trial-and-error gone wrong can cost dearly, and so a 60-year-old woman in Rajasthan would argue that,

"I never call anyone, so I never press a wrong button."

Sharing arrangements within and across households complicated mobile phone use yet further. Within one family, older people and illiterate often asked other persons to operate the phone for them altogether, while borrowing phones across households could become tedious. Women in a discussion group in Gansu shared the following experiences:

I can only answer when someone picks it up or dials, and then I speak to my daughter.

If your phone doesn't work, you can get help from others, people will help each other.

I feel bad when I borrow, and it's hard to borrow a phone.

Sometimes they wouldn't lend. They would say to be out of power or out of service.

Despite the seemingly widespread access, people continued to experience difficulties in learning, using, or borrowing mobile phones. High rates of access therefore did not mean that mobile phones were "ubiquitous."

Mobile phone user (rural Rajastan)

A big data world: masculine, young, rich, literate

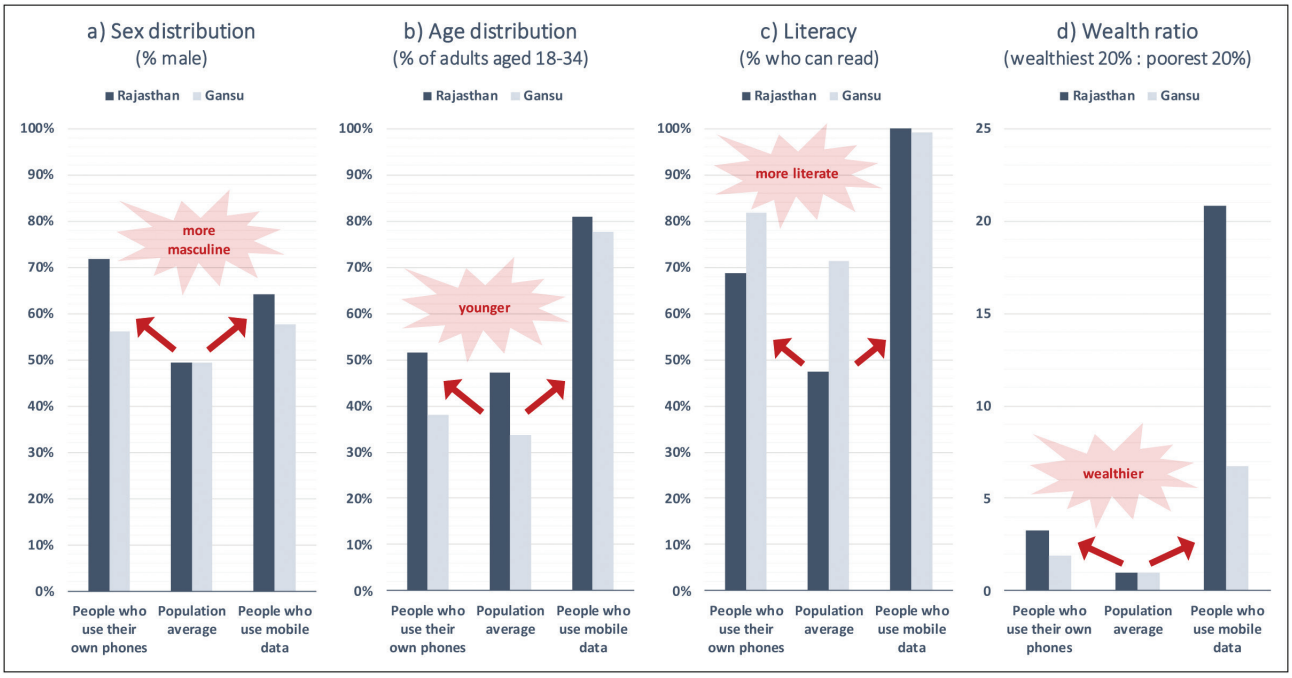
These patterns make it doubtful that mobile data truly represent local populations in rural Gansu and Rajasthan. Let us therefore take a closer look at the characteristics of people who would potentially generate big rural mobile phone data.

Two groups of people would be particularly relevant for the use of big data analyses: The first group consists of people who use their personal mobile phones. This group would leave digital signatures (e.g. call records) that can enable estimates of sub-population wealth and mobility to target national development programmes more effectively (Blumenstock *et al*., 2015). This group comprised 47% of all adults in 2014 in rural Rajasthan, and 77% in Gansu (based on people who used their phone at least once a year according to my survey data).

For development-related analyses, this group would face the disadvantage that call data are specific to the mobile handheld, which is often shared, borrowed, or handed down to other people. A different relevant group would therefore be people who leave device-independent digital signatures, for instance on *Twitter*, *Facebook*, or instant messengers (Chunara *et al*., 2012; Kalampokis *et al*., 2013) – regardless whether they use their own or somebody else's mobile phone. This group is smaller, consisting of 3% of adults in rural Rajasthan and 32% in rural Gansu (based on people who used mobile Internet on any phone at least once a year).

Using the survey data from Rajasthan and Gansu, the graphs in Figure 1 compare the characteristics of these three groups: the general population (centre bar), people who use their own mobile phone at least once a year (left bar), and people who use the mobile Internet at least once per year. In short, compared to the average population, the groups that would produce "big data" were typically wealthy and more educated young men.

The general population within the survey was relatively balanced in terms of sex distribution, with 49% of the surveyed adults being men in both survey sites (Panel a; the survey data was adjusted



Note: Survey data from 798 respondents across rural Rajasthan and rural Gansu, population-weighted for increased representativeness.

Figure 1: Characteristics of general population vs. different types of phone users in rural Rajasthan and Gansu

through re-weighting to represent the local rural populations). In rural Rajasthan, 47% of adults were aged below 35 years (Panel b), and 47% of adults could read in their mother tongue (Panel c). Gansu's rural population was older and more literate, with 34% of adults below 35 years and 71% who could read. In terms of wealth, let us consider a crude indicator that compares the number of people who come from the poorest 20% of the population to the number people who are part of the wealthiest 20%. In the general population, this ratio is always 1 because the poorest 20% of the population are the same number as the richest 20%. However, when we look at population sub-groups, this ratio will shift: If it is smaller than 1, then the sub-group is poorer than the average; ratios greater than 1 mean an over-representation of wealthy people.

The four graphs suggest that the sub-groups using mobile phones (left and right bars) were different from these population averages (centre bars). In all cases, mobile phone users were more likely to be men – general mobile phone owners in Rajasthan included for example less than 30% women. Phone owners were also marginally younger, while mobile Internet users were considerably younger and around 80% of them were below 35 years old (both in rural Rajasthan and in rural Gansu). The contrast is stronger still when we compare literacy rates, which were 22 percentage points higher than average among phone owners in Rajasthan, and 11 percentage points in Gansu. Among mobile Internet users, there was virtually nobody who could not read. Turning to wealth, we can see that phone owners were twice as likely to be in the wealthiest than in the poorest population group in Gansu (ratio: 3.3), and three times as likely in Rajasthan (ratio: 1.9). Yet again, these differences are even more pronounced when we consider data generated from mobile Internet use, where the wealthiest parts of the rural populations were 6.7 times higher represented in Gansu and 20.8 times in Rajasthan. In other words, there were very few poor Internet users.

While we can see deviations between the general population and the people who may be the next producers of big data, we should also remember the diversity of mobile phone users themselves, who include users who make the occasional holiday call with the help of a literate family member, people who use the phone confidently for social and business calls, and those who don't call any longer because they switched to instant messaging apps and voice-over-IP services. Whom of these will big data represent best?

Concluding reflections on representativeness

In my case studies, the people who produce big data are not a cross-section of the population, nor are they speaking in any particular way for the lives of the poor. Regardless of the volume of data, analyses based on such mobile data to inform and support the 2030 Sustainable Development Agenda could therefore be a biased reflection of people who are doing comparatively better than their peers – and who possibly live fundamentally different lives with different constraints. For example, if we were to inform development policy with big data studies of migration patterns or socioeconomic change that represent young men rather than illiterate women, how could activities aimed at ending discrimination for women ever be successful? Might we

not even potentially contribute to perpetuating the very problem?

In conclusion, the informational infrastructure around big data for sustainable development faces at least three main challenges. This article emphasised the danger of misrepresenting and possibly muting disadvantaged population groups who might be priority targets of sustainable development. This is the first challenge. The second challenge is transparency. If, as some observers argue, big data is defined as "data that exceeds the processing capacity of conventional database systems" (Dumbill, 2013:1), then big data analyses cannot be scrutinised with conventional means (Hilbert, 2016; Read *et al*., 2016). This can mean that the potential misrepresentation of populations remains obscure. The third challenge is the risk of not only obscuring but unintentionally yet continuously producing misrepresentations of the target groups for sustainable development (Shearmur, 2015; Spratt and Baken, 2015). Such a bias would arise if the work of the "data scientist" (who holds specialist knowledge for analysing big data) is detached from the "development field-worker" (who holds specialist local knowledge about the development context). This problem is sometimes referred to as the "positionality" of the analyst (Teye, 2012).

Taken together, these challenges can undermine the potential of big data for sustainable development and humanitarian action. Policy makers and practitioners aiming to avoid these pitfalls should calibrate and contextualise big data. Complementary contextualising data (e.g. household surveys or censuses) and the continuing involvement of local development staff can thereby help to understand the nature of the information involved in big data analyses (Shearmur, 2015; Wesolowski *et al*., 2013). Until every single person starts using mobile phones regularly in order to produce their digital signatures responsibly, utilising big data for sustainable development will therefore require more than just a technical solution to capture, represent, and improve the lives of the poor.

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Big Data Project Inventory

The United Nations Global Working Group (GWG) on Big Data for Official Statistics has compiled an Inventory of Big Data projects (including exploratory research, feasibility studies, pilot projects and projects currently in production) that have implications for compiling official statistics and/or supporting the measurement of the SDG indicators. The aim is to share broad information about potential Big Data projects in the statistical community and share specific information about partnerships, data sources, and tools.

The Inventory includes information such as the objective of the project; the Big Data source used; data access and the use of partnerships; applicability to specific domain(s) of official statistics and/or SDG indicators; methods and technology used; and assessment of quality, among others. The GWG collected this information from the statistical community in two surveys conducted in 2014 and 2015.

The GWG investigates the benefits and challenges of Big Data, including the potential for monitoring and reporting on the sustainable development goals. In this context, the GWG and the greater official statistical community recognize the need to adequately address issues pertaining to methodology, quality, technology, data access, legislation, privacy, management and finance, and provide adequate cost-benefit analyses on the use of Big Data.

This inventory is a joint product of the World Bank and the United Nations Statistics Division (UNSD) put together on behalf of the UN Global Working Group (GWG) on Big Data for Official Statistics.

For more information, access:

https://unstats.un.org/bigdata/inventory/

Tech Events

2018

Jan 13–14
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International Conference on Sustainability and Business
Contact: Conference Secretariat
Indian Institute of Management Calcutta (IIMC)
E-mails: susbus2018@iimcal.ac.in, ramendra@iimcal.ac.in
Web: https://www.iimcal.ac.in/international-conference-sustainability-and-business-susbus-2018

Jan 16–18
Kuala Lumpur,
Malaysia

The 4th International Conference on Renewable Energy Technologies (ICRET 2018)
Contact: Lily L. Chen
Conference Secretary
Tel: +86-28-8777-7577
E-mail: icret@young.ac.cn
Web: http://www.icret.org

Jan 30–31
Singapore

EmTech Asia
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Feb 15-17
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Republic of Korea
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E-mail: energy@excodaegu.co.kr

Apr 27-29
Shanghai,
China

2018 8th International Conference on Environment and Industrial Innovation (ICEII 2018)
Contact: Ms. Zero Jiang
Conference secretary
Tel: +852-3500-0137; +86-28-86528465
E-mail: iceii@cbees.org
Web: http://www.iceii.org

May 27 - 30
Shanghai,
China

SNEC - PV POWER EXPO 2018
Contact: Shanghai Follow Me Exhibition Service Co., Ltd
Room711, No.1525
West Zhongshan Rd.
200235, Shanghai
China
Tel: +86 21 64278273
Fax: +86 21 64642653
E-mail: service@snec.org.cn

May 29 - Jun 01
Kuala Lumpur,
Malaysia

2018 International Conference on Smart Grid and Clean Energy Technologies
Contact: Conference Secretariat
E-mail: secretariat@icsgce.com
Web: http://www.icsgce.com

Jun 06 - 09
Bangkok,
Thailand

ASEAN Sustainable Energy Week 2018
Contact: UBM ASIA (Thailand) Co Ltd.
503/23 K.S.L. Tower
14th Floor Sri Ayuthaya Road
Kwaeng Thanon Phayathai
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Jul 08 - 12
Singapore

CLEANENVIRO SUMMIT SINGAPORE (CESS) 2018
Contact Singex Exhibitions Pte Ltd
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Jul 17 - 19
Kuala Lumpur,
Malaysia

Green Energy Expo & Forum 2018
Contact: United Business Media (M) Sdn Bhd A-8-1, Level 8, Hampshire Place Office 157 Hampshite, 1 Jalan Mayang Sari 50450 Kuala Lumpur, Malaysia.
Tel: +(603) 2176 8788, Fax: +(603) 2164 8786
E-mail: ridzuan.husin@ubm.com

Dec 12 - 14
Bangkok,
Thailand

Future Energy Asia Exhibition & Conference (FEA) 2018
Contact: Future Energy Asia
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E-mail: info@futureenergyasia.com
Web: http://www.futureenergyasia.com

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Global business services of Malaysia

MSC Malaysia

http://www.mscmalaysia.my

Introduction

Global Business Services (GBS) is an integration of services that make with the best competitive strategy that utilizes Information and Communication Technology (ICT), Finance and Accounting, Human Resources, and Engineering Design and Services. It has become an essential tool in accelerating and complimenting global business services approaches as more companies are leveraging on global business services strategies to align their business objectives and obtain economies of scale.

As part of the Business Services projects of the National Key Economic Areas (NKEA), GBS is an industry that is fast gaining momentum in Malaysia, being one of the focuses in the country's Economic Transformation Plan. In transforming Malaysia into a "high income" economy, MDEC is the driving force that enhances the Capability, Capacity and the Credibility (3Cs) of this industry to develop a "world-class" GBS hub.

Whether it's the workforce, competitive cost, outsourcing infrastructure, ICT facilities or world-class business infrastructure, Malaysia has the best resources to accommodate to the demands of enterprises today. To date, there are more than 350 foreign and multinational companies who have set up regional and global shared services and outsourcing centres in Malaysia, bringing along billions of Ringgit worth of investments and thousands of jobs opportunities. These companies are currently performing various GBS activities within these 6 industry verticals:

a) Banking, Financial Services & Insurance (BFSI)

b) Information & Communication Technology (ICT)

c) Pharmaceutical & Health (P&H)

d) Logistics & Transportation (L&T)

e) Energy, Chemical & Resources (ECR) f) Fast Moving Consumer Goods (FMCG)

These GBS activities are categorized into 3:

The bulk of activities conducted in an GBS environment are business processes that can be either the back-end or front –end operations. The activities include consolidation of internal business functions such as human resource, finance and accounting, and customer service that includes call centres and technical support.

1. Business Process Outsourcing (BPO)

   Transactional-type internal (back-office) business functions such as human resources or finance & accounting and front-office functions which include customer-related services such as marketing and contact center services.

2. Information Technology Outsourcing (ITO)

   Transactional-type IT and IT-related functions such as programming,technical support, desktop and server support, network and security systems etc.

3. Knowledge Process Outsourcing (KPO)

Value-added processes which are highly complex and require the talent of professionals with widespread educational backing.

High value services - moving up the value chain

MDEC is set to drive the industry's next phase of development and subsequently move Malaysia up the value chain with its focus on the high-yield KPO sector. KPO types of activities and services are highly encouraged with new investments and further develop niche areas such as expanding the Engineering and Design services to Oil and Gas industry, and beyond.

Meanwhile, the cluster is facilitating the growth of local outsources under the Entry Point Projects 2 (EPP2) programme. Incentives and initiatives are provided to allow smaller local players to flourish, and the benchmark for these EPP2 companies is set against the International Association of Outsourcing Professionals (IAOP). Programmes that facilitate market expansion in terms of funding needs such as private equity and venture capitals, as well as to nurture the local companies with respect to growth, market expansion, market access, and the promotion of industry dialogue were formulated and implemented.

Why Malaysia?

The GBS industry has been one of the core focuses in the economic development of Malaysia towards its transformation into a high-income, knowledge-based economy by 2020. Through various policies crafted, government incentives, modern infrastructure access, skilled talent pool and resources in ICT that includes hardware, software, and services, companies are guaranteed to receive support and encouragement to flourish in the sector. Based on the recent study conducted by the International Data Corporation (IDC), these are the key reasons why Malaysia has the potential to be the regional hub for consolidating Finance and Accounting operations. The talent pool and the number of shared services centres had created a conducive ecosystem that will ensure a consistent growth in terms of service value, as well as the maturity and capability of individuals delivering the services.

Doing business in India

Invest India
http://www.investindia.gov.in

Entry options for businesses in India

To do business in India, following options are available to foreign companies:

Setting up a non-corporate entity

Liaison office: A liaison or a representative office can be opened in India subject to approval by Reserve Bank of India. Such an office can undertake liaison activities on its company's behalf. A liaison office can also undertake:

- Representing parent/group companies in India
- Promoting import/export in India
- Promoting technical/financial collaborations on parent company/group's behalf
- Coordinating communications between parent/group companies and Indian companies

Branch Office: Foreign companies can conduct their business in India through its branch office which can be opened after obtaining a specific approval from Reserve Bank of India. A branch office can undertake following activities:

- Import & export of goods
- Rendering professional or consultancy services
- Carrying out research work in area which its parent company is engaged
- Promoting technical/financial collaborations on behalf of parent company/ overseas group company
- Representing parent/group companies in India and acting as buying/selling agent in India
- Providing IT services and developing software in India
- Providing technical support for products supplied by parent company/group

Project office: If a foreign company is engaged by an Indian company to execute a project in India, it may set up a project office without obtaining approval from Reserve Bank of India subject to prescribed reporting compliances. As applicable in case of a branch office, a project office is treated as an extension of foreign company and is taxed at the rate applicable to foreign companies.

Setting up a corporate entity

Wholly owned subsidiary: Foreign companies can set up wholly owned subsidiary companies in India in form of private companies subject to FDI guidelines. A wholly owned or a subsidiary company has the maximum flexibility to conduct business in India when compared with a liaison or branch office and has following salient features:

- Funding can be done via equity, debt (foreign as well as local) and internal accruals
- Indian transfer pricing regulations apply
- Repatriation of dividends is allowed without approvals

Joint Venture with Indian partner: Foreign companies can also set up joint venture with Indian or foreign companies in India. There are no separate laws for joint ventures in India and laws governing domestics companies apply equally to joint ventures.

Foreign Institutional Investors: FII's can invest in India in financial markets such as pension funds, mutual funds, investment trusts and asset management companies or their power of attorney holders. FII's can invest in all securities in primary and secondary markets including the equity and other instruments of companies which are listed or are to be listed on stock exchanges of India.

Entry and investment routes

- Foreigners can directly invest in India either on their own or as a joint venture, with a few exceptions with regard to investment limits and sectors.
- No government approval is required for FDI in virtually all sectors except a small negative list formulated by government. Sector specific guidelines are formulated by government giving sectoral investment caps if any.
- If an investment does not qualify for automatic approval, FIPB considers the proposal.
- Use of foreign brands names/trademarks is permitted for sales in India.
- Indian capital markets are open to FII's and Indian companies are allowed to raise funds from international capital markets
- Foreign technology collaborations are allowed with agreements on
- Technical knowhow fees
- Payment for designs and drawings
- Payment for engineering services
- Other royalty payments

- NRI's can invest in shares and or convertible debentures of Indian companies on a non-repatriable basis and these investments are not considered as FDI.

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.

Home-grown innovation

The Network for Drugs, Diagnostics, Vaccines and Traditional Medicines Innovation (ASEAN-NDI) brings together researchers from 10 ASEAN countries to create products that combat diseases like tuberculosis (TB), malaria, dengue, and parasitic infections.

For more information, contact:

Bernadette Ramirez
World Health Organization
E-mail: ramirezb@who.int

Voluntary licensing of patents in the Philippines

The Intellectual Property Office, Philippines

http://ipophil.gov.ph

REPUBLIC ACT NO. 8293

SECTION 85. Voluntary License Contract — To encourage the transfer and dissemination of technology, prevent or control practices and conditions that may in particular cases constitute an abuse of intellectual property rights having an adverse effect on competition and trade, all technology transfer arrangements shall comply with the provisions of this Chapter. (n)

SECTION 86. Jurisdiction to Settle Disputes on Royalties — The Director of the Documentation, Information and Technology Transfer Bureau shall exercise quasi-judicial jurisdiction in the settlement of disputes between parties to a technology transfer arrangement arising from technology transfer payments, including the fixing of appropriate amount or rate of royalty. (n)

SECTION 87. Prohibited Clauses — Except in cases under Section 91, the following provisions shall be deemed prima facie to have an adverse effect on competition and trade:

87.1. Those which impose upon the licensee the obligation to acquire from a specific source capital goods, intermediate products, raw materials, and other technologies, or of permanently employing personnel indicated by the licensor;

87.2. Those pursuant to which the licensor reserves the right to fix the sale or resale prices of the products manufactured on the basis of the license;

87.3. Those that contain restrictions regarding the volume and structure of production;

87.4. Those that prohibit the use of competitive technologies in a nonexclusive technology transfer agreement;

87.5. Those that establish a full or partial purchase option in favor of the licensor;

87.6. Those that obligate the licensee to transfer for free to the licensor the inventions or improvements that may be obtained through the use of the licensed technology;

87.7. Those that require payment of royalties to the owners of patents for patents which are not used;

87.8. Those that prohibit the licensee to export the licensed product unless justified for the protection of the legitimate interest of the licensor such as exports to countries where exclusive licenses to manufacture and/or distribute the licensed product(s) have already been granted;

87.9. Those which restrict the use of the technology supplied after the expiration of the technology transfer arrangement, except in cases of early termination of the technology transfer arrangement due to reason(s) attributable to the licensee;

87.10. Those which require payments for patents and other industrial property rights after their expiration, termination arrangement;

87.11. Those which require that the technology recipient shall not contest the validity of any of the patents of the technology supplier;

87.12. Those which restrict the research and development activities of the licensee designed to absorb and adapt the transferred technology to local conditions or to initiate research and development programs in connection with new products, processes or equipment;

87.13. Those which prevent the licensee from adapting the imported technology to local conditions, or introducing innovation to it, as long as it does not impair the quality standards prescribed by the licensor;

87.14. Those which exempt the licensor for liability for non-fulfilment of his responsibilities under the technology transfer arrangement and/or liability arising from third party suits brought about by the use of the licensed product or the licensed technology; and

87.15. Other clauses with equivalent effects. (Sec. 33-C (2), RA 165a)

SECTION 88. Mandatory Provisions — The following provisions shall be included in voluntary license contracts:

88.1. That the laws of the Philippines shall govern the interpretation of the same and in the event of litigation, the venue shall be the proper court in the place where the licensee has its principal office;

88.2. Continued access to improvements in techniques and processes related to the technology shall be made available during the period of the technology transfer arrangement;

88.3. In the event the technology transfer arrangement shall provide for arbitration, the Procedure of Arbitration of the Arbitration Law of the Philippines or the Arbitration Rules of the United Nations Commission on International Trade Law (UNCITRAL) or the Rules of Conciliation and Arbitration of the International Chamber of Commerce (ICC) shall apply and the venue of arbitration shall be the Philippines or any neutral country; and

88.4. The Philippine taxes on all payments relating to the technology transfer arrangement shall be borne by the licensor. (n) cdt

SECTION 89. Rights of Licensor — In the absence of any provision to the contrary in the technology transfer arrangement, the grant of a license shall not prevent the licensor from granting further licenses to third person nor from exploiting the subject matter of the technology transfer arrangement himself. (Sec. 33-B, R.A. 165a)

SECTION 90. Rights of Licensee — The licensee shall be entitled to exploit the subject matter of the technology transfer arrangement during the whole term of the technology transfer arrangement. (Sec. 33-C (1), R.A. 165a)

SECTION 91. Exceptional Cases — In exceptional or meritorious cases where substantial benefits will accrue to the economy, such as high technology content, increase in foreign exchange earnings, employment generation, regional dispersal of industries and/or substitution with or use of local raw materials, or in the case of Board of Investments, registered companies with pioneer status, exemption from any of the above requirements may be allowed by the Documentation, Information and Technology Transfer Bureau after evaluation thereof on a case by case basis. (n)

SECTION 92. Non-Registration with the Documentation, Information and Technology Transfer Bureau — Technology transfer arrangements that conform with the provisions of Sections 86 and 87 need not be registered with the Documentation, Information and Technology Transfer Bureau. Nonconformance with any of the provisions of Sections 87 and 88, however, shall automatically render the technology transfer arrangement unenforceable, unless said technology transfer arrangement is approved and registered with the Documentation, Information and Technology Transfer Bureau under the provisions of Section 91 on exceptional cases. (n)

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.

Neural machine translation is an emerging technology. It is based on huge neural network models that "learn" from previously translated sentences. The specificity of neural machine translation (compared to previous "phrase based" statistical methods) is that it produces more natural word order, with particular improvements seen in so-called distant language pairs, like Japanese-English or Chinese-English. In a recent test, WIPO Translate's neural-based machine translation service substantially out-performed both the previous statistical-based model on distant language pairs, as well as other non-WIPO translation services. Since this WIPO tool is trained and focused uniquely on patent documents, instead of a more-disparate array of texts, it gives higher-quality renderings.

For further 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

Starting a business: source of funds

SME Corporation Malaysia
http://www.smecorp.gov.my

How much money do you need?

It depends on your type of business and how quickly you plan to expand. You should sit down and write out how much your expected expenses will be for at least the next 24 months and how much you project to bring in as far as income on a monthly basis. There are several companies that can help you get started with funding your business. You can refer back to your business plan or start asking yourself what type of expenses do you need the money for? Generally, for a start-up business, there will be a few costs involve:

- **Cost of sales:** Product inventory, raw materials, manufacturing equipment, shipping, packaging, shipping insurance, warehousing
- **Professional fees:** Setting up a legal structure for your business , trademarks, copyrights, patents, drafting partnership and non-disclosure agreements, attorney fees for ongoing consultation, retaining an accountant
- **Technology costs:** Computer hardware, computer software, printers, cell phones, PDAs, website development and maintenance, high-speed internet access, servers, security measures, IT consulting
- **Administrative costs:** Various types of business insurance, office supplies, licenses and permits, express shipping and postage, product packaging, parking, rent, utilities, phones, copier, fax machine, desks, chairs, filing cabinets – anything else you need to have on a daily basis to operate a business
- **Sales and marketing costs:** Printing of stationery, marketing materials, advertising, public relations, event or trade show attendance or sponsorship, trade association or chamber of commerce membership fees, travel and entertainment for client meetings, mailing or lead lists
- **Wages and benefits:** Employee salaries, payroll taxes, benefits, workers compensation

No matter what your business type, take into account everything you will spend, from the moment you dig in to the startup process, through the time you're ready to sell a product or service.

Where to get the money?

All businesses require some form of financing. The most basic rule in financing a business is to commit yourself and your savings or other resources to the business. This will ensure your whole hearted commitment to its success. This is also a strong sign of good faith and commitment for other potential lenders/ investors as, if you are not seen to be willing to risk your own funds why anyone else should! Further, for a start-up business, there may not be a wide variety of sources of funds as it is still untested. Hence, you will have to come up with the capital, from personal savings or through selling off surplus assets you may have.

Personal saving

There's nothing like having your own money saved, to put into your startup. You have the satisfaction of having saved it on your own, and the knowledge that you don't owe anyone. When using your own money to finance a business, you will feel more personally invested in the project, because it is basically your money on the line. However, there is more flexibility in using your own money. For example, if your business is having a slow start, you do not need to worry about paying back a bank loan because you used your own money.

But the risk you may face is that - It's your money, and if you're not successful, the money is gone, and with it the opportunity to do anything else with it later. It can also create another financial burden. Most people have a savings account for general purposes. In other words, the money is not saved for any particular purpose and is used whenever it is needed for whatever reason. As such, draining such an account may negatively affect your financial situation if you need to dip into that savings account for an emergency. However, if the personal savings you use to finance a business was money saved for that particular purpose, you should not have any financial troubles as a result of the draining of that account. If your savings account was set up for the purpose of opening a business, this means that you planned ahead and reserved that savings account for that purpose only, and thus, will not feel the pinch in an emergency because you will have other funds available for that purpose.

Financing with debt

Financing a business with debt involves securing a loan. This can be in the form of either unsecured or secured debt. Unsecured debt refers to a loan taken without having to put up any specific form of security or collateral. This involves mainly borrowing from family or friends, a credit card, line of credit and other similar means.

Secured debt, on the other hand, refers to loans where you are required to put up some form of collateral in exchange for the loan, for example, mortgage on the house or refinancing your car, among others. For secured debts, you need to be able to

assure the lender about your ability to meet your payments either through your business or other means. To secure such debt is some cases you will need to present a solid business plan, evidence of your experience and of your ability to repay.

Family and friends

Raising finance from family and friends can be rewarding for both parties: you get the finance to start or expand your business, while your family and friends have the satisfaction of helping you while earning interest on their spare cash. Family and friends may accept more flexible terms and conditions that are better suited to your business than those offered by commercial banks.

Often arrangements with family and friends are informal and based purely on trust and verbal assurances. However, a formal written agreement is strongly advised in order to minimise disputes in the future. Preserving your relationships with friends and family is as important as pursuing your business opportunity.

Personal loan

Financing a business with personal loans means that you borrow the money personally to invest it in your business. This is typically used at start-up or early stages where the business has not established enough history or performance to be able to secure a loan on its own merit.

Mortgage loan

Another source for financing a business is a home mortgage loan. Some banks allow you to mortgage or refinance your house. This may be a risky move as if you are unable to make the scheduled payments, you risk losing your home. It is therefore crucial that you are confident on your continued ability to make all payments scheduled.

Insurance loan

Another source of loan could be from your insurance policy. If you have been paying for a life insurance policy that builds up a cash value you are entitled to take up a loan on the cash value amount. Many insurance companies will loan you money with the cash value as security. This is a rather expensive method of financing a business and also means reduced benefits if you are unable to clear the loan and interests accrued.

Credit cards

Credit cards can also be a source for financing a business when you are first getting started. However, this is another expensive method as the rates charged can be high and it could also affect your credit rating, required for other sources of financing.

Government small business loans

There are a variety of government small business loans and programs that can be used in financing a business, including those specifically for Bumiputeras and micro entrepreneurs. Most of these loans are administered by the Financial Institutions like the Development Financial Institutions (DFIs) and the commercial banks. While some are directly administered by the department/agency involved. Funding from these sources may be relatively easier to secure as the government department/agency guarantees your loan, if you are approved.

Grants

There are often a variety of government grant programs for specific types of startup businesses. For more information, search online on government websites. Unless they're reputable, don't pay money to sites that tell you they'll give you a big list of where you can get grant money. The risk is that - While grants are rarely required to be paid back, accountability is higher, and you might have to work within a difficult deadline, to show your progress. If you do not achieve the progress you indicated in your proposal, there may be some sort of penalty.

Bank loans

Banks lend money to existing businesses but for a start-up, it may be very difficult to get a bank loan as they do not have a track record. Banks require a sound business plan and must be convinced of the viability of your business before they agree to lend you money. Banks also normally need collateral as security. If you have a solid business plan and the lender agrees, this can often be the cheapest (interest rate-wise) loan sources available. The risk is that besides the fact that it's often hard for a startup to qualify - since there's little evidence you'll be profitable - if you do get a loan, it can be like a ticking time bomb if your business isn't doing well.

Equity financing

Equity Financing is borrowing where the investor/financier becomes a part-owner of the business in the process. This could be through venture capital or issuing shares.

Venture capital

Venture capitalists do not want to remain in your business forever. Generally, they want to see an exit strategy that will see them out in about 5 years, with a high return on their investment as their reward. In terms of areas of interest, venture capitalists are interested in both high technology and various other industries. Normally they fund businesses which have already been launched and have probably reached profitability.

The angel investor, on the other hand, is a special type of venture capitalist. Usually an individual with substantial funds, the 'angel' provides capital to start-up companies and takes a personal stake in the venture. Depending on the individual 'angel', their requests for any form of control or a quick return on investment will differ. However, similar to regular venture capitalists, they seek high returns on their investment for the risks they take on.

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 for business in India

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.

Government support

There is need to make continuous efforts, on the part of both Central and State Governments, so as to develop and promote various innovations and technologies in India as well as to spread these to the worldwide markets. The Central authority responsible for this in India is the 'Ministry of Science and Technology'. The Department of Science and Technology (DST) and Department of Scientific and Industrial Research (DSIR) are its two nodal agencies which are responsible for promoting science and technology (S&T) activities in the country as well as for supporting inventors/ entrepreneurs in their pursuits. National Innovation Foundation (NIF) has also been established to encourage Indian innovators by providing them adequate institutional support.

These central agencies, along with efforts of States/ Union Territories, have been undertaking many policy initiatives and measures as well as announcing many schemes and programmes with a view to promote innovation and S&T in the country. Some of the prominent ones are:- Technology Promotion, Development and Utilization (TDPU) Programme; Technology Development and Innovation Programme (TDIP); Science and Technology (S&T) Policy; National Innovation Act, 2008; etc. All such incentives aim to accelerate economic growth of Indian economy and improve the standard of living of the people.

Suggestions and future prospects

There is a vast untapped potential in India for wealth creation by increasing the levels of innovation content in the entire economic development activities of the country. It is a tall call but an essential one, if the current levels of growth of GDP were to be maintained over the next two decades. Innovation will also be a key for sustainability-the ability to meet developmental objectives while ensuring sustainable use of natural resources.

Often missing within discussions of innovation is the role of innovation for directly improving the livelihood or quality of life of the poor. The general assumption is that the market mechanism will take care of this. However, innovation may also be important for the delivery of, and access to, services that are essential for a quality of life; whether it is clean water, modern energy or affordable health care.

Faster growth in a globally competitive market environment demands a national innovation infrastructure that connects knowledge systems to wealth creation efficiently and effectively. In the Indian social context, there is a need to ensure that innovative growth linked processes do not bypass the poor and leave them out of developmental choices emanating from the benefits of globally competitive innovations. The innovation infrastructure of India should aim to bridge the internal asymmetries and serve the dual purpose associated with global competitiveness and inclusive growth.

Both pro-poor and global competitiveness objectives should be embedded in the search for innovations. The number of grassroot innovators in the informal sector in India is large. However, grass-root innovations are not able to reap sufficient economic benefits for want of backing with adequate resources. The innovation infrastructure in the formal sector is thin. It requires deepening by referencing to global best practices and market demands. Such an innovation infrastructure would depend strongly upon a vibrant and gainful public private partnership in research and development as well as commercialization of innovations.

The design and development of a sustainable innovation infrastructure should take into account global best practices, attraction, attachment, retention and renovation of talent within the research and development streams, public private partnerships, venture and angel financing and capacity building. The realization of Indian Vision 2025 to emerge as a major economic power in the global knowledge economy would call for a sustainable innovation infrastructure.

In order to unleash our full innovative potential, we need to put in place a National Innovation policy, which encourages competition among enterprises, greater diffusion of knowledge and increased support to early stage technology development initiatives and grassroot level innovators. There is a need to foster increased collaboration among R&D institutes, universities and private sector enterprises and leverage upon their cumulative strengths in designing and implementing various innovation programmes. There is also a need for an appropriate legislative framework for incentivising the innovators and commercialization of public funded R&D, where the government, the recipient(s) of funds, the inventor, as well as the public benefit from the protection and commercialization of intellectual property.

At the root of innovation is invention, which is an essential creative step that cannot really be directed or forced. However, there is much that can be done to facilitate this initial step and the many subsequent steps that will ultimately yield the value to society from the invention. These steps are not isolated or distinct from one another; therefore it is more appropriate to think of a comprehensive innovation policy, rather than a policy that is aimed at only one of the steps in the process or elements of the innovation system. Innovation policy needs to be placed within the broader social and economic context, informed by goals and aspirations of development and should reflect a fair and effective balance between public and private interests, social and economic goals and inclusiveness versus rapidity.

Technology and innovation promotion in Malaysia

SME Corporation Malaysia
http://www.smecorp.gov.my

1-InnoCERT certification 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 Negaraand 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.

1-InnoCERT certification process

The 1-InnoCERT certification process involves a two-stage assessment. Potential innovative companies are required to conduct an On-line Self-Assessment (www.1-innocert.my) to gauge on their readiness to be certified as a 1-InnoCERT company. Upon completing the self-assessment, the on-line system will generate a Technology Innovation System Evaluation Index, ranging a score from 0 to 1,000. A scoring of higher than 700 is an indication that the company's internal innovation system and processes is ready to comply with the requirement.

Companies with difficulties in scoring higher than 700 can attend regular sessions of pre-certification training to understand the 1-InnoCERT criteria, and on how to become more innovative. Upon reaching a score of more than 700, the company can apply for an on-site innovation audit to be conducted at their premise. On-site innovation audit is compulsory to ensure that companies applying for the 1-InnoCERT certifications are indeed innovative and complies with the requirement of the 1-InnoCERT criteria.

Upon a successful passing of the on-site audit, the company can then officially apply to be certified as a 1-InnoCERT certified company. However, the approval is subject to acceptance by the 1-InnoCERT Approval Committee, which oversees the overall certification Program. Please take note that minimal fees are chargeable for the 1-InnoCERT certification (RM5,000.00 for first time certification and RM3,000.00 for renewal of certification).

1-Innocert's Innovation Assessment adapts the Korean Innobiz innovation evaluation system which is based on an internationally-recognised innovation assessment standard i.e. the Oslo Manual by OECD and the European Commission (Eurostat), 2005. The Oslo Manual provides guidelines for collecting and interpreting innovation data in an internationally comparable manner.

Enabling ePayment for SMEs and micro enterprises

Enabling ePayment for SMEs and Microenterprises is a Project under the Digital Malaysia initiative aimed to increase the adoption of ePayment among SMEs. Due to the cost constraint and intricate process of ePayment, SMEs and Micro Enterprises are facing difficulties in acquiring ePayment capability. With this initiative, SMEs and Microenterprises are being enabled to accept ePayment via means of simplifying the acquisition process and lowering its cost. It will also accelerate the adoption of ePayment with the distribution of affordable Point-of-Sale (POS) terminals.

By 2020, the Project is expected to generate 1,125,000 million ePayment merchant outlets points enabled by Electronic Funds Transfer Point-of- Sale (EFTPOS) terminal, whilst, the project's target for 2012 is 25,000.

The ePayment merchant outlets points targeted are the operators of `pasar tani', small restaurant, night market, flea market and cottage industries, amongst others.

SMEs and Microenterprises must fulfill the following criteria to participate in this programme:

- Registered under Business Act 1956 or Company Act 1965;
- Fulfilled the definition of SMEs and Microenterprises;
- At least 60% Malaysian equity;
- Valid business license from Local Authority; and
- Subscribe to only 1 of approved Third Party Acquirer (TPA)

Green industry initiative

United Nations Industrial Development Organization (UNIDO), Austria

http://www.unido.org

In the last few years, keeping with its mandate, the United Nations Industrial Development Organization (UNIDO) coined the concept Green Industry to place sustainable industrial development in the context of new global sustainable development challenges. Green Industry means economies striving for a more sustainable pathway of growth, by undertaking green public investments and implementing public policy initiatives that encourage environmentally responsible private investments.

Greening of Industry is a method to attain sustainable economic growth and promote sustainable economies. It includes policy-making, improved industrial production processes and resource-efficient productivity. UNIDO's Green Industry Initiative creates awareness, knowledge and capacities.

Resource Efficient and Cleaner Production (RECP)

Taking care of materials, energy, water, waste and emissions makes good business sense. RECP is the way to achieve this. RECP covers the application of preventive management strategies that increase the productive use of natural resources, minimize generation of waste and emissions, and foster safe and responsible production.

http://www.unido.org/index.php?id=o5151

Cleaner Production (CP)

RECP uses CP to accelerate the application of preventive environmental strategies to processes, products and services, to increase efficiency and reduce risks to humans and the environment. It addresses, a) Production Efficiency: optimization of the productive use of natural resources (materials, energy and water); b) Environmental management: minimization of impacts on environment and nature through reduction of wastes and emissions; and c) Human Development: minimization of risks to people and communities and support for their development.

The Stockholm Convention and Persistent Organic Pollutants (POPs)

The Stockholm Convention is a global treaty to protect human health and the environment from chemicals, Persistent Organic Pollutants (POPs), that remain intact in the environment for long periods of time, become widely distributed geographically, accumulate in the fatty tissue of humans and wildlife, and have adverse effects to human health or to the environment.

The Montreal Protocol (MP)

The Montreal Protocol is an international environment treaty designed to protect the ozone layer by phasing out the production of a number of substances believed to be responsible for ozone depletion.

Chemicals Management

UNIDO works with projects, policies and regulations, institutions and sectoral capacity-building, development of preventative approaches and new business models such as Chemical Leasing, to assist enterprises reducing risks and impacts associated to the use of chemicals.

Chemical Leasing (ChL)

Chemical Leasing (ChL) is a strategy which creates a business environment to tackle the challenges of the changing global context and offers solutions for sound management of chemicals and reduction of emissions to the environment. UNIDO plays a leading and coordinating role for the implementation and further development of ChL.

Corporate Social Responsibility (CSR)

Nowadays, requirements for the integration of environmental concerns, human rights issues, fair labour conditions and good governance in industrial development are significantly affecting the business sectors in developing and transition countries. This is referred to as Corporate Social Responsibility (CSR). In this context, UNIDO works on a framework for small- and medium-sized firms (SMEs) that helps translate CSR principles into a relevant SME perspective, thereby enhancing their competitiveness and market access.

Water Management

UNIDO's Water Management programme provides services to transfer the best available environmentally sound technologies and environmental practices to improve water productivity in industry, as well as prevent discharge of industrial effluents into international waters (rivers, lakes, wetlands and coastal areas). Protecting water resources for future generations is amongst the top priorities.

Energy

Energy access is linked a global challenge needing to be addressed; it has links in social development and poverty alleviation, environmental degradation and climate change, and food security. It is a defining issue of our time. UNIDO aims to provide access to modern energy services for the poor, with emphasis on renewable energy projects.

Eco-innovation

United Nations Environment Programme

http://www.unep.org/ecoinnovationproject/

Eco-innovation provides a win-win solution to improving economic competitiveness and sustainability as it starts at the company strategy level and extends influence beyond the company gates to the supply chain. Eco-innovation aims at reducing impacts on the environment, enhancing resilience to environmental pressures, or achieving a more efficient and responsible use of natural resources. The growing market, reputational and regulatory pressures in response to rising resource scarcity and environmental degradation reinforce therefore the business case for eco-innovation.

Harnessing eco-innovation for sustainable development

Alarmingly high levels of resource depletion, and environmental pollution from current production and consumption patterns are pushing the limits of sustainability. Multi-faceted and profound transformations are required to realign development towards a more resource efficient economy. This implies the creation of new strategies, products, processes and practices as well as shifts in consumption behaviour. Eco-Innovation holds the potential for systemic change through creating and meeting a demand for sustainable goods and services.

This is particularly important for developing and transition economies with growing manufacturing sectors. In many of these economies, small and medium-sized enterprises (SMEs) are key to economic activity and growth, providing up to two thirds of formal employment. Unsustainable production practices and business models however hinder company growth. This points to a number of challenges that SMEs in these countries face, such as access to finance and technology, that ultimately make them less competitive in the global market. Eco-Innovation breaks this "business as usual" routine to address these challenges.

What creates an enabling environment for eco-innovation?

For eco-innovation to be viable in the long-run, the following create a conducive environment:

- Business case
- Technical knowledge and expertise
- Enabling policy framework
- Regional and international cooperation

The business case for eco-innovation

- The Business Case for Eco-Innovation publication outlines the key business drivers to implement eco-innovation. It builds on company examples spanning sectors across the globe that generated significant business benefits from eco-innovation.
- In conjunction, a technical Eco-innovation Manual has been developed for implementing partners to identify opportunities and develop strategies to implement eco-innovation. The Manual is complemented by supplements for the agri-food, chemicals and metals sectors.
- The Manual's approach has been validated through a number of regional expert meetings to confirm the ecoinnovation approach in different countries and contexts. It is now being piloted though demonstration projects in the countries highlighted on the map above.

The policy and technology context

- The Mainstreaming SCP Policy for Eco-Innovation guideline aims to inform implementing partners about proactive ways to support a policy framework that will stimulate sustainable production and consumption through ecoinnovation. National level action planning will be carried out in countries highlighted on the map above, with some initial activities implemented within the project span.
- The Technology dimension is also highlighted as part of the conducive framework for eco-innovation. The publication Technologies for Eco-Innovation includes an assessment of the 'enablers' for the uptake of technologies for eco-innovation. In turn, this will support implementing partners in assisting SMEs in the identification, adaptation and development of technology for eco-innovation.

Scaling up eco-innovation Lessons

- A Final Compendium of best practices and lessons from pilot demonstration projects will be compiled upon their conclusion.

The Eco-Innovation Project

In partnership with the European Commission (EC), UNEP is currently implementing a four-year project to promote resource efficiency and eco-innovation. The project aims to change consumption and production patterns in developing and transition economies by encouraging businesses to reduce their environmental footprint.

Technology Offers

CHINA

Glass wool production line

We can offer Glass Wool Production Line / Glass Wool Machine with the following specifications:

- Workshop area: 3,000m^2
- Natural gas wastage: 252 x 104Nm
- Compressed air: 20m/h, 0.8MPa
- Product spec:
  1) Dia. of fiber: =0.8um
  2) Heat conductivity: 0.042W/mk
  3) Working temperature: 400^{o}C (max.)
  4) Density: 15-50kg/m^3
  5) Standard: GB/T13350-2000
  6) Product series: glass wool board and glass-wool belt, pipe and so on.

Area of Application

Construction and Insulation

Advantages

- Good thermal insulation performance
- Incombustible material
- Sound absorption performance and excellent noise reducing effect
- Low moisture absorption rate
- Low aging rate
- Excellent handling characteristics

Environmental Aspects

- Cleaner production
- Waste utilization

Development Status

Idea

Legal Protection

Trade Mark

Technical Specifications:

HIM-GW-3, HIM-GW-5, HIM-GW-6, HIM-GW-8, HIM-GW-10, HIM-GW-15

Transfer Terms

Turnkey

Contact

HiSuccess International
Room 1909, Aviation Tower
No.18, Xin Jin Qiao Road, PuDong District
Shanghai, China 201206

HUNGARY

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.

Advantages

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 partnership

Contact

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

INDIA

Nanogold-loaded sharp-edged carbon bullets as gene carriers

National Chemical Laboratory (NCL) scientists have developed a process for the preparation of carbon embedded nano gold particles with sharp edges which can be used as gene carriers. The bullets are sharp enough to penetrate hard material, with less damage (a comparatively lower force of 0.1-0.2 nN required for

penetration) and can be delivered with a convenient delivery gun .Intracellular gold particles (biogenic) synthesized by a fungus in situ, embedded on a carbonaceous matrix.

Area of Application

- Gene therapy/ improved gene delivery for research and other applications
- DNA based immunization, to study gene function and its regulation, to establish various disease models, metal ion removal, fuel cells, anti-bacterial applications, catalysis

Advantages

- Preparation process is very simple and easy to implement
- The carbon matrix forms 95% of the carrier reducing the amount of gold needed and the plasmid used per transformation
- Advantages of usage of gold particles- High DNA packing density, better transformation efficiency, low nuclease degradation, being in nano scale, higher surface area is obtained- more gene cargo handled
- Advantages of usage of carbon support- Inert and less damage causing- wound caused due to penetration healed faster, better piercing capacity, for example, can effectively pierce hard plant cell walls, less force required to penetrate the plasma membrane as compared to silver nano needles

Development Status

Laboratory model

Legal Protection

Patent

Transfer Terms

Technology licensing

Titanium dioxide nano needles

The technology involves a one-step electrochemical process for the synthesis of pure rutile Titanium dioxide (TiO2) 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 TiO2.

Sector

Biotechnology

Area of Application

Rutile TiO2 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 TiO2
- 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 TiO2)
- Easier, cheaper, quicker process (when compared to previous methods of synthesis)

Development Status

Laboratory model

Legal Protection

Patent

Transfer Terms

Technology licensing

For the above two offers, contact

National Chemical Laboratory, CSIR
A208, PAML Building,
Dr Homi Bhabha Road,
Pune 411007
India

Microfine ginger powder

Microfine ginger powder has wide applications in pharmaceutical, brewery, soft drink, meat canning, pickle processing, curry and confectionery industries. The microfine ginger powder can be directly added in soda water for removal of certain throat irritation and similar affections. The product has high domestic and export potential. From 5 kilogram of peeled ginger, around 700 grams of microfine powder can be produced. The process of production is free from pollution.

Area of Application

- Domestic and industrial kitchen
- Foof processing industries
- Brewery and confectionery industries

Advantages

- Microfine
- Free from presence of ash.
- Produced without generating temperature at the pulverizing point.
- The product maintains high drug and spice values.
- The process of production prevents evaporation of oil during pulverization.

Environmental Aspects

Cleaner production

Development Status

Commercial prototype

Technology Offers

Transfer Terms

Turnkey

Target Countries

India

Contact

Innova Reserach Centre Pvt Ltd
Ochanthuruth, Kochi, 682508, india
Cochin 682508
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 a nd 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

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, Mianmar, 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

Bioherbicide formulation

We have developed an innovative bioherbicide formulation which is 100% free from chemicals.

Area of Application

Agriculture

Advantages

- The formulation is 100% chemical free
- Weeds dry within 30 minutes after application
- Both terrestrial and aquatic plants are controlled
- No residue is found
- Not harmful for the microbes and soil
- Easy method of preparation using cheap waste plants

Environmental Aspects

Waste utilization

Development Status

Laboratory model

Legal Protection

Filed

Technology Offers

Technical specifications

- The formulation is 100% chemical free
- Weeds dry within 30 minutes after application
- Both terrestrial and aquatic plants are controlled.
- No residue is found
- Not harmful for the microbes

Transfer Terms

1. Joint Venture
2. Technical services
3. Technology Licensing
4. Research Partnerships

Target Countries

Worldwide

Herbal formulation for leucoderma

It is well known that these diseases have property of recurrence and most of the medicines used for cure have various side effects and also the disease is also not fully cured. Our formulation is quite effective in curing all the above three diseases in short period of time.

Area of Application

Herbal heath formulations for skin diseases

Advantages

- In case of leucoderma after application of the formulation there starts formation of patches (natural colour of skin) within a week
- The patch increases and gradually covers the whole affected area
- The disease is completely cured within few months.
- Formulation can be prepared without sophisticated instrument.

Development Status

Pilot plant

Legal Protection

Filed

Technical specifications

- In case of leucoderma after application of the formulation there starts formation of patches (natural colour of skin) within a week
- The patch increases and gradually covers the whole affected area

Transfer Terms

1. Joint Venture
2. Technology Licensing
3. Research Partnerships

Target Countries

Worldwide

For the above two offers, contact:

Hiran Biotech, Research and Developemnt Division, 66 Turner Road
Cantt., Kanpur 208004, U.P., India
Kanpur 208004
India

Novel compound with leishmanicidal activity

One new unsaturated amide named as Piplamide, N-isobutyl-19-(3′,4′-methylenedioxyphenyl)-2E,4E-nonadecadienamide, was isolated from the fruits of the Indian medicinal plant Piper longum by bioassay guided fractionation and isolation, using an in vitro promastigotes assay against of Leishmania donovani.

Area of Application

- Piplamide could be evaluated as prospective enzyme inhibitor and could provide lead structure for further optimization of activity for use in antileshmanial drug developement.
- Piperlongimin A and piperlongimin B could provide lead structures for the development of novel anticancer therapeutics.

Advantages

- Piplamide shows a very good antilesihmanial activity against Leishmania donovani promastigotes.
- Piperlongimin A (2E-N-isobutyl-hexadecenamide) and piperlongimin B (2E-octadecenoylpiperidine) inhibited cell proliferation of human leukemia, HL-60 cell lines, and displayed major apoptosis-inducing effects.

Environmental Aspects

Environment-friendly

Development Status

Laboratory model

Legal Protection

Patent

Technical specifications

One new unsaturated amide named as Piplamide, N-isobutyl-19-(3′,4′-methylenedioxyphenyl)-2E, 4E-nonadecadienamide, was isolated from the fruits of the Indian medicinal plant Piper longum by bioassay.

Transfer Terms

1. Consultancy
2. Technical services
3. Technology Licensing
4. Research Partnerships

Contact

Amity University
Sector-125, Noida
Distt Gautam Buddha Nagar 201303
Uttar Pradesh
India

Technology Requests

BANGLADESH

Proper utilization of CO2 from gas fields

We need epc contractor and also investment to utilize properly a silent derivative from the oil and gas field (4% derivative), assumed a remarkable printing ink will be possible to produce from this wastage and also indirectly help to make a green environment.

Area of Application

Environment

Studies Available

Environmental Impact Studies (EIA/EIS)

Project Type

Start-up

Contact

Seek Investor
Mirpur, Dhaka, Bangladesh
1216
Tel: 008801710962792
E-mail: seekinvestor2007@yahoo.com

INDIA

Stevia technology

An Indian enterpreneur 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.

Area of Application

Food processing, Agro industry

Project Type

Start-up

Contact

Mr. K.P. Ganesan
E-mail: kpg030567@yahoo.com

ISLAMIC REPUBLIC OF IRAN

Hemodialysis machine

An Iranian company is planning to establish a cotton seed oil extraction and refining plant. It is looking for help of established Indian company in this field. It will decide about the contribution of each side for manufacturing part of the project after negotiations.

Area of Application

Agriculture, Agro-industry

Transfer Terms

- Technology Transfer

Project Type

New idea

Contact

Iranian Research Organization for Science and Technology (IROST)

Contact

International Cooperation Bureau
No. 71 Forsat St. Enghelab Ave. P.O. Box 15815 Tehran, Islamic Republic of Iran - 15819
Tel: +982188280517; Fax: +98218838340; Web: www.irost.org

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