Strengthening innovation-driven inclusive and sustainable development

Asia-Pacific Tech Monitor

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Intellectual Property Management

Plus

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

UNITED NATIONS ESCAP
Economic and Social Commission for Asia and the Pacific
Asian and Pacific Centre for Transfer of Technology (APCTT)

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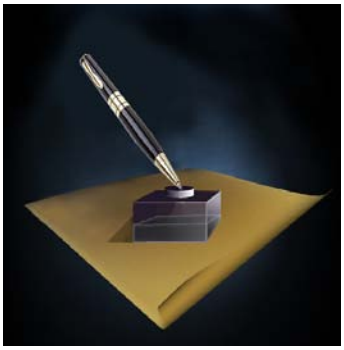

Introductory note

In a national innovation system, Intellectual Property (IP) plays a vital role in stimulating industrial development. Enabling IP policies drive growth of innovative enterprises faster through facilitating innovation, technology transfer and commercialization. Therefore, effective exploitation of IP is crucial to achieve Sustainable Development Goal 9 (build resilient infrastructure, promote sustainable industrialization and foster innovation).

The Global Innovation Index 2019 highlights impressive progress of some Asia-Pacific countries in the area of intellectual property. For example, China achieves top ranks in patents, industrial designs and trademarks by origin, and the Republic of Korea keeps first spot in national patent applications and industrial designs. The Islamic Republic of Iran shows strong performance in patent applications, scientific and technical publications, trademarks and industrial designs. However, there are still countries in this region that are ranked at the bottom quartile of this index with low levels of innovation and generation of intellectual property.

Intellectual property such as patents are vital resources of research institutions and technology-based enterprises for their sustained growth and competitive advantage. They can leverage their intellectual property portfolio for commercial success and revenue generation. Therefore, the patents need to be market-ready and commercially viable to attract the investors. The organizations would also require adopting innovative business models and strategies to commercialize their IP such as patents and others. A case study from Thailand shows successful licensing of more than one form of IP for latex used in asphalt cement for road construction. The business model involves multiple partners in the licensing process.

It is imperative for universities to have a strong component of commercialization in their IP policies to bring out more market-driven innovations. Online IP marketplace platform has been successfully adopted as a tool in Singapore to help commercialize market-ready innovations by universities. An example is the Intellectual Property Intermediary (IPI) Singapore, an initiative of Singapore's Ministry of Trade and Industry. In the recent years, e-commerce poses risks for enterprises such as illegal access and theft of confidential information or trade secrets by hackers and cyber criminals. Alibaba Group and Sina Weibo e-commerce platforms in China have put in place mechanisms to help enterprises manage and safeguard their intellectual property.

This issue of *Asia-Pacific Tech Monitor* discusses the challenges, opportunities, strategies and good practices to manage and exploit the intellectual property for technology transfer and commercialization in the Asia-Pacific countries. Case studies from China, Malaysia and Thailand are presented in this Tech Monitor issue.

Michiko Enomoto
Head, APCTT-ESCAP

ASIA-PACIFIC

BANGLADESH

Planning toolkit for SMEs

The United Nations Office for Disaster Risk Reduction (UNDRR), with the support of the Asian Disaster Preparedness Center (ADPC), developed a planning toolkit for Small and Medium Enterprises (SMEs) to revive their business operation to the new environment. Bangladesh is currently witnessing significant economic shocks due to novel coronavirus (COVID-19). Small and Medium Enterprises (SMEs) are the most vulnerable group in this critical situation because of their low shock-absorbing capacity. To revive their businesses, SMEs have to redesign their business operations to adopt to the new environment, said a press release.

With the assistance of the Business Initiative Leading Development (BUILD), this toolkit has now been adapted for Bangladesh. The toolkit includes: A planning tool organized around '10 tips' to make businesses resilient, a brief guide for impacted businesses with an 'additional 5 tips,' and an awareness-raising brochure summarizing the '10 tips' and the '5 additional tips'. This toolkit will support SMEs to protect their employees and their work environment.

Moreover, this toolkit demonstrates the process of how an SME can continue its operations during this crisis using their existing resources and to help protect SMEs from further disruptions. In addition, the toolkit includes guidance for businesses which are already affected by COVID-19. The toolkit is available at the following link: *http://www.undrr.org/bcp-ap*

The BUILD network is actively supporting the SMEs in Bangladesh. It is also collaborating with the UNDRR the ARISE Network – the Private Sector Alliance for Disaster Resilient Societies with the intention to launch a national network in Bangladesh.

https://unb.com.bd

CHINA

Progress in IPR protection

China released its 2019 Report on Intellectual Property Rights (IPR) Protection and Business Environment at a press conference on the 20th World Intellectual Property Day on Sunday. "So far, 31 IPR protection centers, together with 20 express centers, have been set up to provide convenient, low-cost services for the market," Zhang Zhicheng, head of the Protection Department of the National Intellectual Property Administration (NIPA), said at the conference. The country revised trademark law, anti-unfair competition law and drug administration law on November 1, 2019 to further punish IPR infringement to up to five times the amount of actual losses, higher than global standards, Zhang said.

According to the NIPA, 39,000 administrative adjudication cases of patent infringement disputes were handled last year. The average time to process trademark registration cases was shortened to 4.5 months, and the time to evaluate high-value patents was reduced to 17.3 months. The NIPA also reported and rejected over 38,000 cases of unqualified patent application and trademark application last year.

China's Ministry of Public Security, the Supreme People's Court and NIPA have joined hands to tighten regulations on e-commerce, rural markets, customs and other areas and industries that are susceptible to trademark and patent infringement. Given the outbreak of COVID-19, millions of counterfeit drugs, medical devices and masks have flooded into the markets. In early March, law enforcement officials in 90 countries including China carried out operations confiscating almost 34,000 surgical masks and dismantling 37 organized crime groups. About 121 suspects were arrested. According to AFP, the operation also resulted in the closure of 2,500 links to products related to COVID-19 on websites, social networks, online markets and advertisements.

To have a sweeping crackdown, the General Administration of Customs (GAC) launched an online campaign to monitor the export of medical supplies. "We have worked closely with China's e-commerce platforms and the foreign trade systems that can pinpoint illegal activities and trace the source of production and sales," Di Lianzhu, an official at GAC, said at the press conference.

With 58,990 applications filed in 2019 via the World Intellectual Property Organization's (WIPO) Patent Cooperation Treaty (PCT) System, China has overtaken the U.S. to become the top source of international patent applications filed with WIPO. The total number of actual registered trademarks exceeded 25 million, with every 4.9 market entities owning one registered trademark on average.

Coupling with the patent filing progress is a favorable business environment created for high-quality IP innovation and development, which has also seen an improved global ranking, ascending to 31 from 46 compared with one year ago, according to a World Bank report. A 2019 China business environment survey done by the U.S.-China Business Council shows that about 58 percent of U.S. companies think that China has beefed up IPR protection in the past year, marking the highest level since the survey was launched in 2011.

https://news.cgtn.com

Listed firms spend more on R&D

China's listed firms have ramped up spending on research and development (R&D) last year as both emerging and traditional industries invest heavily for long-term growth, China Securities Journal reported. As of 7:00 p.m. Monday, 1,193 listed companies on the A-share market have disclosed their R&D spending in financial reports for 2019, which amounted to 420.1 billion yuan (about 59 billion U.S. dollars), the report cited data from financial information service provider Wind.

The figure marked a year-on-year increase of 21.88 percent. In particular, 189 companies saw R&D spending rise over 50 percent, while 75 reported growth of more than 100 percent. Computer equipment and application, biological products, telecom equipment as well as medical devices are among the sectors that reported robust growth in R&D spending, the data showed. Besides the emerging industries that rely heavily on high R&D input to sharpen their competitiveness, traditional

industries have also increased expenditure in the area, the report noted. While high R&D spending may affect profits in the short-term, they will be conducive to growth in the long term, said Fu Lichun, an analyst with Northeast Securities.

http://www.xinhuanet.com

COVID-19 vaccine R&D and antibody drugs development

China will make COVID-19 vaccine research and development (R&D) a top priority and accelerate the development of antibody drugs, a senior official said. Wang Zhigang, minister of science and technology, outlined the next stage in the country's major focus of scientific researches for novel coronavirus at a press conference in Beijing. The R&D of COVID-19 vaccines will be given top priority and will mainly come from five main technical routes: inactivated vaccine, adenovirus vector vaccine, recombinant protein vaccine, attenuated influenza virus vector vaccine and nucleic acid vaccine, Wang said.

Chinese scientists have made great progress in their research into novel coronavirus vaccines. A research team led by epidemiologist Chen Wei developed an adenovirus vector COVID-19 vaccine on March 16, the first domestically developed a candidate vaccine to enter clinical trials. On May 22, the vaccine became the first in the world to disclose complete phase one clinical trial results and declare dual immune response in the recipient. Researchers from the National Vaccine & Serum Institutes, Chinese Center for Disease Control and Prevention, have developed an inactivated SARS-CoV-2 vaccine candidate, BBIBP-CorV, according to the life science academic journal "Cell" on Saturday.

"China will make its COVID-19 vaccine a global public good when it is ready for application after successful research and clinical trials," said Wang at a meeting. In the next stage, China will also promote the development of a COVID-19 human monoclonal neutralizing antibody drug with a high success rate of entering into clinical trials and mass production, according to Wang.

The human monoclonal neutralizing antibody drug for COVID-19 developed by researchers from the Chinese Academy of Sciences was approved for clinical trials on Saturday, marking the entry of China's domestically produced COVID-19 antibody medicine into a clinical evaluation phase. Besides vaccine and antibody drugs, Wang also stressed the importance of making a breakthrough in the R&D of nucleic acid testing technology, aiming for products that allow a shorter detection time, higher sensitivity and looser detection conditions and environment.

https://www.globaltimes.cn

INDIA

R&D expenditure and scientific publications

India's gross expenditure in R&D has tripled between 2008 & 2018 driven mainly by Govt sector and scientific publications have risen placing the country internationally among the top few, as per the R&D Statistics and Indicators 2019-20 based on the national S&T survey 2018 brought out by the National Science and Technology Management Information (NSTMIS), Department of Science and Technology (DST).

"The report on R&D indicators for the nation is an extraordinarily important document for the evidence-based policy-making and planning in higher education, R&D activities and support, intellectual property, and industrial competitiveness. While it is heartening to see substantial progress in the basic indicators of R&D strengths such as the global leadership in the number of scientific publications, there are also areas of concern that need strengthening," said Prof Ashutosh Sharma, Secretary, DST

The report shows that with the rise in publication, the country is globally at the 3rd position on this score as per the NSF database, 3rd in the number of Ph.D. in science & engineering. The number of researchers per million population has doubled since 2000. The report captures the R&D landscape of the country through various Input-Output S&T Indicators in the form of Tables and graphs. These pertain to Investments in national R&D, R&D investments by Government and Private sector; R&D relationship with economy (GDP), Enrolment of S&T personnel, Manpower engaged in R&D, Outrun of S&T personnel, papers published, patents and their international S&T comparisons. The survey included more than 6800 S&T Institutions spread across varied sectors like central government, state governments, higher education, public sector industry, and private sector industry in the country, and a response rate of more than 90% was achieved.

https://dst.gov.in

COVID-technology transfer for MSME manufacturing

Recently Defence Research and Development Organisation (DRDO) has listed 35 (approximately 13 major items) technologies related to COVID-19 pandemic for manufacturing, marketing and sale as per the specifications mentioned on its website. The concept detailed there is to ensure that DRDO developed 'Counter Covid-19 Technologies' are available in every part of the country to fight COVID-19. DRDO plans to transfer these technologies to industries through Licensing Agreement for Transfer of Technology (LATOT) to be signed between industries and the concerned laboratory of DRDO with no charges for ToT or for the royalty when sold in India. However, such items shall attract a royalty of two per cent of invoice value when exported.

It is expected that the signing of LATOT shall provide the Indian industries benefits like becoming a bonafide ToT holder of DRDO and use of DRDO logo on the final product. However, DRDO has restricted itself to transfer of technology Papers only (viz. Bill of Material, complete know-how, processes, Quality processes etc.).

https://www.defenceaviationpost.com

IoT patent filing

The National Association of Software and Service Companies (NASSCOM) said about 6,000 Internet of Things (IoT) patents were filed in India from 2009-19, of which over

5,000 were filed in the last five years. But over 70% of the patents filed in India were from R&D centers of global companies, Indian companies and start-ups accounted for just about 7%. Over 40% of the total IoT patents filed in the country have been granted, with global companies accounting for 90% of them.

The report, titled IoT: Driving the Patent Growth Story in India, found that over 80% of these patents filed were related to applications pertaining to Industry 4.0 with the healthcare and automobile industry leading the way. Around 95% of IoT patents were related to hardware components with connectivity network and sensors being the leading sub-technologies. Manufacturers of electronics and electrical Equipment, semiconductor devices, and computer and telecom equipment together accounted for over 60% of the IoT patents filed in India by business entities over 2009-19, while the share for IT/ITeS companies stood at 13%.

Debjani Ghosh, president, NASSCOM, said, "Innovation has always been at the forefront of fighting any crisis...I am confident that the IoT innovation specially with focus in healthcare and manufacturing will gain more impetus in the tech enabled new normal." In terms of applications, patents pertaining to smart electrical appliances and smart wearables lead in the home automation category.

Disaster prevention is one of the key areas which can use IoT in assisting epidemiologists to trace patient zero and the affected contacts by overlaying geographic information system on IoT mobile data. Smart cellular wrist bands can also help in effective quarantine compliance. Tracking people's health conditions through sensor enabled screening systems, and use of sensors to increase contactless common touchpoints, will be crucial from a public safety perspective, noted the report. Monitoring health of workers through protective gears as well as monitoring automated machines remotely, tracking locations of goods will witness increased use of IoT from supply chain and manufacturing stand.

https://www.livemint.com

INDONESIA

Technology transfer rules

The Coordinating Minister for Maritime Affairs and Investments Luhut Pandjaitan assured that future foreign investors will be required to transfer technology. He said this is the partnership scheme for capital investments. "I would often converse with my acquaintances who are domestic and international investors and tell them that Indonesia is a nation that opens to any form of partnership and with whoever.

The reasoning behind his statement comes from the integrated industrial area with added value in Morowali, Konawe, and Weda Bay, which focuses on raw materials essential to the lithium industry, nickel. Luhut Pandjaitan projects that the three locations will be able to absorb more than 100 percent by 2024 which harbors Indonesia's hope to become the second-largest lithium battery exporter in the world.

The challenges facing that hope come to how to sustainably develop the industry, "Which is the lack of workforces with a bachelor or diploma degrees in engineering," said the coordinating minister. Citing the data from the Central Statistics Agency (BPS), Luhut said that 2019 saw 52.4 million of Indonesia's workforces mostly consist of people with lower education backgrounds; 12.61 million college graduates; and 3.6 million with diploma degrees.

https://en.tempo.co

MALAYSIA

Initiatives under national technology and innovation sandbox

Five initiatives have been identified under the National Technology and Innovation Sandbox (NTIS) for a start, said the Ministry of Science, Technology and Innovation (MOSTI). With the establishment of NTIS, several regulations for pilot testing new technologies, such as online sales delivery via drones and self-driving vehicles, have been relaxed in line with the National Economic Recovery Plan (Penjana) announced by Prime Minister Tan Sri Muhyiddin Yassin.

In a statement today, Mosti said the five initiatives included the use of autonomous robots for health services, for delivery as well as disinfection to curb the spread of Covid-19, in government hospitals and university teaching hospitals, as well as for the agriculture sector by optimising usage of fertilisers and spraying of pesticides. Another initiative is artificial intelligence (AI) and Internet of things (IoT) through technologies developed by MIMOS Bhd for video analytics.

On the third initiative, Mosti said linear pick-and-place robots with competency and high accuracy would be used to reduce the dependence on foreign labour and to undertake dangerous jobs in the manufacturing sector with the pilot projects to be implemented in the Muar Furniture Park and Rawang Integrated Industry Park.

The final two initiatives are advanced manufacturing such as 3D printing to produce affordable Malaysian ventilators in view of the shortage of the equipment, and mutation breeding application by Mosti agency Nuklear Malaysia, which has successfully created new paddy varieties NMR151 and NMR152 with high value-add that will contribute to food security, such as high yield value, resistance to fungi infection as well as ability to grow in salt water and minimal water.

Mosti said the sandbox method would lower entry barriers for products, services, innovation as well as new discoveries into the market with the easing of conditions in the testing process and implementation in a safe and controlled environment. "With this, the process of pilot testing new technologies such as drone delivery drones and self-driving vehicles can be conducted more efficiently and faster," it said.

Meanwhile, Mosti pointed out that four financing schemes were proposed encompassing the scope of Industry 4.0 as well as automation and robotics. These include a maximum grant of RM250,000 for funding the Single Site Sandbox and a partial (70%)

grant of up to RM500,000 for the Multiple Site Sandbox. For the commercialisation process, it proposed a maximum financing of RM4 million in the forms of hybrid fund, grant and convertible promissory notes.

Finally, there are matching grants with investors and corporations with a maximum allocation of RM15 million. The financial instruments are subject to the agreements between Malaysian Technology Development Corporation (MTDC) and the companies involved. Mosti, through Malaysian Global Innovation & Creativity Centre (MaGIC), Technology Park Malaysia (TPM) and MTDC, along with Futurise Sdn Bhd (which is under the Ministry of Finance [MoF]), will cooperate with regulatory bodies and other private sectors to coordinate the implementation of NTIS.

https://www.theedgemarkets.com

PHILIPPINES

Intellectual property filings

The Intellectual Property Office of the Philippines (IPOPHL) received a record-high in annual filings for intellectual property protection totaling 47,282 last year, a nearly 10-percent rise from the 43,300 applications in 2018. In a statement, IPOPHL said filings for trademarks (TM) posted the biggest annual growth at 10 percent to 39,399 from 35,672.

Bulk of the filings were in agricultural products and services, followed by pharmaceuticals, health, cosmetics; scientific research, information and communication technology; management, communications, real estate, and financial services; and textiles -- clothing and accessories. Residents were the biggest TM filers, accounting for 60 percent or 23,447. This was followed by Madrid System non-resident applicants with a share of 8,017 and non-resident direct filings applicants at 7,935. Industrial design (ID) applications were the second biggest driver, up 7 percent to 1,631 from 1,522. Residents were the most active filers with a 62-percent or 1,019 contribution to the total, while the rest were non-residents.

The top five fields for ID filings in 2019 were in means of transport or hoisting; furnishing; packages and containers for the transport or handling of goods; fluid distribution equipment, sanitary, heating, ventilation and air-conditioning equipment, solid fuel; and graphic symbols and logos, surface patterns, ornamentation. Meanwhile, utility model (UM) filings stood at 2,228, climbing 4 percent from 2,144 in 2018. Of the 2019 total, about 96 percent were residents. The top five biggest filings were in food chemistry; basic materials chemistry; handling; furniture, games; and pharmaceuticals. Patents posted a 2-percent annual hike, totaling to 4,024 from 3,962. Filings made under the Patent Cooperation Treaty accounted for the lion's share or 80 percent at 3,223.

Based on the country of origin, the United States, Japan, and China were the top filers. Top industries for patent claims were in pharmaceuticals; organic fine chemistry; biotechnology; digital communication; and food chemistry.

Filings at IPOHL's satellite offices within and outside Metro Manila grew 17 percent to 4,616 from 3,950. In 2019, two satellites were opened, namely in Butuan City in the Caraga Region and Vigan City in Ilocos, bringing the total IPOPHL offices in operations nationwide to 16. At Innovation and Technology Support Offices (ITSOs), which are housed in universities and colleges to deliver basic IPOPHL services, filings grew 13.96 percent to 1,624. This was driven by the 235 patents and 1,075 UMs which saw an annual increase of 22 percent and 16 percent, respectively. ITSOs, currently at 100, are significant enablers to inventors and innovators as they provide patent search and drafting services.

Another effort that supported growth is IPOPHL's completion in 2019 of eight Patent Landscape Reports (PLRs) and presentation of 34 other PLRs to industry stakeholders. PLRs outlines the technological trends and competition in a particular field of technology to help assist local industries and research and development institutions in their commercial decisions. As for Copyright deposits, this totaled 1,862, slightly edging down by 7.55 percent year-on-year.

https://www.pna.gov.ph

Digital processing system for patent applications

Innovators and designers can now further their patent and design applications at the Intellectual Property Office of the Philippines (IPOPHL) through digital means, a significant accomplishment that has been a major target under IPOPHL's digital transformation goal. This is made possible with the successful launch of IPOPHL's Information Technology Management Service (ITMS) of the infrastructures and systems that can extend the facilitation of online patent processes beyond the "eFile" service, which allows applicants to submit electronically the required documents and forms to initiate the application.

The new service, called "eDocFile for Patents," can take forward the application for invention, utility model (UM), and industrial design (ID) by receiving all post-filing documents, requests, and basic annuity payments electronically. "The eDocFile for Patents is a remarkable feat for IPOPHL, thanks mostly to the ITMS which worked on this for years, in line with its commitment to make our services efficient, accessible, and user-friendly. With this new online service, IPOPHL eliminates the need for innovators and designers to be physically present at the office to apply for protection of their innovations, helping keep them and patent examiners, as well, safe in their homes," IPOPHL Director General Rowel S. Barba said.

"More importantly, with a system that can make the patent granting process simpler and more cost-efficient, IPOPHL can ensure uninterrupted service—crucially important amid the expected demand for IP protection as the world scrambles to find a cure to COVID and digital solutions that can help us live better lives through the new normal," he added.

The 24/7 eDocFile for Patents has been available since May 15, 2020.It accepts submissions of documents including responses, in general, voluntary amendments, and follow-up letters. Meanwhile, requests processed by the new service includes requests for extension, recordals, corrections, certified true copy, registrability, UM and ID

revivals, renewals for ID submissions like power of attorney/appointment of resident agent. For patent filers who intend to further their application process, the eDocFile for Patents is available here where a video guide is provided for easier navigation and operation of the platform. Notwithstanding, IPOPHL welcomes requests for assistance and may be reached through email (ask@ipophil.gov.ph) or its social media accounts.

https://pia.gov.ph

REPUBLIC OF KOREA

R&D project to foster medical device industry

The Republic of Korean ministries will join forces to boost the competitiveness of the medical device industry, which has drawn attention from around the world for a speedy and reliable response to the COVID-19 pandemic. The Ministry of Trade, Industry and Energy (MOTIE), the Ministry of Science and ICT, the Ministry of Health and Welfare, and the Ministry of Food and Drug Safety announced on Wednesday the initiation of a joint medical device R&D project with a target budget of 1.2 trillion won ($0.98 billion) between 2020 and 2025.

The project aims to support the strengthening of the medical device industry by taking the opportunity of increased trust in Korean-made medical devices and health services in the fight against COVID-19. The project includes the designation of strategic items to increase market share, development of core components and element technologies to strengthen the value chain, development of innovative technologies to preempt future markets, and regulatory support.

Under the project, the government will support scientists and engineers in the development of key technologies related to ventilators, extracorporeal membrane oxygenation (ECMO), and in vitro diagnostic devices for respiratory diseases necessary for the treatment of infectious diseases such as COVID-19. A task force for the project will be headed by Kim Beopmin, a Korea University's biomedical engineering professor.

This year`s new individual projects were planned based on the preliminary feasibility study data, and they will be revised and supplemented through review by clinical, technology, and investment experts around the task force. New request for proposals for such projects are placed on the websites of Korea Evaluation Institute of Industrial Technology (KEIT), National Research Foundation of Korea, and Korea Health Industry Development Institute for expert feedback until May 17. New projects will be selected in July or August for full-scale support.

In order to strengthen the competitiveness of the medical device industry, it is necessary to support R&D, accelerate market entry through regulatory support, create an initial market, support overseas business expansion in connection with global companies, and provide financial support using funds, said Choi Nam-ho, the MOTIE's manufacturing industry director general, asking the task force to play a central role to accelerate the entry of private companies into the market.

https://pulsenews.co.kr

Patents for Covid-19 testing technologies registered

The Republic of Korea has registered 40 patents of Covid-19 diagnostic technologies since the Armed Forces Medical Command filed the first one in February, the Korean Intellectual Property Office (KIPO) said. The number recorded a rapid increase, compared to 19 patents registered during the Severe Acute Respiratory Syndrome (SARS) outbreak in 2003 or 32 patents during the Middle East Respiratory Syndrome (MERS) outbreak in 2015.

KIPO attributed the rapid rise of patent applications to a set of factors, such as the spiking global demand for Covid-19 testing, greater trust in Korea's disease control, the regulator's swift approval for testing kits, and aggressive government support for international standardization of testing methods. Covid-19 diagnostic technologies registered with the KIPO are divided into two categories – molecular diagnosis method (22) and immunoassay test (18).

Molecular diagnosis amplifies and detects the gene of the Covid-19 virus. It includes a conventional real-time RT-PCR test, real-time isothermal amplification method, biomarker test, and recently being commercialized CRISPR diagnostics. An immunoassay test detects the virus by identifying the antigen or an antibody within the body. It can produce the testing result within 30 minutes. Still, its accuracy may be lower than that of a molecular diagnostic method.

Out of the 40 patents, 17 were filed by companies, 12 by universities, six by government agencies, and five by individuals. About 10 of them were supported by national research and development programs. The first patent registered by the Armed Forces Medical Command was licensed out to many companies. Two other patents, registered later by a national university, were also transferred to a private company.

Won Jong-hyuk, director of the Bio-Healthcare Review Division at KIPO, said that a patent on testing technologies to detect multiple respiratory infection viruses was expected to win registration. "Aside from prompt and accurate reviews of patent applications, we will provide industrial/patent trends in diagnostic technologies for major infectious diseases to actively support technology development for Korea's disease control and prevention," he said.

http://www.koreabiomed.com

THAILAND

Grants to boost R&D

The government will provide grants and tax exemptions to private companies in a bid to promote research and development (R&D), especially for projects that serve the public interest. The Office of National Higher Education Science Research and Innovation Policy Council (NXPO) unveiled the government's plan to boost R&D to cushion the impact of the coronavirus outbreak. Kitipong Promwong, the office director, said an agency survey showed R&D investments amounted to 182 billion baht or 1.1% of the country's GDP last year, up by 17.5% from the previous year. "However, the outbreak is forecast to reduce R&D investments to

1.09% of our GDP [166 billion baht] this year and undermine our competitive edge in the long run. Therefore, the government will offer matching grants to companies working on projects serving public interest such as the manufacturing of drugs," he told a briefing at the head office.

According to the NXPO, R&D expenditure by the private sector is projected to fall from 78% last year to 71% this year due to the pandemic. Mr Kitipong said the government will also offer corporate income tax exemptions to over 80 private companies in exchange for their donation of around one billion baht to the innovation fund for SMEs and for creating an investment ecosystem. This will help maintain the country's current ease of doing business standard as well as help ensure the continuity of the government's current policies.

Despite the impact of the coronavirus crisis, Mr Kitipong said R&D expenditure will climb to 2% of GDP and likely exceed the United Kingdom [at 1.26%] by 2027 because R&D investments in developed countries have already plateaued. "To achieve this goal, future research should fall well within our plan for higher education, science, research, and innovation. Our revised draft policy aims to promote human security, local communities, the bio, circular and green (BCG) economy, and innovation-based industries," he said, before adding that the revised draft is expected to be finished by next month.

He said the BCG economy model will be a key national strategy for ensuring the sustainable future growth of the country in line with the sufficiency economy philosophy. "As an example of this, we are upgrading to smart farming and diversifying food products such as the use of functional ingredients. We are also innovating in healthcare tools and services so we can become a genomics hub. Besides tourism, we are also pushing for a circular economy by reducing food waste throughout the entire supply chain," he said. However, R&D will not be limited to these sectors. Mr Kitipong said the agency is also promoting frontier research in quantum and space technology projects by allocating a seed fund of 200 million baht to visionary researchers.

https://www.bangkokpost.com

Medical patent requests

Fifty-one requests have been filed with the Commerce Ministry seeking to patent medical innovations created as a result of the Covid-19 outbreak, according to the ministry. Private individuals and organisations in Thailand have lodged the requests in four categories of creations, said Deputy Commerce Minister Weerasak Wangsuphakijkosol.

They are 26 requests for equipment to stop transmission of the virus, such as face masks and face shields, 18 requests for disinfectant machines or apparatus including sterilisers and walk-in disinfectant chambers; four requests for sanitiser substances; and three for service robots which help minimise human-to-human contact between medical workers and patients.

Mr Weerasak said the requests are being handled by the Department of Intellectual Property which is examining them to see if they can be accepted for registration. The deputy minister said the ministry was standing ready to support people and organisations in coming up with new innovations. Patent requests can be made via e-filing with the ministry for speed and convenience, he added.

https://www.bangkokpost.com

VIET NAM

Intellectual property for firms

The Intellectual Property Office of Việt Nam has implemented measures to encourage research, innovation and application of creative achievements in science and technology into life and production in response to World Intellectual Property Day 2020 (April 26). The office has supported several effective programmes and projects, such as the programme on intellectual property development, which has protected 118 key agricultural products of localities and supported 600 businesses in terms of intellectual property.

The programme has also supported the protection and application of invention practices for 51 technical solutions. In addition, the network project for innovation and technology support centres has promoted intellectual property activities and technology transfer in universities and research institutes.

Nearly 60 research institutes and universities nationwide have registered to participate in the network. Innovations and inventions have appeared in many industries, fields and localities. However, there are still some units, businesses and people who are not fully aware of sustainable development, so innovations mostly focus on economic growth without considering environmental factors.

The office said that start-up groups only focused on forming businesses and seeking investment but have not thought about registering intellectual property rights. Data from the office showed that 80 per cent of start-ups do not understand the importance of intellectual property. Vũ Thị Thuận, chairman of the board of directors of Traphaco Joint Stock Company, said in the pharmaceutical field, there were many creative values that needed to be protected.

However, the current understanding of intellectual property protection in Việt Nam was incomplete, leading to lots of intellectually property theft, she said. To develop sustainably and integrate, businesses themselves must first respect intellectual property rights, she added. Đỗ Thiên Hoàng, a representative from the Intellectual Property office, said to solve this problem, it was necessary to complete the law on intellectual property for emerging objects and strengthening international co-operation.

For intellectual property rights management and enforcement agencies, it is necessary to improve the capacity of applying new technologies for management and processing, focusing on human resources training. For businesses, there should be guidance on implementing intellectual property rights, raising awareness about intellectual property. Many experts said that in the age of technology, inventors need to register intellectual propertyfor their products as quickly as possible. The office and the authorities have been focusing on perfecting systems of intellectual property regulations.

https://vietnamnews.vn

ASIA-PACIFIC

CHINA

Proto device to fight COVID-19

After the COVID-19 outbreak, the name ECMO (Extracorporeal Membrane Oxygenation) has caught the eyes of the public. Regarded as the last resort to save severe COVID-19 patients, ECMO is used to sustain breathing for patients with severe cardio-pulmonary failure by providing continuous extracorporeal respiratory and circulatory assistance. As a top-level life-supporting equipment, ECMO is seen as rather expensive and rare worldwide. There are only around 400 ECMOs in China, which are all imported from abroad.

Professor Liu Shuqin and her Team in Shandong University announced recently their success in developing a proto-type ECMO equipment. Professor Liu is Director of Maglev Engineering Research Center of the School of Electrical Engineering, Shandong University. Since 2008, the team has been studying the maglev artificial heart pump–the core component of ECMO. After more than ten years of conscientious research, her team has made breakthroughs in this direction with technologies of independent intellectual property rights, and now they are seeking cooperation to incubate the technology into real products. It is expected to save more lives of severe patients with the assistance of ECMO.

Also known as "mobile artificial heart-lung apparatus", ECMO is a kind of Extracorporeal Membrane Oxygenation technology for sustaining lives of patients with acute or severe cardio-pulmonary failure. ECMO basically works by pumping out the patient's venous blood with a power pump (artificial heart), oxygenating the venous blood while discharging carbon dioxide through its membrane lung (artificial lung) and then again pumping the blood back into the patient's body. Although ECMO has no curing effects on the infection caused by COVID-19, it provides effective gaseous exchange and functions as a substitute heart-and-lung system for critically ill patients by relieving their dyspnea – a sequela caused by the COVID-19's attacking the lung of human beings. Thus ECMO is regarded as a "life-saving device" enabling medical workers to race against time in patients' cure and rehabilitation.

According to Professor Liu Shuqin, the Maglev Engineering Research Center of Shandong University is one of the earliest research institutes in China to conduct research on maglev technology and has already accumulated rich experience in its theoretical research and technology development. After more than ten years of strenuous efforts, the team of 16 members, with professional backgrounds covering electric engineering, computer technology, mechanics, fluid engineering, materials, chemistry, emergency medicine, cardiac surgery, intensive care medicine, etc., has independently developed an ECMO prototype. Adopting the maglev magnetic suspension technology, this equipment is characterized by low hemolysis, a sufficient pressure buffer, easy flow regulation, high safety reliability, small size, etc. Up till now, the team has already carried out blood tests on animals. Parameters and indexes of the equipment have reached advanced world level.

This equipment is expected to cut the prices of ECMO by one third. At present, each ECMO equipment costs 1.5 to 2 million yuan, in addition to working consumables from 40,000 to 60,000 yuan. Accoding to Professor Liu Shuqin, if this China-made ECMO equipment is produced on large scale, then the cost of each set of ECMO equipment and its consumables may drop to about 1 million yuan and 30,000 yuan respectively. Cost reduction would promote wider availability of ECMO and benefits more patients.

In the reliability test, four centrifugal pumps of the ECMO prototype have been running smoothly for 15 consecutive days without failure. In the blood substitute (diluted glycerin) and blood tests, their performances have reached the international advanced level. Besides, the pump connector could be joined to imported equipment and even completely replace the imported ones given its excellent performance. At present, three patents for new inventions have been submitted for the maglev centrifugal pump two of them have been authorized and one is going through material review.

https://www.globenewswire.com

INDIA

Anti-microbial nanocoating system for facemasks

A team of researchers at Indian Institute of Technology (IIT)-Roorkee has developed a nano-coating system to be used for facemasks and PPEs for reducing the transmission risk of COVID-19. "Facemask is a core component of the personal protective equipment (PPE), along with gown, gloves, and eye protection for frontline healthcare personnel. This nano-coating provides an additional layer of protection against pathogens in existing masks and can curb the transmission risk of the disease," said lead researcher Prof. Naveen K Navani of Department of Biotechnology and Centre of Nanotechnology. The mask has been developed by a four-member team including Pardeep Kumar, Dr. Arun Beniwal, and Ajmal Hussain.

This coating has been tested to effectively kill pathogens within 10-15 minutes. The formulation is highly effective against clinical pathogens such as Staphylococcus aureus and Escherichia coli O157. This formulation will be beneficial to frontline medical personnel for coating their existing facemasks and can be scaled up further for coating on their gowns. The formulation also contains silver nanoparticles and plant-based antimicrobials which show synergistic killing effect against the pathogens.

The combined effect of more than three antimicrobial compounds was used for the development of formulation which can be coated on any surface. Since the phytochemicals used in the formulation are known to destroy viruses, it has the potential to inhibit the coronavirus too.

https://www.newindianexpress.com

Covid-19 vaccine for human trials

India's drug controller has given approval for human clinical trials of the country's first coronavirus disease (Covid-19) vaccine candidate, which has been developed

by Bharat Biotech in collaboration with the Indian Council of Medical Research (ICMR) and National Institute of Virology (NIV), the vaccine maker said. The trials for the vaccine, named Covaxin, are likely to begin next month, the firm said. The strains of Sars-CoV-2 that causes Covid-19 was isolated by ICMR-NIV and transferred to Bharat Biotech in May. Scientists have managed to isolate and culture 11 strains that can be used to develop vaccines and aid research.

The indigenous and inactivated vaccine candidate was developed and manufactured at Bharat Biotech's BSL-3 (Bio-Safety Level 3) High Containment facility located in Genome Valley, Hyderabad. "The Drug Controller General of India… granted permission to initiate Phase I & II Human clinical trials after the company submitted results generated from preclinical studies, demonstrating safety and immune response. Human clinical trials are scheduled to start across India in July 2020," the company said.

Krishna Ella, chairman and managing director, Bharat Biotech, said: "We are proud to announce COVAXIN, India's first indigenous vaccine against Covid-19.The collaboration with ICMR and NIV was instrumental in the development of this vaccine. The proactive support and guidance from Central Drugs Standard Control Organisation (CDSCO) has enabled approvals to this project. Our R&D and manufacturing teams worked tirelessly to deploy our proprietary technologies towards this platform."

In the two phases, experts test if a vaccine is safe to be administered in humans and to establish trends of its efficacy. The company completed comprehensive pre-clinical studies in two months after receiving regulatory approvals. Results from these studies have been promising and show extensive safety and effective immune responses, the company said.

"Our ongoing research and expertise in forecasting epidemics has enabled us to successfully manufacture a vaccine for the H1N1 pandemic. Continuing our focus on creating the only BSL-3 containment facilities for manufacturing and testing in India, Bharat Biotech is committed to advancing vaccine development as a matter of national importance to demonstrate India's strength in handling future pandemics," said Suchitra Ella, joint managing director, Bharat Biotech.

ICMR-NIV managed to isolate the virus from swab samples in early February from initial Covid-19 patients in Kerala. "It normally takes about two-three months for the vaccine candidate to be ready, and then different studies are undertaken to test the vaccine candidate. The next phase of trials will be equally crucial," said an ICMR official, asking not to be named.

https://www.hindustantimes.com

AI-based tool to detect COVID-19 from chest X-ray

Researchers at the Indian Institute of Technology Gandhinagar (IITGN) have developed an Artificial Intelligence (AI)-based deep learning tool for detection of COVID-19 from Chest X-ray images. This online tool indicates the probability if a person is infected with COVID-19, which can be used for quick preliminary diagnosis before the medical test. The tool is developed by Kushpal Singh Yadav (PI), an M.Tech student of Computer Science & Engineering at IITGN, under the guidance of Prof Krishna Prasad Miyapuram, Associate Professor of Cognitive Science and Computer Science at IITGN.

The system is now live as a web-interface on http://covidxray.iitgn.ac.in/. Any user can upload a digital copy of the chest x-ray or CT-scan in standard image formats such as jpeg, png etc. and check whether that person is COVID-19 positive or not. The format of any test image of a new person will be automatically transformed and diagnosed using the AI tool. It will also validate the input images before giving a result. The result is available within a few seconds.

Sharing the motivation and idea behind developing the tool Prof Krishna Prasad Miyapuram and Kushpal Singh Yadav said, "Given the limited testing facilities for COVID19, there is a rush to develop AI tools for quick analysis using x-rays. Developing a reliable tool requires the combination of right algorithms and data. This is where our tool would prove useful, that can be trained for diagnostic purposes and made available for wider use."

AI tools are widely used for medical image diagnosis. The researchers pooled the data of X-ray images of COVID-19 infected patients as well as healthy persons from different sources available on the internet. They trained a machine learning architecture using deep learning algorithms with these images. The deep learning model that IITGN researchers used has 12 layers of neural network, which is similar to the neurons in the human brain. The deep learning method has the advantage that it learns the disease diagnosing features from the x-ray images in an automatic way.

The tool developed by the IITGN team also uses images from other lung infections such as tuberculosis, pneumonia to ensure the specificity of detection of COVID from other lung diseases. This tool out-performs other such high-tech tools available globally. Moreover, it uses simple machine learning architecture, which makes it stand out over others.

https://indiaeducationdiary.in

RT-PCR method to test COVID-19

Increased tracing, testing and isolation of people with novel coronavirus infection is an effective way to contain the virus spread. Currently, the preferred protocol for testing uses the RT-PCR (Reverse Transcription-Polymerase Chain Reaction) test. This protocol does, however, take time and is expensive.

With the steeply rising number of infected persons, there is a need for a reliable test that would give results quickly and also be less expensive. Researchers from the Centre for Cellular and Molecular Biology (CCMB), Hyderabad, have studied such a method, also using RT-PCR but with dry swabs, bypassing the RNA isolation stage, which they find consumes less time and is less expensive. They also suggest a variant method which apparently shows a

higher efficiency that the conventional one. The results have been posted in *bioRxiv* and *medRxiv* preprint servers. Preprints are yet to be peer-reviewed and published in scientific journals.

In the usual method of testing, nasal swabs collected from a person are placed in a viral transport medium (VTM). From this, a part of the liquid is taken, the viral RNA is extracted and RT-PCR test is carried out. The remainder is stored. It is the step of isolating the RNA that takes time and is expensive. So, the authors have proposed an alternative method. Instead of placing the nasal swabs in the VTM, they are put in a Tris-EDTA (TE) buffer solution, protected by ice. "Virus in dry swabs can stay for several days at 4 degree [ice temperature]. For longer storage, it can be kept in minus 80 degree,... it [dry swab] is much more suitable than VTM, and testing can be delayed, if necessary," says Rakesh Mishra from CCMB, and one of the authors of the preprint. He adds that handling and transporting dry swabs is safer and more convenient.

A small part of the dry swab-TE extract was taken in a new vial and heated to 98 degree C. This destroyed the protective wall of the virus particles, releasing its RNA and this was sent for the RT-PCR test. In all, 40 patients were put through both testing protocols (heated TE without RNA extraction and current standard method). While 22 tested positive and 18 negative in the new method, the standard method yielded 23 positives and 17 negatives. The researchers found that the new protocol of using dry swab-TE extract for RT-PCR was at par with the standard method.

However, the standard method is known to have a problem of false negatives. To address this, the researchers took the dry swabs-TE extract, extracted RNA from it and studied the samples. In this variant method, they found that a few samples that were consistently negative in both methods now showed a positive result. So out of 40 samples they now had 28 positives and 12 negatives. This result was reproduced on testing multiple times. They surmise that this is because of low viral load, which was picked up in the new variant method.

https://www.thehindu.com

JAPAN

'Smart' mask to protect against COVID-19

Donut Robotics has developed a new smart mask to protect against COVID-19 transmission, which also contains a built-in speaker to amplify a person's voice and connects to a smartphone app that can translate speech into eight languages. According to Donut, around 5,000 masks are currently planned to be produced and distributed in Japan this September, where they'll retail for 3,980 yen, or around $37.

The mask was designed as a shell that's meant to slide over any standard commercial mask used to protect against COVID-19 transmission, with the straps running through two small slits on either side. The mask was based, in part, on one of the company's earlier projects, a desktop helper robot called 'Cinnamon' that's used at reception desks and customer service stands to help answer basic questions.

Called 'c-mask,' the device is a shell that can be slid into any traditional face mask. 5,000 masks will be sent to Japanese buyers in September and will retail for around $37, or 3,980 yen. The mask will convert the wearer's speech into text and then translate it into French, Chinese, Spanish, Thai, Indonesian, Korean, English, or Japanese through a smartphone app. The c-mask could evolve to support other functions as well, including some augmented reality features, which Donut says will be possible to implement using a built-in Wifi receiver.

https://www.dailymail.co.uk

REPUBLIC OF KOREA

Robot-aided remote sampling of Covid-19

Local researchers said they have developed a robot that can remotely collect a specimen from a patient with an infectious disease, such as Covid-19. The Korea Institute of Machinery and Materials (KIMM), under the Ministry of Science and ICT, said on Tuesday its research team has developed a robot-assisted technology to take samples needed for diagnostic testing without contact between a doctor and a patient. The research team of Dr. Seo Joonho at the Medical Device Lab of The Daegu Convergence Technology Research Center under the KIMM created the technology jointly with the team of Professor Kim Nam-hee of Dongguk University College of Medicine.

The robot-assisted remote sampling consists of "a master device" for the doctor and "a slave robot" for the patient. The slave robot has a disposable swab that takes the patient's sample through the nose and mouth. The doctor uses the master device to control the slave robot and take the specimen. The swab for sampling, mounted on to the slave robot, can move up and down and left and right, or rotate. The researchers applied remote control technology of the parallel robot to collecting samples remotely.

The doctor can move the robot while checking the position of the nostril, the mouth, and the swab with camera images. The user can also remotely adjust the power when inserting the swab and talk to the patient via video. Using the system to collect a specimen without contact with a patient can significantly reduce medical professionals' risk of infection of a highly contagious virus, such as Covid-19, the researchers said. They can make the robot, as small as the size of a face, with a low cost, and it will be highly useful in clinical settings.

http://www.koreabiomed.com

SINGAPORE

Portable COVID-19 micro-PCR diagnostic system

COVID-19 screening can soon be conducted directly at various testing stations, and patients can get their test results in about an hour from the time they get a nasal swab. A team of researchers from the National University of Singapore (NUS) has developed a portable COVID-19 micro-PCR diagnostic system - called Epidax - that enables rapid and accurate on-site screening of infectious diseases and sig-

nificantly reduces the time required to analyze patient samples.

Polymerase chain reaction (PCR) test that is currently being used for COVID-19 diagnosis has to be carried out in specialized testing facilities, and takes a few hours or a few days for results to be made known. A 10-member team from the NUS Institute for Health Innovation & Technology (iHealthtech), led by the institute's Director Professor Lim Chwee Teck, has developed a novel diagnostic system from scratch in a record time of two months. A project of this scale would typically take at least one to two years to complete.

Epidax, which is a microfluidics-based PCR diagnostic system, is about the size of a toaster and very portable. It can be deployed quickly and easily on-site for virus infection screening. Currently, nasal swab samples are first collected at a clinic or testing site and sent to a laboratory for processing to extract the RNA, before the PCR test is conducted.

The Epidax system uses a specially designed microfluidic chip that comprises micro-channels where samples are processed. By employing microfluidic technology, the system is able to process a smaller amount of sample for quicker detection of COVID-19 infection. Using a reagent which enables both RNA extraction and amplification on the chip, the PCR test can be performed right after a nasal swab sample is collected, thus bypassing the intermediate step of RNA extraction. All these features significantly minimise sample handling and shorten the test and waiting time, so patients can get their test results in about an hour. "We have designed the Epidax system to be very easy to use. The lab technician operating the system only needs to pipette the sample and reagent into the microfluidic chip and load it into the Epidax system for processing. These simple steps can be easily executed within 5 minutes," said Prof Lim.

The NUS research team validated the Epidax system against existing PCR systems, and found that the Epidax system has the same or even higher sensitivity than some of the current PCR systems. In fact, the sensitivity of detection can achieve at least 10 copies of RNA per microlitre of sample. The team is currently improving the limit of detection, aiming to reach 1 copy of RNA per microlitre of sample.

https://www.news-medical.net

Sterilisable 'shield' to protect healthcare workers

A team of researchers from the National University of Singapore (NUS) has invented a foldable tent-like device that serves as a physical shield to reduce the risk of exposure to pathogens for healthcare workers performing droplet and aerosol generating procedures on COVID-19 patients. Known as the Droplet and Aerosol Reducing Tent (DART), the device was designed in collaboration with doctors from the National University Hospital (NUH). The DART can lessen the risks of infection associated with procedures such as suctioning, intubation and extubation by providing an extra layer of protection between the healthcare workers and the patient. It also helps to limit environmental contamination, which can be a source of transmission.

The NUS team was led by Professor Freddy Boey, NUS Deputy President (Innovation & Enterprise), and Associate Professor Yen Ching-Chiuan, Co-Director of the Keio-NUS CUTE Center. The team comprises Dr Alfred Chia from NUS Department of Biomedical Engineering, Mr Eason Chow from Keio-NUS CUTE Center, doctoral student Mr Raymond Hon from the NUS Division of Industrial Design as well as researchers from the NUS Faculty of Engineering. The NUS team worked with Dr Deborah Khoo, Dr Wong Weng Hoa, Associate Professor Ti Lian Kah and Associate Professor Sophia Ang from the NUH Department of Anaesthesia. The multi-disciplinary team took less than two months to develop DART and validate its performance.

The DART is a portable, tent-like structure that that can be placed around the patient's head when intubating or extubating. It weighs three kilograms, and can be folded into a flat structure measuring around 51 centimetres by 55 centimetres, with a thickness of three centimetres, making it easy to transport, store and sterilise. It is also simple and fast to set up.

The device features transparent polycarbonate panels, 3D printed nylon joints and Delrin inserts. These durable materials were chosen by the NUS team to enable the device to be sterilised by all standard forms of decontamination used in hospitals, such as elevated temperature autoclaving, and using alcohol of 70 per cent concentration. This facilitates the reusability of the device, and eliminates the risk of cross-contamination.

Arm access ports are situated on the back and side panels of the device. The snap-on flanges allow the attachment of disposable sleeves or diaphragms. This addresses the concern of the arm ports being high risk areas of contamination, and gives the healthcare workers the option to use either sleeved or diaphragm seals – materials easily available in hospitals – according to their preference. The elliptical shape of the access ports gives the user more leeway for arm movements and to manoeuvre, which are important in handling the patient.

A key feature of the DART is its ability to direct air within itself through a High Efficiency Particulate Air (HEPA) filter. It has a set of connectors that enables suction from a central vacuum system, or by a battery-operated fan attached to a HEPA filter. The negative pressure generated reduces leakage of exhaled aerosols or droplets from the patient out of the confines of the DART. Preliminary findings by the research team showed that the DART performs its barrier function as designed, and the exhaust function via the HEPA filter gives additional assurance to the user.

https://www.techexplorist.com

EUROPE

AUSTRIA

Covid-19 test for population screening

Scientists from the Vienna BioCenter and collaborators have now pushed an established nucleic acid detection assay to a new level. The so-called "Loop-mediated isothermal amplification (RT-LAMP)", first developed twenty years ago, is cheap, simple and quick – features that make it in principle an ideal alternative for routine SARS-CoV-2 detection. However, limited sensitivity and robustness

have so far held back RT-LAMP-based assays from entering the center stage for SARS-CoV-2 diagnostics. The improvements introduced by the Viennese team overcome these challenges and make RT-LAMP a potential game-changer for population-scale screening approaches, especially in economically disadvantaged countries.

Starting with a 5-minute lysis step that "breaks open" cells and virus particles, RT-LAMP employs a simple reaction in which the viral RNA is converted into DNA and amplified billionfold within less than 30 minutes. The generation of such tremendous amounts of DNA can be directly observed with the naked eye by a visual colour change from purple to sky-blue in the reaction tube. Combining this method with a simple RNA enrichment step is at the heart of the newly developed method as it boosts sensitivity by orders of magnitude. Neither specialist laboratory equipment nor expert skills are needed – the most challenging step is to keep the sample at a stable temperature of approximately 63°C during the 30 minutes of the reaction, a task that can – if necessary – be fulfilled by re-purposed kitchen devices.

"Our method builds on existing protocols developed for pathogen detection", says Julius Brennecke of the Institute of Molecular Biotechnology (IMBA) of the Austrian Academy of Sciences. "For SARS-CoV-2-detection, we managed to improve it to a level that matches qPCR-like sensitivity on crude patient samples. We are extremely excited and can barely wait to see it applied. We expect that these improvements, including the ability to perform pooled screening, will make a real difference not only in developing countries, but in low-resource environments anywhere in the World. Sensitive, affordable and rapid SARS-CoV-2 screening and diagnostics approaches are much needed now."

"The way this whole project unfolded is rather exceptional," says Andrea Pauli of the Research Institute of Molecular Pathology (IMP). "It started off as a crazy idea, triggered by our believe that as scientists we must act to help in the current pandemic. Through a remarkable coincidence, Max Kellner, an Austrian PhD student at the institute LMB in Cambridge who had prior experience with isothermal amplification methods, got stranded in his hometown Vienna during the lockdown. When we found out, we teamed him up with Vienna BioCenter PhD students Julian Ross and Jakob Schnabl. And so, two groups, normally working on Drosophila oogenesis and zebrafish embryology, came together and set foot in a new field. An exceptional level of team spirit and enthusiasm allowed us to push this project much further than we had ever envisioned and made it a once in a life-time experience for everyone involved."

IMP and IMBA are members of the Vienna BioCenter, and the breakthrough is testimony to the fruitful and collaborative spirit this campus is known for. The lockdown period boosted these synergistic activities in an unprecedented manner across labs and institutes. While normal research activities have returned to the labs by now, scientists across campus continue to contribute their time and expertise to combat the outbreak of the Covid-19 pandemic. As part of the VCDI (Vienna Covid-19 Diagnostics Initiative) they work jointly on questions that open the door for applications which could benefit millions of people around the world. The study underlying this news item is available as a preprint on bioRxiv:

https://www.newswise.com

FRANCE

Ultra-fast saliva test to detect Covid-19

A newly developed test has been able to diagnose in the field and (almost) immediately those patients who are suffering from Covid-19. Called EasyCov, this portable system requires a few drops of saliva, a test tube and less than one hour of heating at 65° to produce a result. Another small reason for pride is that it has been developed by Sys2diag,1 a laboratory that associates scientists from the CNRS and from the companies Alcediag and SkillCell (Alcen Group), all led by the biologist Franck Molina. This test will accelerate and enable much broader coverage for the testing strategy recommended by the WHO since the start of the pandemic.

"Originally, Sys2diag did not specialise in viral detection," explains Franck Molina. "Our core activity is the development of innovative diagnostic tools, and until now we have mostly worked in the field of psychiatry – on a test that can detect severe depression and the risk of self-harm – as well as on cellular machines, which are artificial cells that behave like small computers and are, for example, capable of detecting prediabetes in a patient's urine specimen. But when the Covid epidemic started to accelerate in France and problems regarding tests and reagents were becoming evident, we decided that we ought to try something, based on the technologies and skills we had already developed." So just before lockdown, when everyone in the laboratory was preparing to work from home, the team decided to initiate research on a saliva test.

"The idea was to produce a simple and easy-to-use method which could avoid the purchase of large machines that consume a great deal of reagent," recounts Franck Molina. "We also wanted to find another way of looking for the virus than at the back of the nose – a procedure that can be painful for the patient and unsafe for the healthcare worker because it is uncomfortable and may trigger a sneeze. The question then was where to find the virus in large quantities, apart from in nasal secretions. The answer was: in the saliva. This was a risky choice and we are the only ones in the world to have made it, because saliva, which is full of enzymes, bacteria and cells, is known to be an important biological disruptor."

Like the standard tests, EasyCov searches for the RNA of the virus – which does not of course contain any DNA – and therefore requires a host to transcribe its RNA into DNA and then reproduce. However, the technological choice made by Sys2Diag to achieve this was radically different. "The tests used by medical laboratories, called RT-PCR, function in three stages and successive cycles at different temperatures," details Franck Molina. "First of all, they extract the RNA from the virus; they then transcribe it into DNA, which is amplified until there is a sufficient quantity to produce a reading. Our system relies on quite an old but little known technology called "RT-LAMP" which can do everything at once: the enzymes we

use work simultaneously and all procedures are completed at the same time, at a single operating temperature of 65°C."

https://sciencebusiness.net

GREECE

Rapid Biosensor to detect SARS-CoV-2 S1 Antigen

Researchers at the Agricultural University of Athens, Greece, have developed an innovative portable biosensor for the rapid, ultra-sensitive and scaled-up detection of the SARS-CoV-2 virus surface S1 protein. This new test potentially allows the virus to be detected immediately after an individual becomes infected, while even asymptomatic patients could be identified in the early stages of the virus spread.

The ability to reliably predict the spread of the novel and highly contagious SARS-CoV-2 coronavirus created an urgent need for diagnostic tools able not only to reliably identify infected individuals but also determine the stage of viral replication and spread. A priority goal of the worldwide management of the COVID-19 pandemic is the reduction in the time required to confirm positive cases between infection and symptom appearance, in particular during the very early infection period (1–3 days) and identifying asymptomatic patients.

Currently available serological assays for SARS-CoV-2 screen host antibodies raised against the virus, therefore they are not suitable for monitoring infection at an early stage (up to the first three days). An attractive alternative option is the screening of the SARS-CoV-2 S1 spike protein antigen, which is implicated in the initial stages of viral entry, corresponding to the presence of the whole virus.

The novel biosensor is based on membrane-engineered Vero mammalian cells bearing the human chimeric spike S1 antibody. This was achieved by using a generic methodology known as Molecular Identification through Membrane Engineering which comprises of electroinserting tens of thousands of antibody molecules on the cell surface, thus rendering the cell a selective responder against antigens binding to the inserted antibodies. It has been proven in numerous previous applications that the attachment of the target antigen to its respective antibody causes a change in the cell membrane structure, which is measurable as a change in the cell membrane potential. Therefore, membrane-engineered cells can be used as biorecognition elements in appropriate bioelectric sensors.

For the detection of the SARS-CoV-2 virus surface S1 protein, the biosensor set-up was configured according to the principles of the established Bioelectric Recognition Assay (BERA) as a portable read-out device operated via smartphone/tablet. The response of Vero/anti-S1 cells immediately after the addition of the sample was recorded as a time-series of potentiometric signal at a sampling rate of 2 Hz. The measurements were uploaded via a tablet/Bluetooth communication to a cloud server. The system provided results in an ultra-rapid manner (3 min), with a detection limit of 1 fg/mL and a semi-linear range of response between 10 fg and 1 µg/mL. No cross-reactivity was observed against the SARS-CoV-2 nucleocapsid protein. Beyond speed, the high sensitivity of the novel biosensor could allow non-invasive virus detection in saliva samples.

The novel biosensor, having been tested at the proof-of-concept, offers capabilities for high throughput and low-cost mass screening of the coronavirus antigens. The next step is the clinical validation of the assay in actual patient samples as well as broadening the scope of application to detect antigenic S proteins of other coronaviruses.

https://www.technologynetworks.com

SWITZERLAND

Biosensor for the COVID-19 virus

A team of researchers from Empa, ETH Zurich and Zurich University Hospital has succeeded in developing a novel sensor for detecting the new coronavirus. In future, it could be used to measure the concentration of the virus in the environment -- for example, in places where there are many people or in hospital ventilation systems.

Jing Wang and his team at Empa and ETH Zurich usually work on measuring, analyzing and reducing airborne pollutants such as aerosols and artificially produced nanoparticles. However, the challenge the whole world is currently facing is also changing the goals and strategies in the research laboratories. The new focus: a sensor that can quickly and reliably detect SARS-CoV-2 -- the new coronavirus.

Jing Wang and his team have developed an alternative test method in the form of an optical biosensor. The sensor combines two different effects to detect the virus safely and reliably: an optical and a thermal one. The sensor is based on tiny structures of gold, so-called gold nanoislands, on a glass substrate. Artificially produced DNA receptors that match specific RNA sequences of the SARS-CoV-2 are grafted onto the nanoislands. The coronavirus is a so-called RNA virus: Its genome does not consist of a DNA double strand as in living organisms, but of a single RNA strand. The receptors on the sensor are therefore the complementary sequences to the virus' unique RNA sequences, which can reliably identify the virus.

The technology the researchers use for detection is called LSPR, short for localized surface plasmon resonance. This is an optical phenomenon that occurs in metallic nanostructures: When excited, they modulate the incident light in a specific wavelength range and create a plasmonic near-field around the nanostructure. When molecules bind to the surface, the local refractive index within the excited plasmonic near-field changes. An optical sensor located on the back of the sensor can be used to measure this change and thus determine whether the sample contains the RNA strands in question.

https://www.sciencedaily.com

UK

Low-cost, rapid COVID-19 test

A new type of test developed by U.K. researchers from the Brunel University London, Lancaster University and the University of Surrey can provide COVID-19 detection in as little as 30 minutes using hand-held hardware that costs as little as £100 (around $120 USD) with individual swab sample kits that cost around $5 per person. The test is based on existing technology that has been used in the Philippines for testing viral spread in chickens, but it's been adapted by researchers for

use with COVID-19 in humans. The team is now working on ramping mass production.

This test would obviously need approval by local health regulatory bodies like the FDA before it goes into active use in any specific geography, but the researchers behind the project are "confident it will respond well," and say they could even make it available for use "within a few weeks." The hardware itself is battery-operated and connects to a smartphone application to display diagnostic results and works with nasal or throat swabs, without requiring that samples be round-tripped to a lab.

There are other tests already approved for use that use similar methods for on-site testing, including kits and machines from Cepheid and Mesa Biotech. These require expensive dedicated table-top micro-labs, however, which is installed in dedicated healthcare facilities. This test from U.K. scientists has the advantage of running on inexpensive hardware, with testing capabilities for up to six people at once, which can be deployed in doctor's offices, hospitals and even potentially workplaces and homes for truly widespread, accessible testing.

Some frontline, rapid results tests are already in use in the EU and China, but these are generally serological tests that rely on the presence of antibodies, whereas this group's diagnostics are molecular, so it can detect the presence of viral DNA even before antibodies are present. This equipment could even potentially be used to detect the virus in asymptomatic individuals who are self-isolating at home, the group notes, which would go a long way to scoping out the portion of the population that's not currently a priority for other testing methods, but that could provide valuable insight into the true extend of silent, community-based transmission of the coronavirus.

https://techcrunch.com

NORTH AMERICA

USA

Emergency ventilator for COVID-19 patients

A team of engineers and physicians at the University of California San Diego has developed a low-cost, easy-to-use emergency ventilator for COVID-19 patients that is built around a ventilator bag usually found in ambulances. The team built an automated system around the bag and brought down the cost of an emergency ventilator to just $500 per unit -- by comparison, state of the art ventilators currently cost at least $50,000. The device's components can be rapidly fabricated and the ventilator can be assembled in just 15 minutes. The device's electronics and sensors rely on a robust supply chain from fields not related to healthcare that are unlikely to be affected by shortages.

The UCSD MADVent Mark V is also the only device offering pressure-controlled ventilation equipped with alarms that can be adjusted to signal that pressure is too low or too high. This is especially important because excessive pressure can cause lung injury in COVID-19 patients that often experience rapid decreases in lung capacity as the disease progresses.

Most ventilators measure the volume of air that is being pumped into the patient's lungs, which requires expensive airflow sensors. By contrast, the UCSD MADVent Mark V measures pressure and uses that data to deduct and control the airflow to the lungs. This was key to lowering the device's price.

The team from tUC San Diego and industry partners will be seeking approval for the device from the Food and Drug Administration. They detail their work in an upcoming issue of *Medical Devices and Sensors*. The MADVent can safely meet the diverse requirements of COVID-19 patients because it can adjust over the broad ranges of respiration parameters needed to treat acute respiratory distress syndrome," said James Friend, a professor at the UC San Diego Jacobs School of Engineering and one of the paper's two corresponding authors. "The combination of off-the-shelf components and readily machined parts with mechanically driven pressure control makes our design both low cost and rapidly manufacturable."

Researchers also wanted to make sure that the device could be used by healthcare workers with limited experience with ventilators and no experience with this type of system, said Dr. Casper Petersen, co-author of the study and a project scientist in the Department of Anesthesiology at the UC San Diego School of Medicine. As a result, the MADVent Mark V is safe to use, easy to assemble and easy to repair.

https://www.sciencedaily.com

CRISPR gene editing to fight COVID-19

Bioengineers at Stanford University were working on a system to fight the flu with the gene-editing technology CRISPR when the COVID-19 pandemic emerged in January. So they quickly pivoted to address the new disease—and now they're reporting they've developed a way to inhibit 90% of coronaviruses, including SARS-CoV-2, the cause of COVID-19. The Stanford team worked with researchers at the Department of Energy's Lawrence Berkeley National Laboratory to develop a technique called prophylactic antiviral CRISPR in human cells, or PAC-MAN. The technology disables viruses by scrambling their genetic code. The researchers developed a new way to deliver the technology into lung cells, they reported in the journal *Cell*.

PAC-MAN combines a guide RNA with the virus-killing enzyme Cas13. The RNA directs Cas13 to destroy certain nucleotide sequences in the SARS-CoV-2 genome, effectively neutralizing it. But the Stanford team that developed PAC-MAN needed an effective way to deliver it to the lung, where COVID-19 often does the most damage. So they turned to the Berkeley Lab's Molecular Foundry, which has been working on lipitoids, synthetic peptides that can deliver DNA and RNA into cells.

When the researchers packaged their COVID-targeting PAC-MAN with the lipitoids they were able to reduce the amount of SARS-CoV-2 virus in solution by more than 90%. They are now planning animal trials with collaborators at New York University and Karolinska Institute in Sweden. "An effective lipitoid delivery, coupled with CRISPR targeting, could enable a very powerful strategy for fighting viral disease not only against COVID-19 but possibly against newly viral strains with pandemic potential," said Michael Connolly, a principal scientific engineering associate at Berkeley Lab, in a statement.

The Stanford researchers working on COVID-19 are confident their PAC-MAN system will also prove useful for fighting influenza. In the Cell article, they reported that their CRISPR-Cas13 technology was not only effective against SARS-CoV-2, it also lowered the viral load in human lung epithelial cells infected with the H1N1 strain of the flu.

https://www.fiercebiotech.com

COVID-19 test using nanoparticle technique

Scientists from the University of Maryland School of Medicine (UMSOM) developed an experimental diagnostic test for COVID-19 that can visually detect the presence of the virus in 10 minutes. It uses a simple assay containing plasmonic gold nanoparticles to detect a color change when the virus is present. The test does not require the use of any advanced laboratory techniques, such as those commonly used to amplify DNA, for analysis. The authors published their work last week in the American Chemical Society's nanotechnology journal *ACS Nano*.

"Based on our preliminary results, we believe this promising new test may detect RNA material from the virus as early as the first day of infection. Additional studies are needed, however, to confirm whether this is indeed the case," said study leader Dr. Dipanjan Pan, Professor of Diagnostic Radiology and Nuclear Medicine and Pediatrics at the UMSOM.

Once a nasal swab or saliva sample is obtained from a patient, the RNA is extracted from the sample via a simple process that takes about 10 minutes. The test uses a highly specific molecule attached to the gold nanoparticles to detect a particular protein. This protein is part of the genetic sequence that is unique to the novel coronavirus. When the biosensor binds to the virus's gene sequence, the gold nanoparticles respond by turning the liquid reagent from purple to blue.

"The accuracy of any COVID-19 test is based on being able to reliably detect any virus. This means it does not give a false negative result if the virus actually is present, nor a false positive result if the virus is not present," said Dr. Pan. "Many of the diagnostic tests currently on the market cannot detect the virus until several days after infection. For this reason, they have a significant rate of false negative results."

"This RNA-based test appears to be very promising in terms of detecting the virus. The innovative approach provides results without the need for a sophisticated laboratory facility," said study co-author Matthew Frieman, PhD, Associate Professor of Microbiology and Immunology at UMSOM. Although more clinical studies are warranted, this test could be far less expensive to produce and process than a standard COVID-19 lab test; it does not require laboratory equipment or trained personnel to run the test and analyze the results. If this new test meets FDA expectations, it could potentially be used in daycare centers, nursing homes, college campuses, and work places as a surveillance technique to monitor any resurgence of infections. In Dr. Pan's laboratory, research scientist Parikshit Moitra, PhD, and UMSOM research fellow Maha Alafeef conducted the studies along with research fellow Ketan Dighe from UMBC.

https://www.newswise.com

SOUTH AMERICA

BRAZIL

COVID-19 diagnostic test

Researchers at Biolinker, a biotech startup based in São Paulo, Brazil, are developing a low-cost high-performance COVID-19 diagnostic test using only locally sourced inputs. Biolinker is incubated at the University of São Paulo's Center for Innovation, Entrepreneurship and Technology (CIETEC), jointly run by the University of São Paulo (USP) and the Nuclear and Energy Research Institute (IPEN).

The project was one of the first to be selected in a call for applications issued by FAPESP's Innovative Research in Small Business Program (PIPE) in partnership with FINEP, the Brazilian government's innovation agency, to fast-track funding for products, services or processes developed by tech startups and small businesses in the state of São Paulo to combat COVID-19. "Within a few months, we plan to have completed the development of a standardized kit for the detection of IgG circulating antibodies in blood serum produced in a later phase of the disease. The method used is ELISA [enzyme-linked immunosorbent assay]," Mona das Neves Oliveira, principal investigator for the project and founder of the firm, told FAPESP Innovative R&D.

The project will use a cell-free protein synthesis technology developed by the firm over the last two years to accelerate and optimize protein production processes on the basis of an in vitro transcription and translation system. Researchers have used the system to develop a protein that is being tested. "The tests are going very well," Oliveira said. "We've produced the protein and are now purifying it to avoid false positives and false negatives."

The detection of IgG in patient blood samples will be performed using antigens from the nucleocapsid protein, the antigenic fraction of the spike protein used by SARS-CoV-2 to invade human cells by binding to the ACE-2 receptor in the cell membrane. Through a project supported by FAPESP, the researchers were able to develop and validate an aptamer – a peptide that binds to a target molecule – with strong affinity and specificity for the constant fraction of IgG antibodies.

The test kit will be low-cost because the aptamer and antigens are cheap to produce by the cell-free method. In addition, the firm already has its own plasmids (DNA molecules that can self-replicate) for protein expression and well-established production protocols. "It will be a very affordable, quick test that can be used anywhere for epidemiological screening purposes," Oliveira said. "Negotiations are in progress with companies interested in mass-producing the test kit once it's been calibrated and approved for general use." Ester Sabino, a professor and researcher at the University of São Paulo's Institute of Tropical Medicine (IMT-USP), is partnering with the project. Sabino led the sequencing of SARS-CoV-2 in Brazil.

https://www.technologynetworks.com

Accelerating Innovation in a Successful Technology Transfer Ecosystem

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Abstract

There is little or no doubt that intellectual property rights (IPRs) has become and will become even more important in Asia in the foreseeable future with much of the hype behind the rise of economy giants, China and India. However, countries such as the United Stated of America, the United Kingdom, Sweden, France and Japan still dominate many areas of business through the ownership of copyrights, brands and ground-breaking patents while growing economies in the ASEAN are still struggling to find the sweet spot in implementing the most appropriate innovation ecosystem to drive their own knowledge economies. Despite the well-established intellectual property (IP) regime in Malaysia and those of the ASEAN countries, the rate of commercialisation of IP is rather low (Chandran & Wong, 2011; Chandran et al., 2008, 2009a) and there is much catching up to do. This article looks at the prevailing models of technology transfer in the innovation ecosystem, particularly in Malaysia and other ASEAN countries while identifying some gaps to be filled in to facilitate smoother operation of a comprehensive, well strategised and an outcome-driven innovation ecosystem with scale and focus.

Importance of innovation in transitioning to a knowledge-based economy

Intellectual property is the new economy in the global prosperity of the twenty-first century. As we transition into the creation of a knowledge-based economy with dramatic shifts in global commerce that are impacting virtually all businesses and consumers, the protection of IPRs has become crucial to the survival and ultimate success of any company. Innovations have been primarily the purview of universities, big corporations, or government-linked organisations with huge R&D departments and budgets. However, in the recent years, we are seeing a gradual growth of inventions or new ideas generated by small-and-medium size enterprises (SMEs) or even individuals. Innovation has led to the creation of new and more sustainable businesses, spurred by investments in applied research and development. It is pivotal for relevant stakeholders to educate the business community on the advantages and importance of IP in today's knowledge-based economies. In order to boost the innovation ecosystem, Malaysia and other ASEAN countries should consistently assess the various key propellers of IP and innovation. A few gaps within the innovation ecosystems in Malaysia and other ASEAN nations include:

- the absence of a cohesive, holistic and a collaborative national innovation strategy;
- lack of market-driven policies to enable innovation;
- loose funding instruments for supporting innovation initiatives;
- multiple public agencies and entities working in silos on innovation initiatives;
- broken linkages across industry and public research institutes; and
- the lack of a vibrant entrepreneurial culture and skilled human capital

> "A driving factor for much of the economic growth and rise in living standards in the post-World War II era is the rapid advances in technology and innovation". The US Department of Commerce estimates that technological innovation has been responsible for as much as **75%** of the growth in the American economy since World War II. In a seminal study of 98 developed and developing countries, Klenow and Rodriguez-Clare found that up to 90% of per capita income growth stems from innovation.
>
> *(Source: Global Innovation Policy Index, 2012)*

Global Innovation Index (GII) 2019 ranks the innovation performance of 129 countries across the globe based on 80 indicators. The recent GII 2019 report indicates countries that prioritize innovation in government policies have shown increase in rankings. Some of these countries (Switzerland, Sweden, United States of America, United Kingdom, France and Japan) have a net positive balance from the payments made for accessing the IPRs from foreign economies and the income generated from monetising their own IPRs. Malaysia retains its 35th position in the GII 2019 and remains amongst the middle-income economies that are bridging the innovation divide, supported by its first rank in

Table 1: Southeast Asian countries ranking in GII 2019

No.	Country	Ranking
1	Singapore	8
2	Malaysia	35
3	Vietnam	42
4	Thailand	43
5	Philippines	54
6	Brunei	71
7	Indonesia	85
8	Cambodia	98

Source: Global Innovation Index 2019

indicators such as high-tech net exports and creative goods exports. Singapore was the only ASEAN member state to emerge in the top 20 list. ASEAN countries are ranked in GII 2019 as in Table 1.

Interestingly, the report also indicates that middle-income economies, especially in Asia, are progressively contributing to global research and development (R&D) and international patenting rates via the World Intellectual Property Organisation's (WIPO) International Patent System. There are eight forms of IPRs: patent, trademark, trade secret, copyright, industrial design, geographic indications, plant variety rights and integrated circuit designs. IP is not necessarily specific to products per se. A manufacturing software that expedites a specific process and improves throughput is an innovation that needs to be protected. The software is a copyright and you transfer that IPRs through a software license. Another example is a production process that is much cheaper to produce. The patent for this process is not a product patent but a process patent and it can be licensed. Under certain circumstances, some entities might not choose to patent but may maintain it as a trade secret when it is unlikely that the technology/process can be readily reverse-engineered. However, IPRs can most often be costs unless they are strategically exploited and/or enforced to derive value, monetary or otherwise.

A common problem in the ASEAN countries is that most business entities do not know or fully appreciate the fact that their IP is a valuable asset to their business. Many businesses do not even know that their businesses are generating IPRs that can be commercialised.

The formulation of a successful business model often needs a thorough understanding of alternative ways to profit from a creation. SMEs especially in least developed and middle-income countries do not see the importance of IP protection because of its high cost, lack of awareness of its significance as an intangible asset, not knowing how to defend it and not having proper guidance or experience in IP monetisation. More commonly the need to file a patent arises when there is a possibility of infringement or copying. SMEs need to look at the big picture as IP is an intangible asset that investors will look at when they consider investing funds into the business. The other misconception that SMEs often have is that only physical and tangible products can be protected via IPRs. SMEs should be given both technical as well as financial assistance to develop and fully exploit their business innovations. There needs to be a change in the mindset of SMEs as well as cash-rich corporations to make a sizeable increase in the number of home-grown IPRs. SMEs should align their business strategy with IP strategy as it is crucial in order to measure the impact and returns of their intangible assets and revenue growth. Intangible assets such as brands, inventions and know-how contribute by far the greatest shareholder value in most sectors. Some key issues to consider in developing an IP strategy are as follows:

- Understanding on intangible assets and what constitutes them;
- Determining a value for the identified intangible assets via an IP valuation exercise;
- Ensuring that the scope of IP protection is robust;
- Mechanisms on how intangible assets could be improved, monetised and leveraged; and
- Develop a sound IP commercial strategy.

According to the Association of University Technology Managers (AUTM) in the United States, technology transfer is defined as "the process of transferring scientific findings from one organisation to another for the purpose of further development and commercialisation". Commercialisation of innovations or IPRs may involve more than one right. For an example, the franchise business of Kentucky Fried Chicken (KFC) involves trade secrets (recipes), copyrights (manuals on how to do it or plans of outlets) and trademarks of the brand. These various forms of IPRs will be licensed as a package by the franchisor (owner) to the franchisee (the recipient of the license) in exchange for an upfront fee and continuing royalties based on sales for an agreed period by both parties via a licensing or a franchise agreement, resulting in economic growth and job creation.

SMEs can also de-risk R&D costs and time by licensing technology from a university in which case the industry partner greatly benefits from not having to develop the technology from scratch.

The innovation ecosystem

There have been much ongoing debates and discussions among stakeholders in the Triple Helix (TH) ecosystem about how best to ensure that the protection of IPRs and innovation are optimally calibrated to provide the right incentives for today's creators, innovators and businesses. While it is important to have thoughtful discussions about the particulars of IP law, it is equally important not to lose sight of the big picture, in that IP has never been more important to economic growth and social progress for a country.

Across the innovation ecosystem are four stakeholder groups - government agencies, businesses, individuals (entrepreneurs) and (research/education) institutions.

- **Government agencies** play an important role by supporting long-term R&D efforts through efficient public investments which otherwise would not be taken up by the private sector due to market failure.
- **Businesses** build commercial impetus and market channels for the outcomes of innovation. They generate returns on investment on innovation expenditure.
- **Individuals** play an important role in innovation by providing leadership and entrepreneurial thinking in turning ideas into commercial applications.
- **Institutions** are focused on education and research, facilitate the development of human capital, knowledge and novel technologies which form the ideas to power innovation.

Key enablers to support the national innovation agenda in accelerating the country's innovation strategy include the establishment of a national innovation strategy tailored to local context, pro-market policies, effective funding of innovation, streamlined public organisational structures, world-class infrastructure and talented human capital to power innovation.

Studies have shown that innovation correlates with the GDP growth of a country (Andergassen et al. 2009; Bae and Yoo 2015; Nadiri 1993; Romer 1986; Santacreu 2015; Solow 1956). High-income and emerging economies with good financial infrastructure and system demonstrate high level dynamics of innovation and business capabilities with large R&D investments. On the other hand, developing Asian countries with low investment in R&D may increase risks on impeding future growth.

The current scenario and challenges in relation to innovation in Malaysia

The WIPO World Intellectual Property Report 2019 shows that innovation activity has been growing towards a collaborative and transnational approach over the last decade. It also shows that most of these activities are originating from the top innovative champions – Switzerland, Sweden, Finland, the Netherlands, the United Kingdom and the USA. Malaysia is one of the middle income countries that are in the process of refining its innovation ecosystem and the strengths and weaknesses have been identified at the top level (Table 2):

Commercialization of IPRs requires a sizeable capital which many entities especially SMEs may not have. Traditionally, financial assistance to SMEs comes in various forms like loans or grants and tax incentives from various government or private bodies. However, very few countries have successfully recognised IP as collaterals for loans. Generally, investments into early-stage innovations come from the government in the form of grants and most of these investments are channeled to universities and research institutes. There is the perception that domestic IP is second-grade or "not of good quality" compared to foreign IP. This leads to the unfavorable balance-of-trade in royalty fees which continues to worsen over time. In 2008, this amounted to RM 3.6 billion in royalty fees net outflow, most of which was paid to the United States of America (OECD, 2000). Government support through various initiatives will enable SMEs to have an avenue where they can seek answers to their questions about their IPRs and how to protect it from being copied or stolen. These initiatives will also assist SMEs in understanding how they can monetize their creations. Investors and governments in developing countries should also look into supporting early stage IP to nurture more market-driven innovation by providing environment for SMEs that are willing to licensing and scale up these innovations. Innovation related tax incentives are also another good way to encourage innovation growth and increase home-grown IPs for a country. Pragmatic financial initiatives should be developed to stimulate and support early-stage, high risk and disruptive innovation or business-university collaboration.

A vibrant IP ecosystem requires a strong and pragmatic Trible Holix (TH) collaboration. It will be difficult to harness and leverage on the potential of an IP powerhouse due to fragmentation approach to resources. We will lose out opportunities if we are not prominent and visible. Small nation economies need a more concerted approach to make up for a lack of domestic volume and other constraints. Stakeholders should respond to the changing global IP landscape with more vigor and take the next stride by studying successful models implemented by various agencies and organizations in relation to technology transfer and innovation. The TH concept

Table 2: Strengths and weakness of Malaysia innovation ecosystem

Policy and Institutional
Strengths: • Many policies, plans and programmes on innovation have been created • Leadership credentials • Strong commitment to science, technology and innovation • Coherent vision for the country under the 12th Malaysia Plan and Economic Transformation Plan (ETP)
Weakness: • Lack of coherent innovation efforts between the relevant ministries, agencies and industry • Inconsistency in policies, strategies and implementation planning • Poor monitoring and evaluation • Unfocused initiatives • Lack of skilled personnel in technology transfer

Source: Author's compilation

Table 3: Countries with similar provisions to the Bayh-Dole Act

Brazil	Mexico
China	Norway
Denmark	Philippines
Finland	Russia
Germany	Singapore
Italy	South Africa
Japan	South Korea
Malaysia	United Kingdom

Source: AUTM

(Etzkowitz and Leydesdorff 1995), looks at university-industry-government collaboration in the context of the knowledge society. The TH model points out that innovation and economic development demonstrates the relationship of hybridization of individuals from university, industry and government to generate new institutional models for the generation, exchange and application of knowledge.

The Bayh-Dole Act which passed in the United States in 1980 has made a significant impact to the technology transfer field. The provision of this Act allows universities and small companies to own inventions that were developed with federal government funding. In return, funding agencies can use these discoveries royalty-free for their own purposes. Universities are encouraged to partner with industries to translate research results into products benefiting the public. The table 3 shows some countries which have adopted acts similar to the Bayh-Dole Act into their IP provision laws.

There are a few successful TH models around the world and a good reference model to look into is the Small Business Research Initiative (SBRI) in the United Kingdom which initially originated in the US. SBRI is a two stage contract-based programme run by the UK Government to enable the public sector to tap into new ideas and technologies and speed up their adoption. The contract-based programme funds the development of innovative solutions to meet government needs. SBRI offers innovators the opportunity to win a government contract of £1 million (or more) to help demonstrate and develop their new technologies. The programme is designed to help their local innovators or businesses to get to market and reduce the need for venture capital at the start of their ventures, giving innovators or business owners a better chance of retaining control of their businesses and pursuing a long-term growth strategy, rather than having to make an early trade sale. A Triple Helix model for successful technology development and technology transfer is illustrated in Figure 1.

Germany has been at the forefront in demonstrating how both technical and management expertise from academia (both private and public), industry, trade and science can work with SMEs to help them fill their technical and management gaps. One exemplary German-led innovation model that has been successful across the globe is the Steinbeis model. The model is a system and organisation developed in Germany with a core focus to build a bridge between the academia and industry to promote effective and efficient cooperation, by making knowledge and technology especially for industries. It was founded by Ferdinand von Steinbeis (1807-1893), an economist who promoted collaborations between academia and business practice, and introduced dual education system in medium-sized enterprises. Steinbeis Foundation in Germany has delivered projects on behalf of private and public entities in eighty countries. The network spans fifteen international offices, 1,000 business units, and 6,000 subject matter experts that are available to provide world-class analyses and craft customised solutions for specific project challenges. The model has been adopted by other countries to encourage industry-academia collaboration. However, this model does not constitute the characteristics of TH model but rather bridges the industry-academia collaboration to accelerate technology development process through a pool of subject matter experts from academia.

Higher learning institutions in Malaysia

Innovation has become the main driver of national economic wellbeing and competitiveness resulting in many countries recognising the importance of a knowledge-based economy and engaging in what might be called "a race for global innovation advantage". In the globalised economy, innovation is known as the fundamental driver of economic growth and the Malaysian government needs to implement a broad range of innovation-enabling policies that create the conditions for private enterprises, government agencies or non-profit entities (universities and public research institutes) to successfully innovate throughout to achieve sustainably high rates of innovation. Regarding research institutions and universities, tight public budgets have led the Malaysian government to introduce reforms to enhance socio-economic returns from public investments in research organisations. Large disparity in technology transfer budgets between private universities and state-supplemented public universities, as well as the universities with high licensing portfolio is another common dilemma. According to SCOPUS, Malaysia has doubled its share of ISI publications where it moved up from its 43rd position in 2008 to the 23rd in 2018 (SCImago, 2018). Greater emphasis on engineering in recent years has provided opportunities for commercialisation of public research. According to OECD Reviews of Innovation Policy (2016), the pressure on universities to commercialise research results will be even more important in the following years - starting in 2015 all Malaysian public universities will gain autonomy status in exchange for raising 30% of their operating budget. This will represent a daunting challenge for institutions, which until recently, were allocated sufficient public funds and, consequently, have only had to adopt a more business-

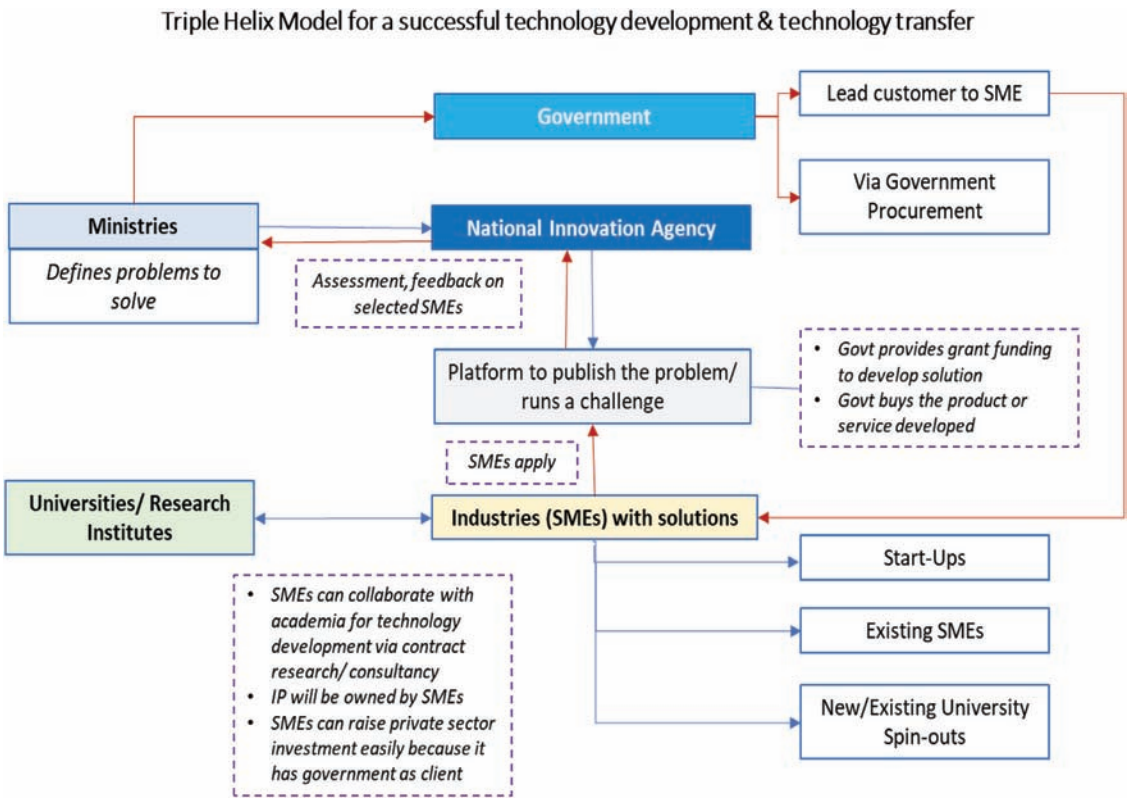


Figure 1: TH model for successful technology development and technology transfer

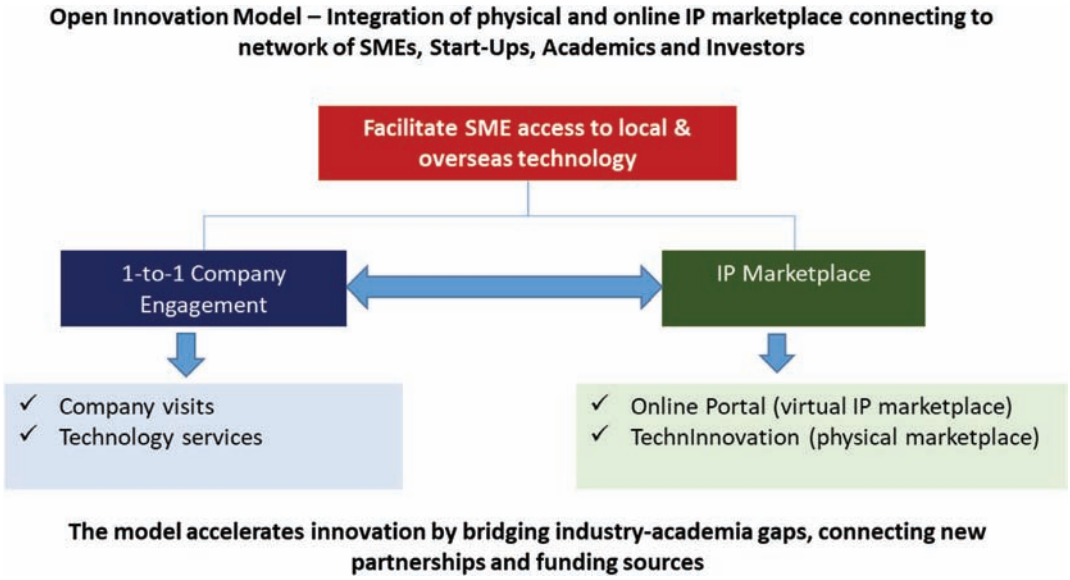
(Source: Author's illustration)

oriented means of operating in the recent years. Policies in support of universities' and public research institutions' commercialisation activities need to be considered within the whole context of these fundamental changes.

For example, the Malaysian government has invested billions of ringgits into R&D funding but the fundamental question is if our universities are developing enough market-driven innovations for commercialisation and what are the technology transfer metrics put in place to measure the Malaysian innovation landscape. Although the government has brought in performance evaluation programmes with quantitative performance measures, have they really captured the success? The scenario is similar to rest of the ASEAN countries. Despite the increasing number of IPRs and publications churned out every year, universities and public research institutes are grappling with a more challenging issue on commercialising their innovations. There has been a lot of emphasis and discussion on providing a robust incentive and financial infrastructure in place to downstream innovations to industry. However, financial support alone would not be sufficient to successfully creating an effective innovation ecosystem.

Currently, universities should not only play an important role in advancing research and disseminating knowledge, but should also provide a platform that provides incentives for progressing IPRs with advanced industrial applications and commercialisation. University IP policies should amalgamate with commercialisation policies towards crafting more market-driven innovations. Academics should look into engaging in activities that result in producing linkages with industries to bring in the needed expertise and manufacturing capabilities. Some recommended activities could include setting up a promotion or marketing platform for IPRs that are available for licensing, investing in strengthening capabilities of technology transfer professionals in engaging with industries, attracting international partners for joint research and/or to commercialise IPRs generated by universities and research institutes and producing a healthy pipeline of market-driven innovations. Most universities and national innovation agencies do not have an effective IP marketplace platform for industries to access the available commercially ready innovations for licensing and commercialise opportunities. One notable example is Intellectual Property Intermediary (IPI) Singapore, an initiative of Singapore's Ministry of Trade and Industry (MTI). Established in April 2011 under the recommendation of Economic Strategies Committee (ESC) and the Research, Innovation and Enterprise (RIE) 2015 National Committee, IPI strategically partners and connects businesses to market-driven innovations from various institutions via an effective online IP marketplace platform, bringing together a collaborative open innovation ecosystem promoting internalization of technology transfer activities (Figure 2).

Universities should also work closely with regulators in allowing flexibility around



Source: Recomposed from WIPO Regional Seminar on IP, Technology Transfer & Commercialization (2014)

Figure 2: IPI Singapore open innovation model

regulatory frameworks that allows researchers in public universities to engage in spin-offs and provide inventors a share of income from future innovations in order to support IP and innovation more effectively.

Technology transfer is now part of the Malaysian government's mandate for institutions receiving federal funding for research. Most commonly, technology transfer is accomplished through licensing IPRs to companies that have the resources and desire to develop and produce the technology for specific applications. In return, universities receive payments (in the form of cash fees, equity and/or royalties on earned revenues) for the innovations that are licensed. The income to the university is distributed according to each university's policy but it includes returns to inventors and a mechanism for channelling income back into the research programmes of the university.

The function of technology transfer offices is to manage the university's IP portfolio, identify IPR protection that is most appropriate, to transfer the inventions to potential commercial partners through licensing, to monitor the patent filings and license agreements, and to ensure compliance with Bayh-Dole reporting requirements.

The Malaysian and the ASEAN scenario

The technology transfer landscape in Malaysia is in its developmental phase and the same is true for a majority of other ASEAN countries. Many ASEAN member states have identified the importance of technology transfer and its relevance in the formation of a knowledge-based economy. Many innovations that are being generated at research organisations, as well as industry, do not find their way to the market for various reasons. Some of the reasons are outlined below:

Not market-driven

Most solutions created at research organisations do not address a real market need. As such, these projects are solutions created in search of problems. Such solutions need to be 'pushed' into the marketplace by the universities via matchmaking efforts. Most often, these innovations do not find big enough problems to 'fit' themselves into as they are not market-driven.

Lack of skilled personnel

There is a significant lack of qualified and skilled personnel to facilitate technology transfer. This group of personnel - known as Technology Transfer Managers (TTM) - are individuals who work in technology transfer offices of universities and other organisations who look into new invention disclosures and assess them for commercial viability. Technology transfer managers need to be skilled and well versed in many areas such as invention disclosure assessment, IPRs, marketing technologies, negotiation of deals, basics of license agreements and spinout company formation. It takes years for an individual to acquire the necessary knowledge and skills to become a 'polished' technology transfer manager. Currently, individuals with such skills are scarce in the Malaysian and the ASEAN landscape.

Measurement of success through metrics that are not direct indicators of impact

Many governments and organisations across the world have been utilising metrics that are not true indicators of success in measuring the impact of technology transfer. These include the number of patents filed, number of spin-out companies created etc. Such gaps can be seen in many countries where the numbers have only led to the disappointment of impact seekers. Much education needs to be deployed in measuring the true impact of technology transfer and to determine its spill over effects to an economy.

Organisational policies and standards

IP and commercialisation processes must be governed and executed via clear policies in organisations creating new knowledge. Such clear and aligned policies will encourage and incentivise researchers and innovators to keep innovating consistently. It will also encourage them to develop some of the skills required for innovation commercialisation from concept to market entry. Most organisations in the Malaysian and ASEAN landscape lack such policies that are clear and aligned with the organisational mission. Such poor policies can discourage new invention disclosures and therefore lower rates of R&D commercialisation with commercial viability.

The pressing need: Technology transfer managers focus on commercialising the outcomes of university research in many disciplines. Successful technology transfer managers demonstrate proven competency in:

- Grasping technical concepts quickly, and translating these into commercially viable proposals;
- Working effectively with key stakeholders, assertively influencing them and where appropriate showing tenacity and persistence in business development situations;
- Deploying excellent interpersonal and communication skills, both verbally and in writing;
- Successfully negotiating and licensing commercial contracts with industry
- Working successfully within a close-knit team; and
- Managing a large portfolio of complex projects to a successful commercial conclusion.

Most technology transfer offices/platforms of research organisations in the ASEAN region are lacking trained and accredited individuals with the skills mentioned above to deliver on knowledge and technology transfer requirements. The lack of expertise is crippling the transfer of knowledge and innovations from research organisations to the industry. It has further resulted in reduced commercialisation rate in terms of the number of innovations that are protected and the number of innovations transferred to industry or another entity for further development and commercialisation.

There is no typical pathway to formally develop oneself into a technology transfer role that needs soft skills, such as communication and people skill. These are primary factors needed to succeed in the field. People need to be skilled in having consultations with scientists, turning over rocks and introducing researchers from industry to academic researchers. The development of skill set relating to technology transfer and commercialisation has become a pressing need in Malaysia and the ASEAN region. Many state governments are currently pushing their national agenda towards innovation and commercialisation which has spurred talent development in the industry with recognition from organisations such as the Alliance of Technology Transfer Professionals (ATTP). The mission of ATTP is to provide public recognition and acknowledgment of technology/knowledge transfer professionals, with demonstrated competency, based on internationally recognised standards. In Malaysia, the Innovation and Technology Managers Association (ITMA), a non-governmental organisation (NGO) that serves as a platform for the technology transfer offices within universities in Malaysia.

Learning from the top innovation leaders

Amidst the uncertain global environment and growing competition, most ASEAN countries require a 'game changer' to shift their economy to an innovative nation by 2025. Effective national innovation strategies are important to boost the country's potential and create wealth from innovation and countries with the best innovation strategies are benchmarked on how the most innovative countries build their innovation capacity. According to OECD report on knowledge based industries in (2000), Chinese Taipei, Denmark, Ireland, Finland, Singapore and Republic of Korea, which were initially lagging in 1978 subsequently developed innovation by enhancing policies and while investing in infrastructure and human capital. As a result, these countries demonstrated an increase in their innovative output per capita and by 1999 had overtaken countries such as the United Kingdom, France and Italy.

Countries have adopted various innovation strategies depending on their national competitive advantage, industry structure and the respective role of government in the country. Singapore, with its tradition of strong government and limited local resources adopted a government-led approach and imported innovations from MNCs. Taiwan province of China, with its SME driven industry, focused on nurturing SMEs, while the Republic of Korea delivered its innovation agenda through its large chaebols. Israel, on the other hand, with its large base of scientists and engineers, focused on incubating entrepreneurs. There is no single right path to develop and sustain a successful national innovation strategy.

Other European countries such as Finland also have strong governments that take an active role to build up the physical infrastructure, human capital and regulatory environment to drive innovation. Having embarked on a much longer innovation journey, countries such as Finland have established a highly-skilled workforce and have put in place the physical infrastructure and regulatory environment for innovation to flourish. A narrow sector focus, e.g. telecommunications and ICT in the Finnish example, have enabled it to accelerate its innovation drive against much larger economies, to become market leaders for new products and services in these industries.

At the other end of the spectrum, countries have also succeeded with a more market-based approach. For example, although the local government in Hong Kong has typically taken a more laissez faire approach to government policies, competition within the services sector – which contributed more than 90% of Hong Kong's GDP – have spurred private companies to invest in innovation in order to increase productivity and become best-in-market in terms of service quality and performance. In contrast, other countries such as the US (Silicon

Valley), the UK and Japan succeeded in becoming leaders in new-to-market innovation while adopting a market-based approach by leveraging their large manufacturing and technology base and developed economy with skilled workers and mature infrastructure.

Conclusion

The formation of a knowledge-based economy revolves around the strategic implementation and integration of various innovation mechanisms and IP building blocks of the triple helix, enabling a sustainable and innovative economy. Countries with the best innovation strategies coordinate their policies towards skills, scientific research, information and communications technologies (ICTs), tax, trade, IP, government procurement, standards, and regulations in an integrated approach designed to drive economic growth through innovation. Member countries in the ASEAN should proactively play a vital role in making investments in strategic and emerging advanced technologies and help to facilitate the transfer of technologies to private marketplace with the explicit intent and purpose of driving economic growth and creation of new skills. Measures should be taken to continuously fine-tune the innovation ecosystem into a more mature system as can be seen in countries such as Sweden, Finland, USA, Republic of Korea and Singapore. SMEs should constantly think out of the box and drive towards a sustainable and competitive economy by collaborating with both government and academia to translate innovations into commercial products and services that creates wealth and increases job opportunities.

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Search Facility for PATENTSCOPE Database to Support COVID-19 Innovation Efforts

The World Intellectual Property Organization (WIPO) has launched a new search functionality for its global patent database, PATENTSCOPE, to facilitate the location and retrieval of information contained in published patent documents that may be useful for innovators developing new technologies to fight the COVID-19 pandemic. The WIPO COVID-19 search facility of PATENTSCOPE will provide scientists, engineers, public health policymakers, industry actors and members of the general public with an easily accessible source of intelligence for improving the detection, prevention, and treatment of diseases such as the novel coronavirus.

For more information, access:

https://patentscope.wipo.int/search/en/covid19.jsfg

A Practical Guide for MSME Intellectual Property Management on E-Commerce Platforms

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Abstract

The MSMEs operating e-commerce platforms enjoy new development opportunities and are confronted with new intellectual property (IP) risks. MSMEs need to update their IP management to adapt to the new ecosystem of platform economy. Safeguarding IP assets and self-defending in IP disputes are two interrelated aspects for risk management. The MSMEs should take all the innovative, proactive and comprehensive measures to acquire and protect their IP assets and defend their legitimate business interests by cooperating with the platform operators, taking counteractions against the IP claims and resolving the IP disputes effectively. Preparing for the worst but striving for the best. Those MSMEs that are capable of successfully managing the IP risks will be the final winners of platform economy.

The United Nations declared June 27 as International Micro-, Small-, and Medium-sized Enterprises (MSME) Day to recognize the valuable contribution made by small businesses towards the 2030 Agenda for Sustainable Development. Although MSMEs encounter the considerable difficulties in the 2020 COVID-19 pandemic, they have the new opportunity to capture in the world platform economy.

Digital platforms, particularly online matchmakers or technology frameworks, brings together people in an unprecedented way and enable economic and social activities carried out in a far wider reach unthinkable a decade ago. E-commerce that involves the sale or purchase of goods and services over computer networks by businesses, individuals or other organizations is substantively amplified and reinforced by the platform economy. An e-commerce platform provides two or more parties to an e-commerce transaction with the services of online business premises, deal-making and information releasing etc. to enable the parties to engage in transactional activities independently. The large-scale e-commerce platforms, such as Alibaba, Amazon or eBay or Lyft, accommodate tens of millions of operators doing business all around the world. MSMEs can especially benefit from the platform economy because the platforms can provide the ICT infrastructure support, wide market access and value-added financial and logistic services.

When vibrantly developing their value chain on e-commerce platforms, MSMEs are confronted with critical intellectual property (IP) risks that could endanger their sustainable business operation. IP refers to the intangible assets deriving from the valuable and original results of human endeavors, such as inventions, manuscripts, software, algorithms, business names, designs, pictures, videos, music, etc. These assets increasingly making up a large proportion of a MSME's net worth. Proper management to identify, analyze and respond to the risk factors related to IP rights will reduce not only the likelihood of an adverse event occurring but also the magnitude of its impact on the business. MSMEs operating on e-commerce platforms need to update their IP management to adapt to the new ecosystem of platform economy. MSMEs' new IP management needs to center with the e-commerce platforms to identify, analyze and resolve the IP risks.

A MSME's IP management contains two equally important and corelated components, i.e. safeguarding its own IP assets and defending its interests in IP disputes. E-commerce platforms present both new opportunities and new challenges for MSMEs to manage their IP risks.

Safeguarding IP assets

Adequate protection for IP is extremely important for a company's success. Before a MSME can take advantage of IP assets it has to acquire the exclusive rights through legal means.

Acquisition of IP Rights

Unlike resourceful multinational companies that can purchase the IP rights from the other parties through licensing or assignment, most MSMEs can only acquire the IP rights in the first hand.

A number of IP rights need to be granted or registered in relevant jurisdiction. Most countries entrust the IP authorities with the power of granting or registering IP rights. The procedure for their acquisition and maintenance may differ from country to country, but the basic principles and

general procedures are common to most countries.[1]

(a) IP rights acquired through approval or registration with the competent authorities

IP rights may be roughly divided into two groups based on the procedures or conditions of acquisition. One group of rights, including patents, utility models, industrial designs, trade/service marks, geographical indications, etc. are acquired in most jurisdictions through approval or registration with the competent authorities.

For example, a trade or service mark is a distinctive sign which identifies certain products or services as those produced or provided by a specific person, enterprise or a group of persons/enterprises allowing the consumer to distinguish them from goods or services of others. In many countries, a MSME has to necessarily register the trademarks to get the legally exclusive rights over them.[2] The MSME must file an application in a national or, where such possibility exists, a regional trademark office. The Office will then, once the required fees have been paid, examine the application. If the application is not rejected, the Office will make a decision to register the trademark and grant the legal right to the applicant.

In another example, industrial designs are compositions of lines or colors or any three-dimensional forms which give a special appearance to a product or handicraft. In most countries, protection of industrial designs can only be acquired through registration.[3] As a general rule, to qualify for protection through registration, the design must be new or original.

MSMEs face many challenges in acquiring IP rights through authorities' approval or registration. MSMEs have inadequate in-house knowledge of IP rights and procedures for their protection and limited manpower to undertake the necessary groundwork needed for IP acquisition (for example, initial searches and other pre-filing preparations) and can hardly bare the high costs involved, particularly, in the patenting process which includes the expenses for the translation of documents and fees for IP agents or attorneys.

E-commerce platforms, especially large ones, may help the MSMEs to file or register the IP rights. For example, Taobao[4], one of leading platforms from Alibaba Group, launched the so-called "Tao Brands" project, which helps the MSMEs that have accumulated the brand reputation on the platform to register trademarks, designs or other IP rights with the authorities. The brand incubation project has created for the MSMEs thousands of "Tao Brands" well-known on the platform. E-commerce platforms may become the important incubator and cultivator for MSMEs' IP rights.

(b) IP rights acquired without special procedural requirements

Another group of IP rights, typically copyright, trade secret, etc., can be acquired without special procedural requirements but their subsistence depends on the proofs.[5] E-commerce platforms may help the MSMEs to record and prove their rights.

E-commerce platforms play very important role for MSMEs' information retention and cybersecurity. E-commerce platform operators are able to record and store the information on the goods and services and the transaction information on the platforms and keep such information complete, confidential and available. In the course of settling an e-commerce dispute, MSMEs may rely on the platform to provide the authentic records or information on IP rights. E-commerce platforms' information capacity substantively improve the MSMEs' IP management efficacy.

Technology developments come along with new forms of cybercrimes. The so-called black industry registers a large number of accounts using automation software, abnormally creates user accounts, falsifies authentication identity information and transactions, illegally sells the hacking tool. Cybercrimes like hacking, Trojan horse or spreading computer virus pose major IP risks to MSMEs. Hackers gain illegal access and commit the crimes such as theft of confidential information or trade secrets. MSMEs that become the victims of online espionage are often not aware of any loss until it is far too late. Cyber experts estimate that every company utilizing a computer network is actually being attacked by hackers, who are continuously probing for weaknesses.

Fortunately, e-commerce platform operators can take technological and other necessary measures to keep their networks safe, prevent the intrusion of offences and criminals, effectively respond to cybersecurity incidents, and guarantee the security of e-commerce transactions. E-commerce platform operators normally prepare contingency plans for cybersecurity incidents. When cybersecurity incidents occur, they shall initiate the contingency plans immediately, take corresponding remedial measures, and may report to the competent authorities of the incident.

In the unlikely cases that the platform loses, fabricates, tampers, destroys, conceals, or refuses to provide the MSMEs' IP information in the dispute settlement proceedings, the MSMEs are entitled to request the platform assume the corresponding legal liability.

Protection of IP Rights

Although IP theft poses a risk to all industry sectors, the MSMEs in the manufacturing, consumer goods and cultural industry are especially vulnerable. Counterfeit bags, watches, accessories and perfumes, fake designer clothes, pirate DVDs, CDs, smartphones and computer games can quickly destroy a MSME's market reputation and competitive edge.

[1] IP rights could also, where certain conditions are met, be acquired at a regional or international level, through, e.g., the patent cooperation system and international trademark registration system maintained by the World Intellectual Property Organization.

[2] IP rights are very complicated. In some countries, trademark right can be acquired through registration and/or use.

[3] In very few countries, protection may also be available for unregistered industrial designs.

[4] Taobao is a Chinese online shopping website, headquartered in Hangzhou, and owned by Alibaba Group. It is the biggest e-commerce platform in China.

[5] Acquisition of copyright protection is usually automatic once the work is fixed in some material form. However, in some cases there may be a possibility or, exceptionally, a need to register copyright.

E-commerce MSMEs can, of course, resort to the courts or competent authorities for IP protection. The MSMEs operating on e-commerce platforms, however, may enjoy extra protection for their IP rights. Most platforms have implemented the IP protection measures for the purpose of complying with the legal requirements and maintaining the transactional order of the online marketplaces. Under the laws of many countries, an e-commerce platform shall take necessary measures such as deleting, blocking, disconnecting links or terminating transactions and services against on-platform IP infringements upon its actual or constructive knowledge; otherwise, the platform will have to be jointly liable with the infringer.[6] The legal liability doctrine incentivizes e-commerce platforms to take actions proactively against the infringements committed on the platforms.

Apart from the circumstance in which the platform obtains the actual knowledge of the infringement, the platform should become aware of facts or circumstances from which the infringement is apparent, particularly through receiving a notice of alleged infringement from the right holder or a person authorized to act on its behalf. A platform operator that chooses to be blind to apparent infringements is subject to legal punishment.

In the belief that its IP right has been infringed upon, a MSME has the right to request, by a notification, the e-commerce platform to take necessary measures, such as deleting, blocking or disconnecting links to the alleged infringing information or terminating transactions and services to the alleged infringer. The notification normally should include the MSME's identity, proof of the IP right and *prima facie* evidence that the infringement has been committed on the platform. The platform operator shall timely act upon the notification and forward the notification to the on-platform operator that's been alleged for infringement.

Although platform's notice-and-takedown measures are cost-effective for IP protection, they are only the interim and internal measures and cannot replace law enforcement. After the information or traders that are taken down, MSMEs should seek the formal legal remedies in a timely manner through suing to the court, filing the complaint to the authorities or other means; otherwise, the takedown measures could be undone under certain conditions.[7]

Case study

Alibaba Group's ecosystem includes seven major e-commerce platforms: Taobao, Tmall (China), Tmall Global, 1688.com, AliExpress, Alibaba.com and Lazada. Each platform varies in terms of its business model and the types of customers it serves. AliExpress and Alibaba.com serve consumers and businesses from around the world. Lazada is a popular online shopping and selling destination in Southeast Asia. Tmall Global has become the preferred channel for overseas brands and MSMEs to enter the Chinese market. As of April 2018, 17 countries and regions have established the "national regional pavilions" on the Tmall Global platform. More than 100,000 brands have entered the various e-commerce platforms under Alibaba Group, which covers 75% of the world's consumer brands with most commercial value. The product information on the Alibaba.com is presented in 16 languages for global consumers.

Alibaba commits to protect IP rights and requires that its merchants do the same.[8] In 2015, Alibaba group established the Platform Governance Department to promote the comprehensive e-commerce IP protection. After years of practices, Alibaba group has formed a governance model synchronizing technology, commerce and law, which is called "Ali Model".

Alibaba group has the Platform Governance Department, platform rules and active prevention & control technologies to protect IP rights. Alibaba Group uses the new technologies such as commodity brains, fake product identification models, image recognition algorithms, semantic recognition algorithms, commodity knowledge bases, real-time interception systems, biometrics authentication, big data sampling models, and data collaboration platforms to protect IP on the platforms.

Through a variety of technical algorithms, up to about 600 million product images can be identified every day, and the recognition accuracy rate is as high as 97.6%.; 97% of suspected infringing goods can be cracked down as soon as they launch online. In 2017, the product information taken down by the identification data technology was 27 times more than that taken down upon the notifications by IP right owners.

In 2016, Alibaba deployed a unified and upgraded IP protection system called Intellectual Property Protection Platform (i.e. IPP). IP Rights owners can register a single IPP account and submit takedown requests across all seven e-commerce platforms of Alibaba Group. IP rights owners can also track and manage their takedown requests across all seven platforms through IPP.

When the IP rights owners request that the infringing listings be removed by submitting takedown notifications, they should provide the Proof of identity (e.g., identity cards or business license), Proof of IP rights (e.g. trademark certificates, patent certificates,

[6] The Chinese E-Commerce Law (2018) is one of the outstanding examples. Besides, the Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP), which is a new free trade agreement concluded by Australia, Brunei, Japan, Malaysia, New Zealand, Singapore, Vietnam, Chile, Mexico, Peru and Canada in 2018, contains the similar liability regime.

[7] For example, under both Chinese E-Commerce Law and US Digital Millennium Copyright Act, if the on-platform operator that's subject to the takedown measure may submit a non-infringement statement to the platform, and IP right owner does not file a complaint or lawsuit within the designated period, the platform should promptly terminate the measures it has taken.

[8] See "Alibaba Group Intellectual Property Rights Protection Handbook".

copyright registration certificates and/or copyright ownership statements) and Proof of Authorization in cases of agency. Under the Alibaba rules, if an on-platform trader is found selling fakes and pirated goods, particularly in severe and/or repetitive cases, its business accounts shall be suspended or closed down.

In August 2017, Alibaba launched Express IPP, which accelerates the rights owners' takedown requests handled through the data-driven technology. In 2018, 96% of all legitimate IP takedown requests submitted through the IPP during business days were processed within 24 hours. Those right owners that have submitted at least 100 takedown requests over the previous three months, enjoyed the successful takedown rate of at least 90% and have no history of deliberately providing false information are eligible to join the Good Faith Program under which their reported listings can be taken down more expeditiously.

Self-defending in IP disputes

MSMEs should pay sufficient attention to the IP related risks posed by the disputes with competitors. If a competitor claims the IP assets in designing, developing, manufacturing, distributing and/or selling similar products or services, the MSME needs to know how to defend its interests in the IP disputes. In order to manage the potential risks of legal liabilities, the MSMEs operating on e-commerce platforms should proactively engage with the platform operators, take necessary counteractions to resist the wrong IP claims and settle the disputes effectively.

Engaging with E-Commerce Platforms

An e-commerce platform operator governs its platform through making and implementing the platform rules that are contracted into the service agreements with the on-platform operators and consumers. The rules specify the issues of relevant parties' rights and obligations in respect of joining and quitting the platform, assurance of the quality of goods and services, protection of consumer rights and interests, protection of personal information and IP rights. Since the platform rules have the direct impact on the MSMEs operating on the platforms, engaging with the platform operators in the rule-making process is very important to safeguard their business interests.

Under many countries' laws, e-commerce platform operators are required to protect IP rights through formulating the IP rules in cooperation with all the stakeholders and in compliance with the principles of openness, fairness and impartiality. Since these platform rules are inevitably applied to their businesses of the MSMEs operating on a platform, they should proactively engage with the platform operators when the rules are being developed. Some countries' newly enacted laws have already required the platform operators solicit public comments (at prominent places on the platforms' homepages or primary webpages) when the rules are being formulated or modified and ensure that the relevant parties can fully express their opinions in a timely manner.[9] With respect to the IP rules, if the MSMEs actively take part in the platform rule-making process and express their requests or concerns, the rules made through the multi-stakeholder participation are less likely to unreasonably expand the IP protection beyond the legal boundary and override the IP rights' legitimate limitations or exceptions. After the IP rules have been developed, they are incorporated into the platform service agreements binding to the MSMEs. Therefore, it's essential that the MSMEs proactively engaged with the platform operators in the IP rule-making process to keep proper balance between the IP interests and MSMEs' business interests and prevent those rules from overlooking the on-platform businesses' legitimate interests.

All the platform rules must be sufficiently publicized. For the purpose of transparency, the platform operators shall continuously display their platform rules (or the links to the rules) at prominent places on their platforms' homepages and primary webpages to ensure the convenient access to and download of such information in full by the on-platform MSMEs. If any MSME finds that any platform rule, including IP rule, is not publicized, it may resist the rule from being imposed on it.

Platform operators' governance power should be reined in the legal limit. If a platform operator is found to utilize the platform rules or service agreements to unreasonably restrict or place unreasonable conditions on the on-platform MSMEs or charge them with unreasonable fees, the MSMEs are entitled to sue the platform operator to invalidate the unreasonable rules or agreements.

Resisting the wrong IP claims

The MSMEs on the platforms should keep an alert eye on the IP notifications forwarded by the platform operators. Upon receipt of an IP right owner's notification of infringement, the MSME should take immediate counteractions to prevent or mitigate the negative effects on its business.

(a) Non-Infringement Statement

In the belief that the IP notification is wrong, groundless or malicious, the MSME should timely submit to the platform operator a non-infringement statement, along with the *prima facie* non-infringement evidence (e.g. MSME's trademark or patent certificates or copyright registration) to rebut the IP infringement claim. Submission of the non-infringement statement is a very important tactic for the MSMEs in face of the IP notification. Without it, the platform operator would act upon the request of the IP right owners and delist the MSME's relevant goods or services from the platform or even suspend or terminate the MSME's business account on the platform, which would be very damaging to the MSME's

[9] 2018 Chinese E-Commerce Law implements such legal requirements on the platform operators.

business and reputation. By submitting the non-infringement statement, the MSME, however, may resist the negative effects of the IP notification in many jurisdictions. Upon the receipt of the non-infringement statement, the platform operator will forward it to the IP right owner who gave the notification, and advise that the right owner to file a complaint with the competent authority or a court. If not hearing from the IP right owner in a reasonable period of time about acceptance of the case by court or authority, the platform operator will terminate the measures it has taken against the MSME.[10] For example, under the Chinese E-Commerce Law, upon receipt of the non-infringement statement forwarded by the platform operator, the IP right owner may file a complaint or lawsuit within 15 days and notify the same to the platform operator to continue the actions taken against the on-platform operator; should the platform operator receive no further notice from the right owner within the 15 days, the measures it has taken against the on-platform operator shall be terminated.

(b) Court order

Upon the receipt of the IP notification, the MSME may, in addition to submission of the non-infringement statement, immediately apply for a court order to prevent or stop the platform operator from taking the action according to the IP request, provided that the MSME is able to prove that their legitimate interests would suffer imminent and irreparable damage from the IP notification. Normally, the court will decide whether to approve the application in a short period of time (e.g. 48 hours). Once the court order is issued, the platform operator shall comply and not take any action against the MSME. However, the effect of the *ex parte* (without the presence of the Respondent) order cannot last long. In order to seek legal remedies, the MSME needs to bring the lawsuit against the IP right owner that sent out the notification soon after the issuance of the court order.

(c) Damages

If the IP right owner is proved to send out the erroneous notification, it shall bear the civil liability of compensating the MSME for the damages caused by suspension or termination of the business. If the MSME can prove that the IP right owner sent out the notification in bad faith, the IP right owner could be subject to the punitive damages.[11] The evidence is critical to enable the MSME to win the lawsuit against the IP right owner. For example, the proofs that the IP right owner provides the falsified trademark certificate in the notification or knowingly sends out the groundless notification to disrupt the competitor's business during the special timing (like Black Friday or Cyber Monday) could be the persuasive evidence of IP right owner's bad faith. In these cases, the MSME is entitled to the punitive damages as well as the compensation of the actual loss.

(d) Platform credit system

Most platform operators have established the credit rating systems for on-platform operators. An operator's credit shows its market reputation and trustworthiness. Apart from the consumers' comments, the MSMEs' credit is most affected by the IP claims. Therefore, it's very important for the MSMEs to fight against the wrong or malicious IP claims. In some countries, the platform operators are required to publish the notifications from IP right owners, non-infringement statements from on-platform operators and final outcomes. Under such publicity requirement, the MSMEs must act even more forcefully to defend their name against the malicious IP right owners. Once the MSMEs' counteractions are successful, not only the IP right owners in bad faith will be "shamed" publicly but the MSMEs' credit on the platform can be boosted.

Settling the disputes

Once a MSME discovers that it has indeed infringed the other's IP rights, the most cost-effective solution is to settle the dispute quickly and cheaply, rather than to be involved in the prolonged and expensive legal proceeding.

(a) Online complaining mechanism

Many MSMEs have voluntarily established the mechanisms to enable the IP right owners or others to file the complaints. In some countries, all e-commerce operators are required to set up online complaining mechanisms.[12] The MSMEs that directly receive the complaints from the IP right owners may assess the risks in the IP disputes. In many circumstances, settling the disputes amicably with the IP complainants through communications, negotiations and settlement agreements could be less costly than deteriorating the disputes and to be dragged into the complicated legal proceedings. The online complaining mechanism could help the MSMEs to manage the IP risks in the early stage through timely acquiring the information of the IP disputes and taking effective measures to settle the disputes. It would be completely counterproductive if the MSMEs set up the so-called "sham" complaining mechanism or ignore or even revenge the complainants.

Since the online complaining mechanism is a valuable vehicle for the MSMEs to manage the IP risks, it should be designed properly to enable the IP right owners to file the complaints conveniently and effectively and enable the MSMEs to accept and handle the complaints swiftly. The MSMEs can use the automatic information systems

[10] In some countries, a non-infringement statement, *per se*, is capable to enable the platform to terminate the actions taken in accordance with the IP notification. But in other countries, the IP right owners are given a grace period (e.g. 10 days under the US law) to take legal action and the non-infringement statement would not terminate the platform's action until the expiry of the grace period.

[11] Punitive damages are considered punishment and are typically awarded at the court's discretion when the defendant's behavior is found to be especially harmful. Punitive damages are awarded in addition to actual damages.

[12] For example, under the Chinese E-Commerce Law, e-commerce operators shall develop convenient and effective complaining and reporting mechanisms, publish the means of complaining and reporting and the relevant information, and accept and handle the complaints and reports in a timely manner.

provided by the platform for online complaining mechanisms. The automatic information system may be embedded in the user interface or in email system.

After receiving the complaints, the MSMEs should promptly contact the complainants and assess the risks and the possible costs of settlement. The MSMEs should always prepare for the worst but strive for the best. Through negotiation, the MSMEs may get an even clearer picture about the IP claims and the costs. The settlement agreements can be reached with the complainants if the costs will be lower than litigation or other dispute resolution. If eventually the settlement agreements cannot be reached, the MSMEs could be better prepared for the next stage of strategy, such as hiring legal professionals, drafting legal defense and/or collecting evidence to rebut the IP right owners' claims. Even if the IP right owners sued the MSMEs in the courts, the parties can still negotiate and reach the settlement agreements during the proceedings. Sometime, rivalry is merely a tactic to facilitate the other party to move on in the settlement process.

(b) Platform online dispute resolution

The online dispute resolution (ODR) mechanisms provided by the platforms may be used to resolve the MSMEs' IP related disputes. For example, if a consumer complains about the suspected counterfeit goods sold by a MSME on the platform, the dispute may be solved through the platform ODR according to the platform's dispute resolution rules. The platform ODR is especially useful in the cross-border disputes in which the parties locate in the different countries and need a nimble and alternative means of dispute resolution to avoid the complicated legal issues of choice of jurisdiction and laws. The platform ODR has the potential to become the common practice for platform governance. But the platform operators are not required to set up the ODR systems. Some small platform operators that have not the sufficient expertise and capability may choose not to develop the ODR mechanisms.

The platform ODR is applied either based on the parties' explicit and informed consent or based on the platform rules and service agreements that incorporate the ODR rules. The MSMEs that subscribe to the platform rules and service agreements are actually bound by the platform ODR. Therefore, before deciding to adopt the platform rules or to conclude the platform service agreement, a MSME should be mindful whether it is prepared to accept the governance of the platform ODR. Once the platform subscription is complete, normally the MSMEs cannot opt out from the ODR proceedings.

The platform ODR is in quick development but far from mature. Its process designs vary from platform to platform. Many big platforms are experimenting different forms of ODR systems. The United Nations Technical Notes on Online Dispute Resolution set out the principles that underpin any ODR process, including fairness, transparency, due process and accountability. The European Union Directive on Consumer Alternative Dispute Resolution (ADR) requires independent, impartial and having expertise. The Chinese E-Commerce Law provides that the disputes should be fairly and equitably settled according to the dispute settlement rules developed and published by the platform operators.

The MSMEs should protect their own interests based on these basic principles. Under the principles of transparency, impartiality, fairness and equitability, the MSMEs may request the ODR platform disclose any actual or potential conflicts of interest (such as any financial relationship between the complainant and the platform operator). Under the principles of independence and accountability, ODR platform should adopt a code of ethics for its neutrals (i.e. the persons in charge of resolving the disputes) against any irregularities. Under the principle of due process, the MSMEs should be given the sufficient opportunity to present and defend their cases in the proceedings.

Case study

Sina Corporation that is running Weibo, one of the biggest social media platforms in China, established the "Sina People's Mediation Committee (SPMC)" in March 2014. The SPMC is the first Internet mediation organization approved by the authorities. It is an autonomous organization to mediate the disputes on Sina Weibo platform. During mediation, the Committee helps the parties to voluntarily reach settlement agreements through persuasion, facilitation and other reasonable methods. Since its establishment, the Committee has accepted for average 20,000 cases per week. The disputes involve defamation, copyrights or trademark infringements and other legal issues. The mediation process is entirely online and the results are published.

Alibaba Group develops the Public Review Mechanism (PRM), which adopts the so-called jury model to resolve the disputes emerging from the platform transactions. The PRM was established on Taobao platform on December 18, 2012. Under the PRM, the members of Taobao platform (i.e. the persons with the Taobao accounts) may determine whether the platform rules are reasonable by majority votes and adjudicate the transactional disputes between the parties. Nearly 5 million people have actively joined the PRM and over 100 million disputes on the platforms have been adjudicated.

Conclusion

The MSMEs, in order to succeed in the highly competitive platform economy, should value their IP assets and take all the innovative, proactive and comprehensive measures to protect them. Although confronted with the complex IP challenges, the MSMEs would be able to safeguard their legitimate business interests by cooperating with the platform operators, taking defensive actions against IP claims and resolving the IP disputes effectively. Only the business models that respect IP rights are sustainable and only those MSMEs that are capable of successfully managing the IP risks will be the final winners of market competition. ■

Intellectual Property Management

A Case Study of a License of Ultra-Low-Ammonia Latex for Asphalt Cement in Thailand

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Abstract

This paper presents a successful case of a license of ultra-low-ammonia latex for asphalt cement in Thailand. It demonstrates a license with more than one form of intellectual property and a business model that involves multi-parties. A turn-key technology could be a preferred model and easy to implement in a business that does not require any custom-designed solution. However, when a specifically designed technology like this ultra-low-ammonia latex is desired and can be done via a license agreement, there are several key factors to take into consideration. This paper will discuss key success factors, impacts, and challenges encountered throughout a supply chain of the para-asphalt road construction business. This paper concludes with the lessons learned and further addresses a new collaborative research opportunity that comes with this licensing deal.

Introduction

Thailand is the leader of producer and exporter of natural rubber in the world (Workman 2020). Para rubber is one of Thailand's most economic agricultural products. Natural rubber is an engineering material for the production of numerous products such as tires, automotive parts, conveyor belts, gloves, condoms, balloons, etc. However, the price of natural rubber fluctuated and the production was over-capacity. Having a sound policy to support the rubber industry is thus detrimental to survive the rubber business and stakeholders in the entire value chain in Thailand.

The objectives of this paper are to report a successful case of a license of ultra-low-ammonia latex for asphalt cement in Thailand. The success of and barriers concerning technology transfer has been around for decades. The authors employ this case to demonstrate how this license has overcome major barriers that are often addressed e.g. technical barriers like technical risk, lack of operational test data, unawareness of new technology, lack of transfer experiences, limited absorptive capability, and lack of trust (Greiner and Franza 2003). It further demonstrates the technical solutions corresponding to the government's policy on road construction. A specific business model of the license was developed as a solution when a key player of the road construction supply chain has limited experiences in managing different forms of intellectual property (IP) right. In doing so, this paper is divided into five main parts. Part I provides an overview of the importance of the rubber industry in Thailand. Part II describes the background of the research projects, carried out by the Green Latex and Rubber Materials (GLRT), the Innovative Rubber Manufacturing Research Group (IRM) at the National Metal and Materials Technology Center (MTEC), the National Science and Technology Development Agency (NSTDA). Part III describes different forms of IP under this license, and business model development. Part IV highlights the success, lessons learned, impacts, and challenges. This part will also touch on the development of the para asphalt cement industry, supports the UN Sustainable Development Goals, and challenges encountered throughout a supply chain of the para-asphalt road construction business. Finally, this paper provides recommendations for those with limited licensing experiences in particular in developing countries.

Background of para asphalt cement research project

Technical problems of the asphalt road

Asphalt is a natural substance derived from the distillation of crude oil and also used in various ways as sealant, preservative, waterproofing agent, and pavement binder. The use of asphalt has increased rapidly in world consumption, most of which have been used in road construction. However, asphalt is quite sensitive to temperature fluctuation. In tropical countries, asphalt is soft at normal temperature but tends to flow like a viscous liquid at high temperatures. Here, the lack of rheological and viscoelastic properties of asphalt can cause deformation on the road surface. At low temperature, asphalt change its properties, becomes hard, rigid, solid which could easily cause brittleness and further lead to fatigue cracking failure. Asphalt roads experienced with increasing traffic load, higher traffic volume, and extreme weather conditions (cold, hot, and wet weather) require resealing to prevent cracking every three to five years. Resealing the asphalt road surface cost both time and money. Either natural polymer (such

as natural rubber) or synthetic polymer (such as SBS or EVA) together with additives become one of the alternative solutions in improving the asphalt properties for asphalt pavement. This Polymer Modified Asphalt Cement (PMA) provides higher strength and durability of asphalt road surface than that of the asphalt cement (Chen et al. 2002).

It provides the following properties:

- high rutting resistance
- high fatigue resistance
- decrease raveling
- anti-stripping
- long lifetime
- save maintenance cost
- high skid resistance

Thailand has started to produce Natural Rubber Modified Asphalt Cement (NRMA) since 1957 (Vichitcholachai 2013). Among the natural rubber used in asphalt modification, latex is mostly used because it yields a higher quality of the NRMA products, comparing to other forms of rubber at the same amount. Unfortunately, ammonia is the only choice of preservatives that are used to preserve the property of the natural rubber latex. The manufacturers often suffer from pollution problems caused by the ammonia vapors, that comes with a pungent odor and clogging of natural rubber latex in pipelines. Ammonia vapors are widespread and there are complaints from nearby communities. Under the production process, commercial ammonia natural rubber latex is normally mixed with asphalt and additives in a reactor at a temperature ranging between 140-160°C as shown in Figure 1.

In using an ammonia gas trapping equipment for disposal in wastewater treatment ponds, it has resulted in an imbalance ecosystem as ammonia destroys microorganisms in wastewater treatment ponds (Landreth 1989). Installation of the ammonia trapping equipment and the construction of additional wastewater treatment ponds are neither effective nor sustainable to solve the problems of ammonia vapors in the NRMA plants. In solving this long-existing issue, an Ultra-low Ammonia (ULA) Latex used for mixing with asphalt cement is developed. Special features of ULA latex include a very low ammonia concentration (0.10-0.15%), high mechanical stability time (> 1,500 sec), good thermal stability and long shelf life in responding to the industrial standard (more than 6 months). Normally, before any utilization, the commercial latex has to be kept for 21 days after the production. But with this ULA latex technology, it can be used within 1-2 days after the production. Most importantly, when working with the industry, it is critical to comply with any required industrial standard. Having used the ULA latex technology, the ULA-NRMA products meet the standard of Thai industrial products (TIS 2731-2559).

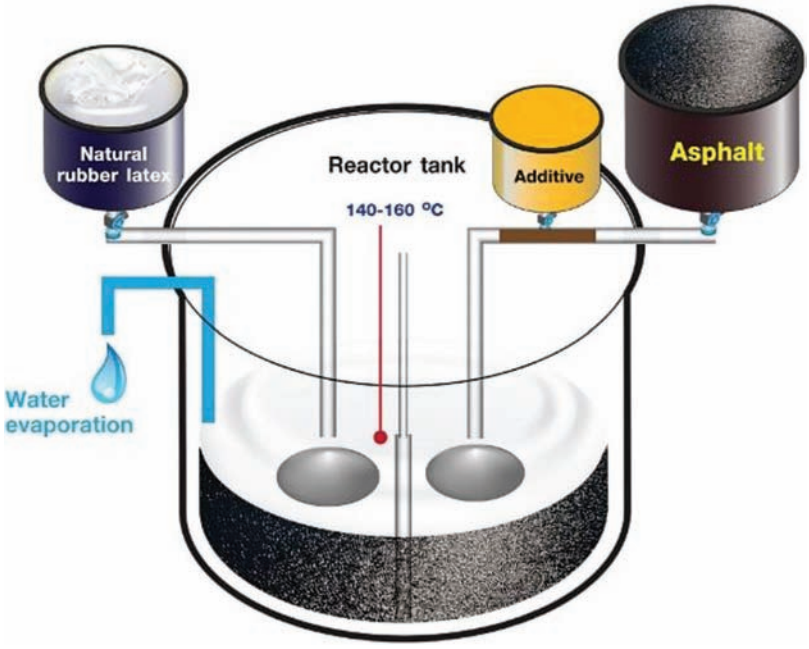

Figure 1: A production process of natural rubber latex modified asphalt cement (NRMA)

As indicated in the technical problems of the asphalt road, this ULA latex for Asphalt Cement becomes a key solution in road construction industries. Listed below are some core benefits of this ULA latex technology. Those are:

1) Concentrated latex production
   - Ensure less pollution from ammonia vapors in latex factory and Para AC plants
   - Could be transported to latex factory without any storage required
   - Promote stability at high temperature
2) Para asphalt cement production
   - Reduce complaints from surrounding communities
   - Reduce clogging in Para AC pipelines
   - Does not require either ammonia gas trapping equipment installation or additional wastewater treatment ponds construction
3) Para asphalt concrete production
   - Reduce pollution from ammonia vapors
   - The high-quality ULA-Para AC products comply with the standard of Thai industrial products (TIS 2731-2559)

Technology management

This session is divided into two aspects: IP protection and business model development. The license of the ultra-low-ammonia latex for asphalt cement is selected for the discussion for several reasons. First, this case demonstrates a sound strategy in dealing with a licensee with limited experiences in the IP management. To achieve the goal of a technology transfer, it is essential to understand the needs and limi-

tations of the licensee. Occasionally, many research organizations can come up with advanced and complicated solutions to technical problems. Its development is often connected with high technical and personnel requirements. As a result, it becomes a concern by the producers/industry when they want to acquire the technology (Mazurkiewicz and Poteralska 2017). Second, the licensed technology demonstrates different attributions of different forms of IP. A patent alone shall not suffice the transfer of this technology. To ensure that the provided solution secures the business of the partner companies, the licensed technology requires an additional form of knowhow that is protected under the Thai trade secret law. Finally, the success of this case involves both understandings and contributions of multi-stakeholders. The understanding is based on a long term relationship that the research group and the ULA latex producer have established. Because of this strong relationship and trust, the research group becomes a solution provider to the ULA latex producer, who has become a licensee later on.

IP protection

There are two forms of IP under this licensing agreement. The licensed intellectual properties involve the patent protection on a method of increasing the stability of latex and reducing the amount of ammonia in the production of low ammonia concentrated latex for use at high-temperature applications. The second form of IP protection involves a formula of an ultra-low ammonia for concentrated latex to be used with the asphalt cement, which is protected under the Thai trade secret law.

According to the Thai Trade Secrets Act, the law requires three elements to be eligible for trade secret protection: the trade information must not be publicly known by persons normally connected with the information; the commercial value of which derives from its secrecy status; and the controller must take reasonable steps to maintain the secrecy (The Thai Trade Secret Act B.E. 2545 2002). The latter requirement of "reasonable steps to maintain the secrecy" of trade or technical information is considered a weak point in many R&D institutions in Thailand. And this license of the ultra-low ammonia latex for the asphalt cement has no exception. The reasonable measures to keep the trade information secret could be executed in many ways. A simple example could be done by a Confidential Disclosure Agreement (CDA) to be signed prior to disclosing or revealing any necessary information. If without proper management of confidentiality of technical information, trade secret proprietor could easily lose their right to the trade secret protection. Strategically, the patent on this method alone will not make the case successful. The research group has emphasized that this patent works only with the use of a ULA latex specific qualification. Otherwise, it would not have yielded a desired result. So far as the management of the trade secret is concerned, the key producer of the para asphalt cement becomes reluctant to take this technology. Having addressed the concern of the trade secret management, the next part discusses the business model development that becomes a key solution to the producer of the para asphalt cement.

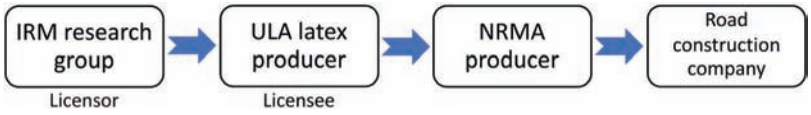

Figure 2: A supply chain of the para asphalt road construction

Business model development

The license of this ULA latex for asphalt cement involves four key players. As mentioned in the introduction, para rubber is one of Thailand's most economic agricultural products. Since 2013, the Department of Rural Roads (DRR) has announced a policy to promote the use of para rubber with the asphalt for road construction and pavement. In corresponding to the National Twenty Year Strategy Plan on the Para Rubber (FY 2017-2037), the DRR has continued to promote more uses of the latex for the asphalt cement. Because of this policy of the DRR, major producers of asphalt cement in Thailand are looking for the technology that meets the demand of the road construction company. In Fig. 2, it demonstrates key players under the supply chain of the para asphalt road construction business. It includes 1) a research organization who provides the licensed technology, 2) a ULA latex producer who produces the ULA latex for the asphalt cement, 3) a Natural Rubber Modified Asphalt (NRMA) producer, and 4) a road construction company who demands the para asphalt cement for the para asphalt concrete.

In this case, the NRMA producer is one of the top producers of the natural rubber modified asphalt cement in Thailand. They have four manufacturing plants across Thailand. Prior to the launch of the policy of the DRR, their interest focus merely on the regular asphalt production. In meeting the policy of the DRR, the NRMA producer is looking for the para asphalt technology to be used for the para asphalt cement. The natural rubber used for the modified asphalt is usually in the latex form which is preserved by ammonia. Nonetheless, considering the growing asphalt production business of the NRMA producer, the ammonia vapors remains their high concern as it has resulted in a hazardous working environment at their manufacturing plants. Therefore, the ULA latex for the asphalt cement becomes their solution as it provides them two key answers namely meeting the demand of the DRR's policy in promoting the para asphalt cement, and reducing the air pollution caused by the preservative, ammonia. Unfortunately, although the NRMA producer is interested in the ULA latex, they are not comfortable being the one to manage the licensed intellectual properties, in particular, the trade secret. This brings to a question of who should be the one to manage the licensed intellectual properties. Concerning the innovation process and management, the person or team to manage such a process depends on the type of organization. (Ungureanu et al. 2016)

In this case, instead of being a direct licensee of the ULA latex technology, the ULA

latex producer comes into play as being a more experienced party. One of the key factors in the para asphalt business is that it requires the long term experiences in mixing the asphalt. The research group has a long-term established relationship with the ULA latex producer. The trust is there and as a result, three key stakeholders agree with the licensing conditions to have licensed the intellectual properties to the ULA latex producer, who will supply such produced ULA latex to the NRMA producer. This business model reflects the fact that all parties have the same understanding of their needs, and they know the strength and weaknesses of each other. More importantly, due to a clear tangible value of the ULA latex to the natural rubber latex producer, this license has overcome the common barrier of the successful transfer of technology, mismatch of the demand and supply. The next section will discuss more about the key success factors as well as the lessons learned from the case study.

Success, lessons learned, impacts, and challenges

Key success factors and lessons learned

The research team has been closely working with the rubber industry both small and large scales across Thailand for decades. The key success factors from their extensive experiences can be listed and described as followings:

a. understanding the nature of the industry
b. familiarity of the working nature of the industry
    i. Expertise of the team and understanding the key players including end users
    ii. Gone through the up-scaling process with the industry
c. clarity of the licensed specification and scope of deliverability
d. expectation management

First, due to the long term experiences with the rubber industry, it allows the research team to know the industry's need and understand the nature of the rubber industry. The natural rubber latex is an initial material that is preserved before going through the processing and transforming to the rubber products. Throughout the entire supply chain of the para asphalt road construction industry, it involves many players including but not limited to rubber farmers, latex manufacturing producers, natural rubber modified asphalt producers, and the road constructors. For many years, the research team has worked with each of these players to identify their needs and concerns to better provide them either consultation services or technical solutions. This has established a long term and deep relationship between the research group and the stakeholders. Second, it is often the case that many desired transfer of technology are technology at a laboratory scale level with limited field tests. This has resulted in failures of the technology transfer. To work with the industry, an up-scaling process with the industry to explore a feasibility and validate the technology is crucial. Third, the employed case study clearly defines the subject matter that are licensed, and the scope of what to deliver to the licensee. Finally, an expectation management is recommended to both sides. Often times, the licensor believes that their licensee has an absorptive capability and is able to understand the licensed IP while the licensee would expect to see the licensed technology solve their problems and make them more money. In the case study, both licensor and licensee have a good expectation management. Their relationship has long established, resulting to the understandings of both sides, and are willing to work together to ensure the licensed technology work as originally planned.

Impacts

The discussion of this section is divided into two parts. The first part briefly discusses the impact of the ULA latex on the asphalt road construction industry in Thailand. Next, a discussion will touch on another layer of the impact that the ULA latex has supported and aligned with the UN Sustainable Development Goals (UNSDGs).

As introduced in the introduction, the ULA latex is developed as an alternative to a commercial latex in the para asphalt cement production. It provides a high impact on the local para asphalt industry for several reasons. First, the ULA latex reduces air pollution from the ammonia vapors at the latex and the para asphalt manufacturing plants. It expedites the manufacturing process. Normally, before any utilization, the commercial latex has to be kept for 21 days. But with this ULA latex technology, it can be used within 1-2 days after the production date. Until 2020, the ULA latex has been used for the road pavement in Thailand totaling more than 3,000 kilometers which has saved the maintenance costs of the road construction of Thailand more than USD 16 Million/year.

The impact of the ULA latex does not stop there. Policy-wise, this technology also supports the UN Sustainable Development Goals including goal 9 (Industry, Innovation, and Infrastructure) and goal 12 (Responsible consumption and production). For goal 9, the ULA latex is considered as a green technology that functions as a bio-modifier of asphalt binder for the road construction/pavement industry. The NRMA products made from the ULA latex give high quality, sustainable, and resilient asphalt concrete road. This helps to upgrade domestic transportation both in urban and rural areas which supports the economic development and human well-being of Thailand. Besides, a longer lifetime of the natural rubber modified asphalt roads reduces the recurrence of the road repairs. At the practical level, it indirectly reduces severe traffic jams as we have less road reconstruction. This further saves fuel and time consumption. Increasing consumption of the renewable natural rubber delivers sustainable benefits for the rubber farmers and the rubber industry.

Concerning goal 12, the ULA latex technology supports domestic natural rubber consumption about 3,500 tons/year to construct the asphalt roads across Thailand. The development of the ULA latex replacing conventional latex achieves the management of toxic chemicals used in the rubber industry. This helps to significantly reduce the release of

ammonia gas to the air and minimize the adverse impacts on worker's health, surrounding communities, and environment. Typically, greenhouse gas emissions are reported in units of carbon dioxide equivalent (CO_2 eq). Ammonia is converted to CO_2 eq by multiplying by their emission factor in kg CO_2 eq per unit. (2.07 kg CO_2 eq per kg of ammonia) (Williams and Al-Ansari 2007). The ULA latex contains ammonia lower than the conventional latex as 0.1%. From 2018-2020, the ULA latex has been produced for more than 8,000 tons. This has resulted in the reduction of the total ammonia content as 8 tons. In sum, the ULA latex can reduce the CO_2 eq context as 16,560 tons.

Meeting Tomorrow's Challenges

Technical challenges for future technology

Aside from the asphalt roads, concrete roads and gravel roads are also common and built-in Thailand. The construction of these 3 kinds of roads uses different technologies. It becomes a challenge for the research team to apply the ULA latex with concrete and gravel road construction. The difficulty is how to mix the ULA latex with cement, coarse aggregate, sand, and soil to get a homogeneous mixture and obtain the excellent quality roads. In the future, the research team hopes to take part in setting the standard of natural rubber based roads in Thailand.

Competitive challenges

Since the leading asphalt manufacturer in Thailand uses the ULA latex for their NRMA production, it drives the ULA latex development from competitors in the rubber industry. Now, ULA latex has 2-3 competitors in the market. It is a big challenge for the research team to keep the market shares of the ULA latex in the road construction/pavement industry. Customer engagement becomes a competitive strategy for the research team. The team has been endlessly working on further development of the ULA latex. This is to maintain their status as a champion who has leveraged the para asphalt cement industry in Thailand.

Capacity constraints

Due to limited personnel resources and the turn-over rate of the research assistants, this has directly resulted in losing manpower. The remaining team has to find the replacement and this requires tremendous time to train those new staff. In addition to this limitation, insufficient infrastructure has always been the case in research institutions in the developing world. To up-scale the technology, a pilot plant is desired. Currently, the research team has to reach out latex manufacturer to help trial on the large scale production of the ULA latex. Nonetheless, as this technology contains the trade secret formula, access to such formula should be restricted and limited. Although the formula is protected under the Thai trade secret law, any unintentional leakage of the formula to outsiders would easily jeopardize the secrecy status of the technology.

Conclusion

Technology commercialization is a challenge everywhere. The challenges and barriers may include but not limited to technical risk, lack of operational test data, unawareness of new technology, lack of transfer experiences, limited absorptive capability, risk aversion, and lack of trust. However, these challenges can be overcome when the stakeholders have a good understanding of the technology transfer process.

Know the industry's need: The needs of the rubber industry and end user like the NRMA producer is identified right at the beginning. They are the one who suggest the opportunity to the research team.

A relationship is a key to the success: Greater opportunities are derived from a good relationship that comes with trust. While the current license of the ULA latex is still on-going, the NRMA producer has already identified their interests to work on other relevant problems with the research group. The ULA latex producer and the NRMA producer become less risk averse because they see the value the relationship brings. A licensing deal's real value derives from creating a relationship that brings together the scientific expertise of the research team with the practical manufacturing skills of the industrial partner (Phanraksa and Rubesch 2012).

The IP management can be learned: Having learned how the formula trade secret has been handled, the NRMA producer has shown their interest to get a license directly from the research group, rather than having the ULA latex producer done it. At the beginning, the NRMA producer hesitated to get involved with the trade secret due to their limited experiences. Now that the stakeholders have learned from each other, next potential licensing deal could be based on a different business model. Whether the next deal follows the same or take a different licensing pattern, maintaining the good relationship is the key to the success. IP is definitely essential for business but it is not everything of the deal.

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New Madrid System Online Service for Filing International Applications

The World Intellectual Property Organization (WIPO) has launched the Madrid Application Assistant, which automatically records all the information required to complete an international application. The Madrid Application Assistant is the latest improvement to the service level of the Madrid Registry as part of WIPO's drive to enhance the creation and management of trademark rights under the Madrid System.

The Madrid Application Assistant helps users to generate high-quality application files. Through the data import from the Office of origin's national/regional trademarks database, the application is automatically pre-populated with the relevant information for a Madrid international application - from contact details to a full list of goods and services. Built-in features also include the automatic verification of the classification of the list of goods and services, as well as its translation. This reduces user effort while also lessening the risk of irregularities, thus making the process of filing an international application more efficient and accurate.

By integrating online filing options currently available in all member Offices concerned, the Madrid Application Assistant serves as a convenient gateway to navigate applicants to those services quickly. Furthermore, improved quality of application files generated by the Madrid Application Assistant will contribute to substantially reduce workload of examination for the Office of origin by minimizing irregularities.

The Madrid Application Assistant is derived from Madrid e-Filing, the WIPO-powered online filing solution for Madrid Member IP Offices. This means it could easily be upgraded to the latter in order to support all examination work by Offices of origin from start to finish, including online verification and real-time communication of files to WIPO. IP Offices are encouraged to liaise with WIPO to discuss upgrading the Madrid Application Assistant to Madrid e-Filing in the Offices of origin.

WIPO advises all users of the Madrid System to use the Madrid Application Assistant and online filing services offered by IP Offices. It is committed to providing more online services under the Madrid System for the benefit of the users as well as member IP Offices.

For more information, access:

https://www.wipo.int/madrid/maa-landing/

INTELLECTUAL PROPERTY RIGHTS AND INTELLECTUAL PROPERTY MANAGEMENT

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Abstract

Intellectual Property (IP) means, creative ideas and expressions of the human mind (intellect) that have commercial value. Intellectual property is intangible assets as a result of human achievement that have commercial value and are original, such as Patents, Designs, Trademarks, Copyright, like music etc. These assets help industry to increase valuation. The protection and management of these assets are very crucial. IP management facilitates the interaction between the industry and institutes helps in maintaining the complete inventory of IP, determination of valuation of IP assets etc. The patent management involves obtaining and maintaining patents and requires technical, legal and business skills. Intellectual property management needs to develop IP Cell, Internal technology commercialization team, IP management committee and IP policy, develop IP plan and strategy and identify, measure and monitor the IP assets and audit the IP portfolios periodically.

Background of intellectual property

Intellectual Property (IP) means, creative ideas and expressions of the human mind (intellect) that have commercial value. IP is the property represented by the product emanating from creativity of the human mind, human intellect and creative ideas. It can be an invention, original design, trademarks, artistic creation etc. In earlier times, only physical or tangible assets like movable and immovable properties fetched the maximum value and the owner had an exclusive right over it. With the passage of time, new ideas cropped in, new concepts and means for the progress of mankind were thought of and new inventions came to the forefront, which brought about industrial, economic and cultural development in the society. These new activities acquired the form of intangible assets owing to the inherent and practical values associated with them. Therefore, another form of property right was generated which required safeguarding for the owners of those properties. The property right, pertaining to such intangible assets, is called Intellectual Property Rights, popularly known as IPR. It share many of the characteristics associated with conventional concept of the personal property. At present, IPRs are regarded as a source of national wealth and mark of an economic leadership in the context of global market scenario.

The Intellectual property is an asset and, as such, it can be bought, sold, mortgaged, licensed, exchanged or gratuitously given away like any other form of the property. Further, by acquiring a legal right over the property, the creator of the intellectual property seeks to ensure that he has exclusive right over it and that the property can be put to use by others only with his consent. Besides, ownership of intellectual property right is the legal recognition and reward to receive for any ones' creative efforts. In earlier times, only physical or tangible assets like movable and immovable properties fetched the maximum value and the owner had an exclusive right over it. With the passage of time, new ideas cropped in, new concepts and means for the progress of mankind were thought of and new inventions came to the forefront, which brought about industrial, economic and cultural development in the society. These new activities acquired the form of intangible assets owing to the inherent and practical values associated with them. In the new era, Micro, Small and Medium Enterprises (MSMEs) have vast role in creation, protection and IP valuation. Intellectual property valuation can be both qualitative and quantitative in nature. Qualitative analysis deals with, at a microscopic level for intangible assets. The qualitative study formulates assumptions on which the financial models like cost approach, market approach are based. MSMEs should be kept themselves in middle between the industries and universities/academics, so that effective are based collaboration can be happened and they should look ahead to form the independent IP cell. It will further provide incentive to create IP and mechanism for its protection and utilization, simultaneously enhancing awareness, greater interaction among universities, academic and research institutions and identify the communication gaps between them. It is observed that Asian countries are more proactive to protect their IP's. From the figures 1 & 2, it is observed that the filing of IP in Asian countries is highest. In patents, 66.8 % are from the Asia and rest is for world; for trademarks 70% filing coming from Asian countries; similarly for designs 69.7% are coming from the Asian countries.

Types of intellectual property rights

Property are divided into two categories, tangible and non-tangible property

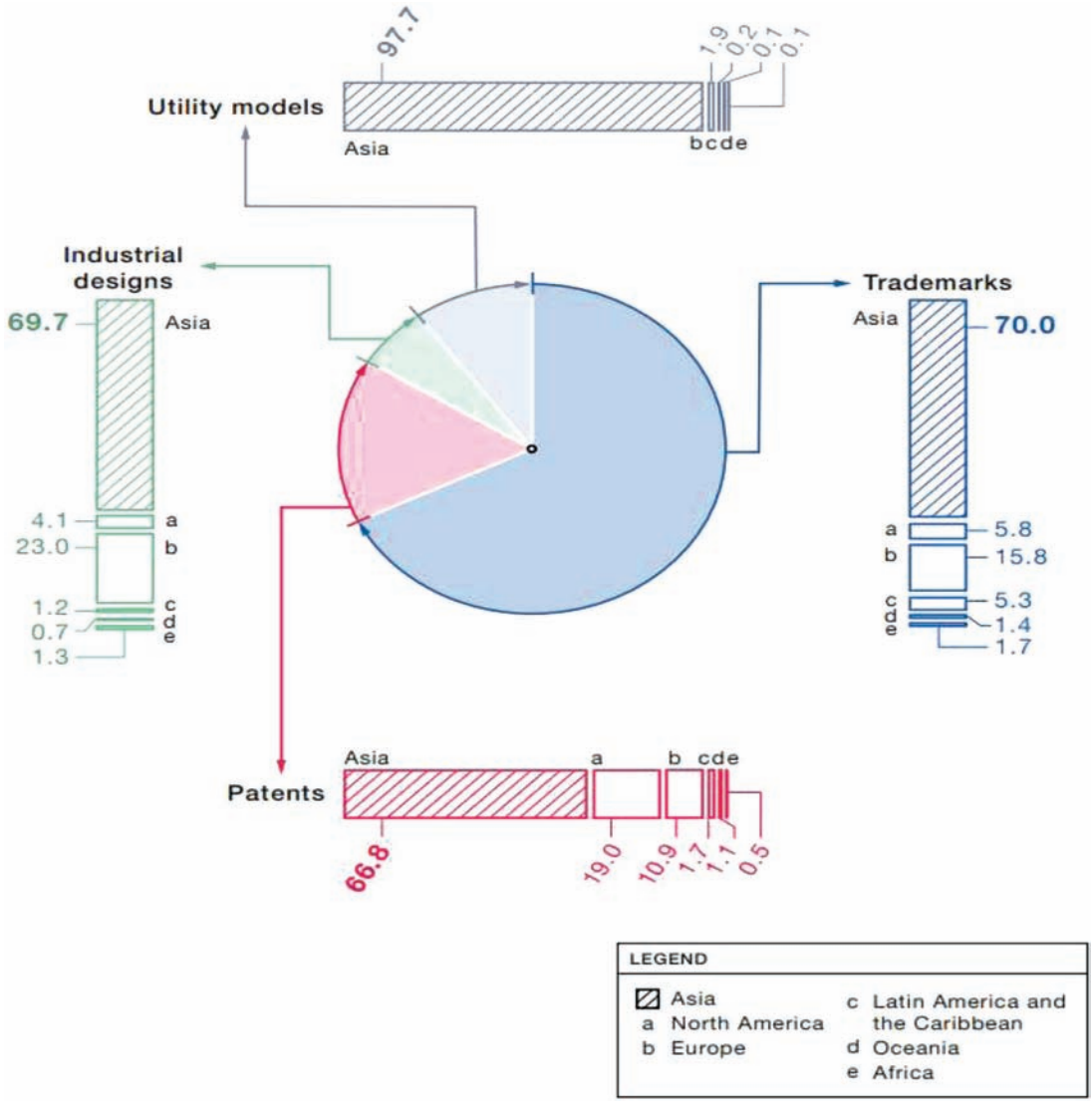

Figure 1: IP filing statistics in the world

(Table 1). Intellectual Property Rights can be broadly divided into two categories:

Industrial Property - Patents, Designs, Trademarks, Geographical Indications, etc

Copyright - Writings, Musical work, Audio-visual work, Dramatic work, Painting & Drawings, Sound recording, Broadcasts, Performance of musician, actors, singers etc

The signification of Intellectual property for institutes and industries and is presented in Table 2.

Industrial property

It mainly consists of Patents, Designs, and Trade Marks, Geographical Indications (Table 3).

Patents

Patent is an exclusive right granted by the Government to the applicant for his disclosed invention of industrial product or process which should be new, non-obvious, useful and patentable as per the patentability criteria laid down in the national law. A patent offers technical solution to a technical problem. In lieu of disclosure of invention, the Government provides legal protection for a limited term for the invention. A patent enunciates a contract between an inventor / applicant and the Government and gives the territorial right in the country where it is granted.

The patent right enables the inventor to derive material benefit, to which he is entitled, as a reward for his intellectual efforts and compensation for expenses incurred in research and experimentation relating to his invention. Patent right gives protection against infringement and creates possibility of assigning or licensing of the right and enables the patentee to take legal action against any person who is exploiting the patented invention without consent or license from the patentee. A patentee acquires the right, enforceable by law, to decide who should and who should not use his patented invention. He/she retains this right for the term of the patent provided he pays the necessary renewal fees. The grant of patent right by the government does not mean that the govern-

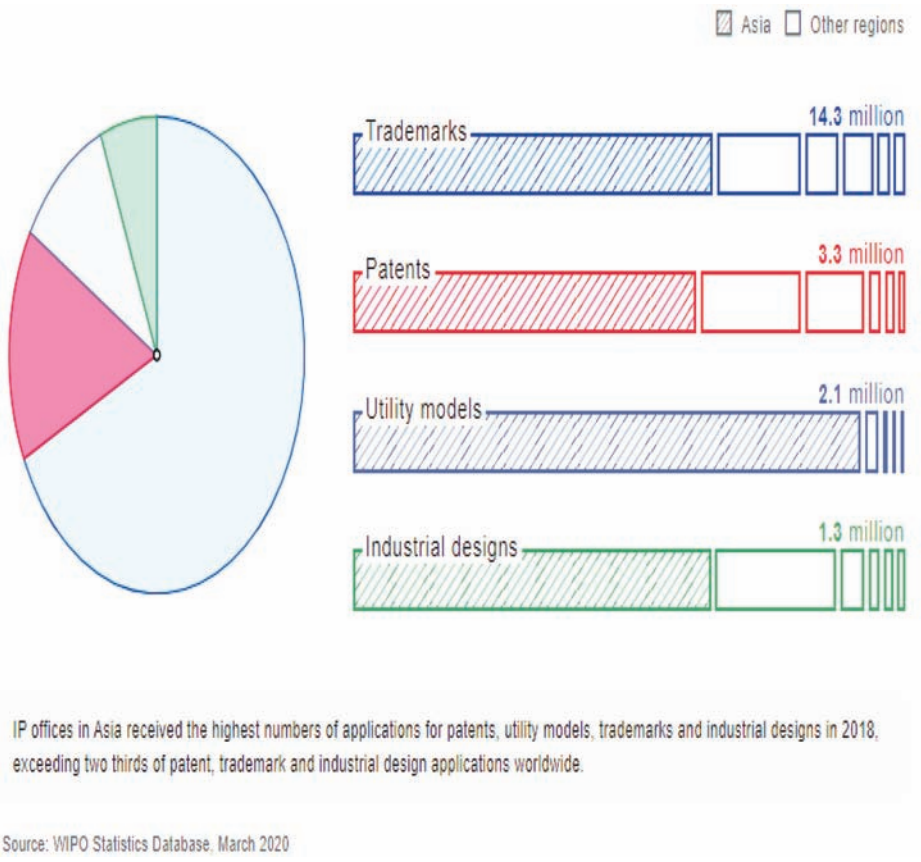

Figure 2: IP filing statistics in the world

ment itself would automatically enforce the patent right. It is up to the owner to bring an action, usually under civil law, for any infringement of his patent right.

Designs

Design means only the features of shape, configuration, pattern, ornament, composition of color or line or a combination thereof. It must be applied to any article, whether two dimensional or three dimensional or in both forms, by any industrial process or means, which in the finished article appeal to and are judged solely by the eye. Such a design is registerable, provided it is not contrary to public order or morality or does not contain obscene or scandalous matter. Registration of a design confers upon the registered Proprietor the exclusive right to apply a design to the article in a class in which the design has been registered. Industrial designs are of great commercial value because shape or configuration of the article can often be a great selling point. When companies are competing at equal price and functionality, design is the only differential that matters for achieving market advantage and competitiveness.

Table 1: Various forms of property

Property		
Tangible Property	Non-tangible Property	
	Intellectual Property Rights	
House (fixed property) Bike/car (movable property)	Industrial Property	Copyright
	Patents Designs Trademarks Geographical Indications Copyrights etc.	Writings, Musical work, Sound recording, Performance of musician, actors, singers Dramatic work, Audio-visual work, Painting & Drawings, Computer programs etc.

Trademarks

A Trade Mark is a visual symbol in the form of word, name, logo, label etc, as applied to an article of commerce, with a view to indicate origin of manufacture or service or vendor in that respect and enable customers to distinguish the product of one manufacturer from the goods of the other. When properly advertised, the Trade Mark becomes an effective instrument to attract the customers and acquire goodwill of the customer. A Trade Mark, through its

Table 2: Significance of IP for institutes and industries

Significance of IPR	Benefits
Published Patents can be used for further Research & Development	Avoids duplication of work
Transferring invention as public property after expiry	Anyone can manufacture said product which may save the cost of royalty
Encouragement for latest Technology i.e. helps industry to improve existing technology to produce better products	Public will get new and better technology
Venturing into new market by innovated products	Expanding market share with latest products.
Serves as an Indicator of achievements & identify the ability of researcher	Applicant/ Inventor will get Royalty after technology transfer / licensing / commercialization which will motivate
Increase the valuation of company / market value. Tax saving in R& D cost	IPRs being intangible assets forms substantial part of assets of a company and thus increase the valuation in balance sheet.
Preventing competitors from copying or imitating	Infringement actions against any party who infringes rights

Table 3: Types and importance of various IPRs

IPR	property created by human mind
Patents	for new and inventive inventions
Designs	for any new design applied on product that appeals to eye
Trademarks	logo, word name etc. for identification of the manufacturer or vendor of the product,
Geographical Indications	Goods which are referring to place of origin of that product
Copyright	are rights for songs, music, text, computer programs

Table 4: Important work areas of IP management

Areas of IP Management	Benefits & work to be carry out
IP Cell & IP policy formulation for the organization	Repositioning of R&D
IP Generation	Aware employees in various departments about the identification of patent-able inventions and protection of IPs. Creating additional incentive to researchers
IP Assessment	Competitive assessment
IP valuation Identify value from R&D determine the impact of research to the society	Strategic decision making
IP portfolio management. maintain patent databases	Developing linkages with other research institutions for forming long-term beneficial partnerships. Building licensing / joint venture/ joint collaborative research Attracting funding from private/public sector

widespread and extensive use in public, becomes popular and eventually results in acquiring an exclusive right, which can be legally enforced by the owner of the mark.

Trade Mark helps the consumer to answer the question," who makes the product or who has provided the service?" e.g. COCA COLA, SONY, TVS, LIC etc.

Geographical Indication

Geographical indication (GI) identifies agricultural, natural or manufactured goods, originating from a definite territory. It is an indication or appellation of the origin of a particular product. For the purpose of qualifying for geographical indication protection, the goods should have special qualities or characteristics or reputation based upon the climatic or production characteristics which are unique to the geographic location. e.g., Darjeeling Tea, Basmati Rice, Kanchipuram sarees, Nagpur oranges etc. "Goods" means such goods as agricultural, natural or manufactured goods, as originating or manufactured in the territory of a country or region or locality in that territory, where a given quality, reputation or other characteristic of such goods is essentially attributable to its geographical origin, and in case of manufactured goods, either the production or processing or preparation of the goods take place in such territory, region or locality. GI confers legal protection to geographical indications in India and prevents unauthorized use of a registered geographical indication by others. It boosts exports of Indian geographical indications by providing legal protection. It promotes economic prosperity of producers of goods produced in geographical territory.

Copyrights

Copyright is protection that covers published and unpublished literary, scientific and artistic work. Copyright relates to the exclusive right to do or authorize to do certain acts in relation to original lit-

erary, dramatic or musical work, artistic creations (paintings, photographs, work of architecture, artistic craftsmanship) cinematographic films, sound recording, software program etc., provided such works are fixed in a tangible or material form. Copyright comes into existence as soon as the work is created and protects skill and labor employed by the creator in production of his work and varies according to the nature of the work. Copyright is not given for just an idea, but subsists only in the material form to which the ideas are translated or expressed. No copyright is granted for a person who merely communicates his brilliant idea to an artist or play writer. The production i.e. the result of communication of the idea, is the copyright of a person, who has fixed the idea in a form. The author has no monopoly in the ideas or subject matter; others can produce the same result and can have a copyright provided they do it independently. It is a Bundle of Rights and can be exercised independently of each other. Unauthorized copying or reproduction of the author's work amounts to infringement. But, a fair dealing with the work for private uses i.e. study, research, review, criticism etc, without an intention of commercial gain is not an infringement.

Intellectual property management

Intellectual properties are intangible assets which result from human achievements that have commercial value and are original, such as patents, designs, trademarks, copyright, like music etc. These assets help industry to increase their valuation. The protection and management of these assets are very crucial. IP management facilitates the interaction between the Industry and institutes which helps to commercialize R&D results. Intellectual property management helps in maintaining the complete inventory of organizations' IP, determination of valuation of IP assets etc. Also the term patent management involves obtaining and maintaining patents which require technical knowledge (to identify and to assess technology), legal and business skills. In large organizations they have separate dedicated team/department to protect intellectual property. In smaller organizations, they are likely to hire patent management firms/ law firms.

Some of the key work areas of the Intellectual property management have been identified which can be implemented in industry as well as in institutes (Table 4).

Methodology for intellectual property management

1) Set-up/Formulate IP Cell, Internal technology commercialization team, IP management committee & IP policy for the organization; obtain feedback and review for improvements; identify a centralized IP office with executive authority like Office of the GM, Dean or Head etc.
2) Develop IP plan for IP protection, IP exchange, IP market-watch etc.
3) Develop an IP strategy
4) Identify, measure and monitor the IP assets. Identify the hidden Intellectual capital of organization & ways to measure it. Focus on IP assets for IP creation, protection, IP evaluation, IP enforcement etc
5) Raise level of awareness by creating IP Awareness, IP culture and employees training in the field of IP and inform them the rights and responsibilities.
6) Administer Incentive Award programme. Implement Invention Mining or brainstorming
7) Implement and maintain Invention Notebook system
8) Resolve inventor-ship issues and work with inside/outside IP counsels, coordinate and track all IP / Patent Attorney activity
9) Organize and facilitate IP review committee meetings
10) Record IP in an IP asset register. Create and maintain the IP database
11) Audit the IP portfolios periodically
12) IP evaluation and commercialization of IP assets by assignment & licensing.
13) Action should be taken in case of infringement / erosion of IP.
14) Prepare stronger IP protection system and secure the confidential information.

Conclusion

An IP management culture is essential in industries and institutes. Industries and Universities should work collaboratively in the field of IPR to make the students employable. Agreement between institutes and industry for collaboration or joint research should be made compulsory to avoid the duplication of research work for proper IP management. In all institutes there may be creation of advisory boards comprising members from industry to fill the communication gap in academic & industries.

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- ✓ WIPO Guide to Intellectual Property Worldwide
- ✓ WIPO Intellectual Property Handbook
- ✓ Indian patent office
- ✓ RGNIIPM/ IPO, India training manuals/ materials

Websites

- ✓ www.ipindia.gov.in
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- ✓ www.wipo.int
- ✓ http://en.wikipedia.org/wiki/Knowledge
- ✓ http://nopr.niscair.res.in/bitstream/123456789/3595/1/JIPR%2011%285%29%20330-333.pdf

Tech Events

2020

Sep 16–18, Bangkok, Thailand
7th International Tradeshow for Bio Business & Investment in Asia Exhibition
Contact: Anucha Parnphichate
Project Manager / Head of Science & Technology Unit
Tel: +662 670 0900 ext. 202
E-mail: anucha@vnuexhibitionsap.com
Web: https://www.bioinvestmentasia.com

Nov 19-21, Bengaluru, India
Bengaluru Tech Summit 2020
Contact: Gurunath Angadi
Project Head
MM Activ Sci-Tech Communications
No.11/6, 'NITON', Block 'C', 1st Floor, Palace Road,
Bengaluru - 560 052, India
Tel: +91-80-4113 1912/13
E-mail: gurunath.angadi@mmactiv.com
enquiry@bengalurutechsummit.com
Web: https://www.bengalurutechsummit.com

Sep 22–24, Jakarta, Indonesia
POWER-GEN ASIA 2020
Contact: Clarion Events Ltd
Bedford House
69-79 Fulham High Street
London SW6 3JW, United Kingdom
Tel: +44 (0) 121 767 3769; Fax: +44 (0) 121 767 2880
E-mail: info@clarionevents.com

Sep 23–25, Noida, India
RENERGY -RENEWABLE ENERGY INDIA EXPO 2020
Contact: Exhibitions India Group Pvt. Ltd.
217-B, Okhla Industrial Area
Phase - III, New Delhi -110020, India
Tel: +91 11 4279 5000; Fax: +91 11 4279 5098
Web: http://www.exhibitionsindia.com/

Sep 28–29, Tashkent, Uzbekistan
Green Energy Future Central Asia 2020 (GEFCA 2020)
Contact: GEFCA 2020
1 A Navol St, Tashkent 100017, Uzbekistan
Tel: +86 186 0171 2917
E-mail: jay@leader-associates.com
Web: https://www.centralasia.greenenergy-future.com/

Sep 29–Oct 1, Singapore
Internet of Things World Asia
Contact: Jaimman Wadhera
Tel: +44 (0) 20 755 19200
E-mail: tmt.registrations@Informa.com
Web: https://tmt.knect365.com/iot-world-asia/

Oct 7–8, Singapore
2nd Annual Cleantech Forum Asia
Contact: Secretariat
E-mail: forums@cleantech.com
Web: https://www.cleantech.com/event/cleantech-forum-asia/

14–17 Oct, Seoul, Republic of Korea
ECO-EXPO KOREA 2020
Contact: Ministry of Environment - South Korea
Government Complex-Sejong
11, Doum 6-Ro, Sejong-si 339-012
Republic of Korea
Tel: +82 44 201 6568
Web: http://k-eco.or.kr/

Oct 27–29, Singapore
ASIA CLEAN ENERGY SUMMIT 2020
Contact: ACES Secretariat
Tel: +65 6338 8578
Web: https://www.asiacleanenergysummit.com

Nov 05–08, Tokyo, Japan
10th Asian Conference on Sustainability, Energy & the Environment (ACSEE2020), an interdisciplinary conference
Contact: The International Academic Forum (IAFOR)
Sakae 1-16-26 – 201, Naka Ward, Nagoya, Aichi,
Japan 460-0008
Web: https://acsee.iafor.org

Nov 7–9, Phuket, Thailand
2020 5th Asia Conference on Environment and Sustainable Development (ACESD 2020)
Contact: Ms. Nancy Liu
Conference Secretary
Tel.: +86-28-86512185
E-mail: acesd@iacsitp.com; Web: http://www.acesd.org/

Nov 13–16. Jeju, Republic of Korea
9th Asia-Pacific Forum on Renewable Energy (AFORE 2019)
Contact:
Secretariat, 05836 Room B515, H Business Park,
25, Beobwon-ro 11-gil, Songpa-gu, Seoul,
Republic of Korea
Tel: +82-2-883-8051; Fax: +82-2-883-8042
E-mail: ksnre@ksnre.or.kr
Web: http://afore2019.org/afore2019/

Nov 18–19, Singapore
GREEN WORLD ASIA
Contact: Angie Eng
Director of Marketing & Partnerships
Tel: +65 6817 5811
Mob: +65 8163 2109
E-mail: a.eng@closerstillmedia.com
Web: https://www.greenworldasia.com/

Nov 30–Dec 02, Kuala Lumpur, Malaysia
ASIAWATER EXPO & FORUM 2020
Contact: United Business Media (M) Sdn Bhd
Suite 5-01, Level 5, Sunway VISIO Tower
Lingkaran SV, Sunway Velocity
55100 Kuala Lumpur
Malaysia
Tel: +603 9771 2688
Fax: +603 9771 2799
Web: https://www.asiawater.org/

Dec 2nd–3rd, Singapore
Climate Risk Summit Asia
Contact: Jusnita Chang
Tel: +6013 333 3962
E-mail: jusnitachang@economist.com
Web: https://events.economist.com

6–7 Dec 2020, Phuket, Thailand
International Conference on Green Energy and Technology (ICGET)
Contact: Conference coordinator
E-mail: info@researchfora.com
Web: http://researchfora.com/Conference2020/Thailand/8/ICGET/

Dec 8–10, Kuala Lumpur, Malaysia
ASIA 2020: Water Resources & Renewable Energy Development in Asia
Contact: Secretariat
Tel: +44 20 8773 7244
E-mail: Asia2020@hydropower-dams.com
Web: https://www.iwra.org

Dec 15–17, Mumbai, India
INTERSOLAR INDIA 2020
Contact: MMI India Pvt.Ltd.
Inizio 507 & 508, 5th floor
Cardinal Gracias Road
Opp. P&G building
Chakala, Andheri (E)
Mumbai – 400 099. India
Tel: +91 22-4255 4700; Fax: +91 22-4255 4719
Web: http://www.mm-india.in/en/meta/home/home.html

2021

18–21, 2021, Jakarta, Indonesia
FOODTECH INTERNATIONAL 2020
Contact: Wakeni - PT. Wahana Kemalaniaga Makmur
Kompleks Perkantoran Graha Kencana Blok CH - CI
Jl. Raya Pejuangan No. 88
Jakarta 11530, Indonesia
Tel: +62 (21) 53660804; Fax: +62 (21) 5325887
Web: http://foodtechinternational.net/

Tech Ventures & Opportunities

Business Coach

Tech Opportunities

Skill development in India

Ministry of Skill Development & Entrepreneurship (MSDE), Government of India

https://www.msde.gov.in/pmkvy.html

National Skill Development Mission

The National Skill Development Mission was approved by the Union Cabinet on 01.07.2015, and officially launched by the Hon'ble Prime Minister on 15.07.2015 on the occasion of World Youth Skills Day. The Mission has been developed to create convergence across sectors and States in terms of skill training activities. Further, to achieve the vision of 'Skilled India', the National Skill Development Mission would not only consolidate and coordinate skilling efforts, but also expedite decision making across sectors to achieve skilling at scale with speed and standards. It will be implemented through a streamlined institutional mechanism driven by Ministry of Skill Development and Entrepreneurship (MSDE). Key institutional mechanisms for achieving the objectives of the Mission have been divided into three tiers, which will consist of a Governing Council for policy guidance at apex level, a Steering Committee and a Mission Directorate (along with an Executive Committee) as the executive arm of the Mission. Mission Directorate will be supported by three other institutions: National Skill Development Agency (NSDA), National Skill Development Corporation (NSDC), and Directorate General of Training (DGT) – all of which will have horizontal linkages with Mission Directorate to facilitate smooth functioning of the national institutional mechanism. Seven sub-missions have been proposed initially to act as building blocks for achieving overall objectives of the Mission. They are:

(i) Institutional Training, (ii) Infrastructure, (iii) Convergence, (iv) Trainers, (v) Overseas Employment, (vi) Sustainable Livelihoods, (vii) Leveraging Public Infrastructure.

Pradhan Mantri Kaushal Vikas Yojana (PMKVY)

Pradhan Mantri Kaushal Vikas Yojana (PMKVY) is the flagship scheme of the Ministry of Skill Development & Entrepreneurship (MSDE). The objective of this Skill Certification Scheme is to enable a large number of Indian youth to take up industry-relevant skill training that will help them in securing a better livelihood. Individuals with prior learning experience or skills will also be assessed and certified under Recognition of Prior Learning (RPL). Under this Scheme, Training and Assessment fees are completely paid by the Government.

Key components of the scheme

Short term training

The Short Term Training imparted at PMKVY Training Centres (TCs) is expected to benefit candidates of Indian nationality who are either school/college dropouts or unemployed. Apart from providing training according to the National Skills Qualification Framework (NSQF), TCs shall also impart training in Soft Skills, Entrepreneurship, Financial and Digital Literacy. Duration of the training varies per job role, ranging between 150 and 300 hours. Upon successful completion of their assessment, candidates shall be provided placement assistance by Training Partners (TPs). Under PMKVY, the entire training and assessment fees are paid by the Government. Payouts shall be provided to the TPs in alignment with the Common Norms. Trainings imparted under the Short Term Training component of the Scheme shall be NSQF Level 5 and below.

Recognition of prior learning

Individuals with prior learning experience or skills shall be assessed and certified under the Recognition of Prior Learning (RPL) component of the Scheme. RPL aims to align the competencies of the unregulated workforce of the country to the NSQF. Project Implementing Agencies (PIAs), such as Sector Skill Councils (SSCs) or any other agencies designated by MSDE/NSDC, shall be incentivized to implement RPL projects in any of the three Project Types (RPL Camps, RPL at Employers Premises and RPL centres). To address knowledge gaps, PIAs may offer Bridge Courses to RPL candidates.

Special projects

The Special Projects component of PMKVY envisages the creation of a platform that will facilitate trainings in special areas and/or premises of Government bodies, Corporates or Industry bodies, and trainings in special job roles not defined under the available Qualification Packs (QPs)/National Occupational Standards (NOSs). Special Projects are projects that require some deviation from the terms and conditions of Short Term Training under PMKVY for any stakeholder. A proposing stakeholder can be either Government Institutions of Central and State Government(s)/Autonomous Body/Statutory Body or any other equivalent body or corporates who desire to provide training to candidates.

Kaushal and Rozgar Mela

Social and community mobilisation is extremely critical for the success of PMKVY. Active participation of the community ensures transparency and accountability, and helps in leveraging the cumulative knowledge of the community for better functioning. In line with this, PMKVY assigns special importance to the involvement of the target beneficiaries through a defined mobilisation process. TPs shall conduct Kaushal and Rozgar Melas every six months with press/media coverage; they are also required to participate actively in National Career Service Melas and on-ground activities.

Philippine Roadmap for Digital Startups

The Department Information and Communication (DICT), The Philippines

http://www.dict.gov.ph

The Philippine Roadmap for Digital Startups is a short and long-term strategic plan for the Philippine startup community and The Department Information and Communication Technology (DICT) towards developing digital innovation in the country. The goal of this initiative is to generate innovative startups that will spur economic growth and to find solutions to society's most pressing and pervasive issues. This roadmap is a framework that clearly defines our overall direction to push for digital innovation – one that can leverage the country's resources to its highest potential.

The Roadmap is divided into three parts:

- **The Internet-Related (Digital) Startup Ecosystem** – Provides a clear definition of terms, goals and benchmarks. A summary of current internet-related technology ecosystems, as well as one for the current Philippine startup ecosystem, is included.
- **Patterns of Technology Startup Ecosystem** – Provides insights from various startup ecosystems around the world, highlighting key features of each ecosystem. It also explores the Philippines' current progress in those defined key areas as well as a SWOT analysis of the local ecosystem.
- **Action Plan** – Enumerates the short and long-term recommendations for all stakeholders to improve the Philippine digital startup ecosystem as well as the localized programs based on existing programs from international ecosystems.

The information and findings in this roadmap are gathered from leading local technology startup founders, as well as from existing literature of various projects, government reports, and affiliates including leading universities and startups.

The Philippine Roadmap for Digital Startups: 2015 and Beyond provides a framework for the government and the private sector to take a coordinated and systematic approach towards developing internet-related innovation against ambitious targets as a means for inclusive growth. The focus is to produce innovative businesses that find solutions to our country's most inherent challenges.

The roadmap is a collective effort for the community by the community, which includes the government, tech startup participants, and the academe, to come up with appropriate programs for the Philippines, focusing on the country's unique factors/features. The purpose is to provide support on all stages of development for tech startups and entrepreneurs of different backgrounds to flourish.

The roadmap contains studies of other tech startup ecosystems, which includes South America, China, Silicon Valley, Singapore and Israel. These ecosystems have attracted talent that fostered local innovation because they have the right mechanism in place for them to grow and reach their highest potential. Their environment (Intellectual Property, facilities such as Science Parks, Research and Development, Multinationals that have served as an exchange platform of knowhow, and Funding) allowed individuals to create and work collaboratively and strategically.

The Philippines, by all means, should strive to develop itself not by aiming to be a replica of Silicon Valley, but by aligning its unique resources and core strengths with strategic planning. The country has an attractive demographic (a growing young population, growing middle class, etc.), rich in natural resources, a pleasant culture (e.g. polite, English speaking). These are areas that should be highlighted on top of appropriate measures to development. The technology startup participants today alongside the government should aim to implement the best practices in promoting Internet-technology innovation through a step-by-step process and analysis on the roadmap.

Technology Bank for Least Developed Countries

The Technology Bank for the least developed countries (LDCs) has been operationalized with the signing of the Host Country Agreement and the Contribution Agreement between the Government of Turkey and the United Nations. The new Bank is expected to improve the utilization of scientific and technological solutions in the world's poorest countries and promote the integration of least developed countries into the global knowledge-based economy. The establishment of the Technology Bank marks the first Sustainable Development Goal (SDG) target to be achieved, SDG 17.8. Its achievement is highly symbolic, as it responds directly to the 2030 Agenda's principle of leaving no one behind.

For more information, access:
http://unohrlls.org/technologybank/

Registration of licensing agreement in Thailand

Department of Intellectual Property, Thailand
http://www.ipthailand.go.th

Consideration criteria

Licensing Agreement to use the patent is the contract, with which the patent/petty patent owners grants the specific right to the licensee. The permission shall not exceed the protection period as prescribed by law.

* The protection period of invention patent lasts 20 years.
* The protection period of petty patent lasts 6 years, or upon the petty patent renewal application according to Article 65 paragraph 2 of the laws.

Conditions of application submission

1. To register a licensing agreement, the applicant shall submit the form as determined by the Director-General, together with a licensing contract to use the invention patent/petty patent.

2. Authorization

   2.1 In case the applicant of the patent does not reside in the Kingdom of Thailand, he shall authorize the patent agent/patent attorney registered with the Director-General of the Department of Intellectual Property to act on his behalf. In this regard, the power of attorney shall be presented to the Director-General in accordance with the following regulations;

   (1) If the authorization is done outside the Kingdom of Thailand, the signatures in the authorization letter or power of attorney shall be certified by the authorized official of the Thai embassy or consulate or Director of the office of the Ministry of Commerce located in the country where the principal or power grantor resides, or the person authorized to act on behalf of the said officials or the person authorized to certify the signature according to the law in that country, or

   (2) In case the authorization is done in the Kingdom of Thailand, the applicant shall submit a copy of passport or temporary residence certificate of the principal or power grantor, or any evidence indicating that at the time the authorization was made, the principal or power grantor was in Thailand.

   2.2 The Power of Attorney shall be attached with the revenue stamp of 30 Baht/patent agent or patent attorney/application.

Proceeding according to the official's instruction

1. In case that the official finds a correctable defect in the application, the official shall notify the applicant or his patent agent/patent attorney for the correction. The applicant shall finish the correction within 90 days of the notification reception date. After such period, without the correction, the applicant shall be deemed to have abandoned the application, except the Director-General extends the period for correction as deemed appropriate due to any necessity.
2. After the applicant corrected the application, the applicant shall submit the correction application and the fee to the Department of Intellectual Property or the provincial office of the Ministry of Commerce. The corrected application shall enter the consideration and initial inspection processes respectively, similarly to the re-submission of the application.
3. In case of application submission via the website of the Department of Intellectual Property, the inspecting official shall check the completeness of information and details in the patent/petty patent application, request or other applications based on information and details appearing in the e-patent filing system. In this regard, the applicant shall present the application and supporting documents to the Department of Intellectual Property within 15 days of application number reception date and patent/petty patent application filing date via internet. The inspection of application submitted via internet shall be in accordance with the Notification of the Department of Intellectual Property Re: Principles and conditions for submission of patent/petty patent application, requests or other applications via internet.

Notes

1. The working process starts after the inspection of the documents is completed, as specified in the manual of the public service.
2. In case the application or documentary evidence is not correct or incomplete, the official shall record the defect of the document or indicate the required additional documentary evidence (Record of conditions on application reception). The applicant shall correct the document and/or submit the additional document within 90 days of the application filing date. If the applicant fails to submit all additional documents within

the specific period of time, the applicant shall be deemed to have abandoned the application. The official shall return the application to the applicant and inform the reason of the return and his appeal right.

3. Any person fee paid to the Department of Intellectual Property shall not be refunded in all cases, except
   (1) The law stipulates that the fee must be refunded, or
   (2) The applicant double-paid or overpaid the fee, by which the faulty payment resulted from the mistake of the state official, not the payer. In this regard, the Department of Intellectual Property shall consider the refund case by case.
4. In case the applicant is required to submit many additional documentary evidences, the applicant shall submit all additional documentary evidences in the same time.
5. In case the applicant submits the copy of the documentary evidence, the applicant shall certify the copy of the documentary evidence.
6. In case the applicant submits the document in foreign language, the applicant shall submit the document with Thai translation and the correct translation certification of the translator.
7. In case the applicant or the authorized patent agent/patent attorney does not submit the application by himself, and granted power to the other person to submit the application, the application submitter shall present a sub power of attorney or temporary power of attorney, so that he is eligible to submit the application and sign in the record of conditions on application reception. If it appears that the application and the documentary evidence is not correct or incomplete, and the application submitter is not authorized to sign on the said record, the official shall not receive the application.
8. The working period does not include the time period when the applicant follows the official's instruction or corrects the application, or the period of temporary suspension of registration.

Relevant laws

The Ministerial Regulation No.25 (B.E. 2542) issued by virtue of the Patent Act B.E. 2522 (Dated 24 September 1999).

The Patent Act B.E. 2522 as amended by the Patent Act (No. 2) B.E. 2535 and the Patent Act (No. 3) B.E. 2542

Artificial Intelligence-Based Image Search Tool for Brands

The World Intellectual Property Organization (WIPO) has launched a new artificial intelligence (AI)-powered image search technology that makes it faster and easier to establish the distinctiveness of a trademark in a target market. Earlier-generation image search tools primarily determine trademark image similarity by identifying shapes and colors in marks. WIPO's new AI-based technology improves on this technology by using deep machine learning to identify combinations of concepts – such as an apple, an eagle, a tree, a crown, a car, a star – within an image to find similar marks that have previously been registered.

The new technology results in a narrower and more precise group of potentially similar marks, facilitating greater certainty in strategic planning for brand expansion into new markets. With fewer results to scrutinize, this also translates into labor-cost savings for trademark examiners, attorneys and paralegals, industry practitioners and researchers.

WIPO's new AI search technology leverages deep neural networks and figurative elements classification data from the Madrid System for the International Registration of Marks and from large trademark offices. All users can access the AI search technology for free through WIPO's Global Brand Database, where it has been fully integrated into the database search engine.

The new search functionality covers the national collections of 45 trademark offices already participating in the project - even if they have not been using a classification system for figurative elements. This represents a total number of almost 38 million trademarks to date. WIPO periodically adds new collections from around the world to the database.

For further information, contact:

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

Rights, obligations and limitations to patent rights

ASEAN Intellectual Property Association
http://www.aseanipa.org

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;

ASEAN Standards Harmonization Initiative for Energy Efficiency

In ASEAN countries, inefficient air conditioners (ACs) have contributed to environmental problems due to inefficient electricity consumption as well as high GHG emissions. Addressing this challenge might be difficult since there are still non-tariff barriers to trade that need to be removed to enhance regional market integration for higher efficiency ACs and there is not yet any harmonized energy efficiency (EE) standards for higher efficiency ACs in the region.

Funded under the EU SWITCH-Asia affiliated program, ASEAN SHINE aims at increasing the market share of higher efficient air-conditioners in ASEAN through harmonization of test methods and energy efficiency standards, adoption of common Minimum Energy Performance Standards, and changing consumer purchasing attitudes in favour of energy efficient air-conditioners.

The progressive phasing out of inefficient ACs and the increased share of higher efficient ACs will lead to:

- Improved efficiency at demand-side in ASEAN residential sector.
- Reduced emissions of greenhouse gases in ASEAN.
- Removal of non-tariff barriers to trade within ASEAN and enhance regional market integration.
- As the action will result in having the same harmonized EE standards for ACs in the ASEAN region.

The major activities:

- Establishment of the EU-ASEAN Energy Efficiency Standards Harmonization Initiative
- Harmonization of standards for testing methods
- Regional policy roadmap
- National policy roadmaps for increase of MEPS
- Capacity building for testing laboratories
- Capacity building for AC manufacturers (SMEs)
- Consumer awareness campaigns

For more information, contact:

ASEAN Centre for Energy
ACE Building, 6th Floor
Directorate General for Electricity Complex
HR. Rasuna Said Blok X-2, Kav. 07-08
Kuningan, Jakarta-12950, Indonesia
Tel; (62-21) 527 9332
Fax: (62-21) 527 9350
E-mail: secretariat@aseanenergy.org
Web: http://www.aseanenergy.org

Green Climate Fund

Green Climate Fund, Republic of Korea

https://www.greenclimate.fund

The Green Climate Fund (GCF) is a new global fund created to support the efforts of developing countries to respond to the challenge of climate change. GCF helps developing countries limit or reduce their greenhouse gas (GHG) emissions and adapt to climate change. It seeks to promote a paradigm shift to low-emission and climate-resilient development, taking into account the needs of nations that are particularly vulnerable to climate change impacts.

It was set up by the 194 countries who are parties to the United Nations Framework Convention on Climate Change (UNFCCC) in 2010, as part of the Convention's financial mechanism. It aims to deliver equal amounts of funding to mitigation and adaptation, while being guided by the Convention's principles and provisions.

When the Paris Agreement was reached in 2015, the Green Climate Fund was given an important role in serving the agreement and supporting the goal of keeping climate change well below 2 degrees Celsius.

Responding to the climate challenge requires collective action from all countries, including by both public and private sectors. Among these concerted efforts, advanced economies have agreed to jointly mobilize significant financial resources. Coming from a variety of sources, these resources address the pressing mitigation and adaptation needs of developing countries.

GCF launched its initial resource mobilization in 2014, and rapidly gathered pledges worth USD 10.3 billion. These funds come mainly from developed countries, but also from some developing countries, regions, and one city (Paris).

GCF's activities are aligned with the priorities of developing countries through the principle of country ownership, and the Fund has established a direct access modality so that national and subnational organisations can receive funding directly, rather than only via international intermediaries.

The Fund pays particular attention to the needs of societies that are highly vulnerable to the effects of climate change, in particular Least Developed Countries (LDCs), Small Island Developing States (SIDS), and African States.

GCF aims to catalyze a flow of climate finance to invest in low-emission and climate-resilient development, driving a paradigm shift in the global response to climate change.

Our innovation is to use public investment to stimulate private finance, unlocking the power of climate-friendly investment for low emission, climate resilient development. To achieve maximum impact, GCF seeks to catalyse funds, multiplying the effect of its initial financing by opening markets to new investments.

The Fund's investments can be in the form of grants, loans, equity or guarantees.

Key features

GCF invests in adaptation and mitigation activities in developing countries, managing a project portfolio that is implemented by its partner organisations, known as Accredited Entities.

GCF's approach is marked by several distinct features:

balanced portfolio: GCF's investments are aimed at achieving maximum impact in the developing world, supporting paradigm shifts in both mitigation and adaptation. The Fund aims for a 50:50 balance between mitigation and adaptation investments over time. It also aims for a floor of 50 percent of the adaptation allocation for particularly vulnerable countries, including Least Developed Countries (LDCs), Small Island Developing States (SIDS), and African States.

Unlocking private finance: The Fund is unique in its ability to engage directly with both the public and private sectors in transformational climate-sensitive investments. GCF engages directly with the private sector through its Private Sector Facility (PSF). As part of its innovative framework, it has the capacity to bear significant climate-related risk, allowing it to leverage and crowd in additional financing. It offers a wide range of financial products including grants, concessional loans, subordinated debt, equity, and guarantees. This enables it to match project needs and adapt to specific investment contexts, including using its funding to overcome market barriers for private finance.

Country ownership: GCF recognizes the need to ensure that developing country partners exercise ownership of climate change funding and integrate it within their own national action plans. Developing countries appoint a National Designated Authority (NDA) that acts as the interface between their government and GCF, and must approve all GCF project activities within the country. This country-driven approach ensures GCF's activities operate in harmony with national priorities.

The aim of all GCF activities is to support developing countries limit or reduce their greenhouse gas emissions and adapt to climate change impacts.

Modes of financing for startups

Small Industries Development Bank of India (SIDBI), India
https://smallb.sidbi.in

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

Sources of long term capital

Reinvestment of profits

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

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

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

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

Loans from commercial banks / financial institutions

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

Public deposits

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

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

Risk capital

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

Issue of shares

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

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

Issue of debentures

Companies generally have powers to borrow and raise loans by issuing debentures. The rate of interest payable on debentures is fixed at the time of issue and the debentures have a charge on the

property or assets of the company, which provide the necessary security. The company is liable to pay interest even if there are no profits. Debentures are mostly issued to finance the long-term requirements of business and do not carry any voting rights.

Sources of short term capital

Trade credit

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

Factoring

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

Discounting bills of exchange

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

Selected Green Technology Funds

Adaptation Fund (AF)

https://www.adaptation-fund.org

The Adaptation Fund (AF) is designed to finance climate change adaptation projects and programs based on the priorities of eligible developing countries.

Climate Investment Funds

https://www.climateinvestmentfunds.org

The Climate Investment Funds (CIF) accelerates climate action by empowering transformations in clean technology, energy access, climate resilience, and sustainable forests in developing and middle-income countries.

Global Environment Facility Trust Fund

http://www.thegef.org

The Global Environment Facility provides funding to meet the agreed incremental costs of measures to achieve agreed global environmental benefits in biological diversity, climate change, international waters, land degradation, primarily desertification and deforestation, chemicals and wastes.

Least Developed Countries Fund (LDCF)

https://www.thegef.org/topics/least-developed-countries-fund-ldcf

The LDCF meets the needs of least developed countries whose economic and geophysical characteristics make them especially vulnerable to the impact of global warming and climate change.

Innovation programmes in Malaysia

Malaysian Innovation Foundation

https://www.yim.my

Inclusive innovation

Specifically designed to empower the bottom 40% of the income group to leverage on innovations to promote the transformation of communities including microenterprises in the rural areas through handholding and technical and management support, the High Impact Project 6 – Inclusive Innovation (HIP6) programme is part of the SME Masterplan 2012-2020 organised by SME Corp and managed by YIM as appointed Lead Agency.

HIP6 promotes public-private partnership to share responsibility and accountability in creating drivers of change that can empower the bottom 40% of the income pyramid to leverage on innovations created for the benefit and wellbeing of the communities.

Since the programme was incepted, almost 23,000 people have participated in the HIP6 Inclusive Innovation Challenges which is organised to identify deserving innovations for support and funding.

Mainstreaming grassroots innovations

Mainstreaming Grassroots Innovation (MaGRIs) programme is a project that focuses on upscaling and accelerating the development and diffusion of potential grassroots innovations in Malaysia via collaboration with various parties from government, industry, grassroots community and youth.

The MaGRIs programme provides an environment to develop grassroots innovators with potential innovations and groom them to become community role models. New methods to stimulate grassroots commercial activities into mainstream commercial activities are often uncovered while grassroots innovators leverage through opportunities to mainstream their innovations into mainstream commercial activities. Often, academic and industry collaborators are roped in to support the MaGRIs programme activities.

From innovation development to commercialisation with market diffusion to inclusive communities, the programme even has its own MaGRIs Ambassador originating from the same communities, sharing community success stories and creating engagement with this targeted community. Since MaGRIs was incepted in 2016, more than 13,000 people have engaged with the programme.

Social Innovation (MSI) Fund

The MOSTI Social Innovation (MSI) project was launched with the objective of improving the well-being of the society through the implementation of project, services, capacity and skill building or innovation output using the existing technology that can be implemented sustainably.

As a start, the implementation of MSI involves outreach programmes to the grassroots level and scaling up innovative ideas from the outreach programme with the objective of "humanising innovation".

Innovators can submit their project ideas to MESTECC for the MSI grant. MESTECC functions as a one-stop centre for innovators to submit their innovations with proof-of-concept. The innovation projects will be matched with its agencies and collaborators to facilitate and monitor the projects.

Lifelong Learning Initiative

Grassroots innovators (GRIr) have benefited the community by innovating products and services that are useful and of values to their community. However, their contributions are often neglected, not brought to proper authorities for their development and advancement. GRIr are national assets contributing to social and economic growth. GRIr need proper recognition, capacity building initiative to motivate, sustain them to innovate better solutions, provide leaderships at grassroots level.

This project was funded by The Boeing Company under Boeing Global Corporate Citizenship (BGCC). In the first sequel, the project has successfully accredit 20 grassroots innovators in 2016 and with the BGCC support again an additional 20 grassroots innovators are selected for APE in the second sequel, 2017.

Through Lifelong Learning Initiative – Accreditation of Prior Experience (APE) platform, an individual's expertise, skills and experiences officially recognized based on National Occupational Skills Standards (NOSS) into Malaysian Skills Certificate qualifications: Certificate of Competency, MSC levels 1 to 3, Diploma Malaysian Skills or Advanced Diploma Malaysian Skills; awarded by the Government.

Innovation promotion in India

National Institution for Transforming India (NITI Aayog), India

https://aim.gov.in/overview.php

Atal Innovation Mission

Atal Innovation Mission (AIM) is Government of India's flagship initiative to promote a culture of innovation and entrepreneurship in the country. AIM's objective is to develop new programmes and policies for fostering innovation in different sectors of the economy, provide platform and collaboration opportunities for different stakeholders, create awareness and create an umbrella structure to oversee innovation ecosystem of the country.

Five major initiatives taken in first year of establishment:

1. Atal Tinkering Labs-Creating problem solving mindset across schools in India.
2. Atal Incubation Centers-Fostering world class startups and adding a new dimension to the incubator model.
3. Atal New India Challenges-Fostering product innovations and aligning them to the needs of various sectors/ministeries.
4. Mentor India Campaign- A national Mentor network in collaboration with public sector, corporates and institutions, to support all the intiatives of the mission.
5. Atal Community Innovation Center- To stimulate community centric innovation and ideas in the unserved /underserved regions of the country including Tier 2 and Tier 3 cities.
6. ARISE-To stimulate innovation and research in the MSME industry.

Atal Tinkering Labs

With a vision to 'Cultivate one Million children in India as Neoteric Innovators', Atal Innovation Mission is establishing Atal Tinkering Laboratories (ATLs) in schools across India. The objective of this scheme is to foster curiosity, creativity and imagination in young minds; and inculcate skills such as design mindset, computational thinking, adaptive learning, physical computing etc.

Atal Incubation Centre

AIM intends to support the establishment of new incubation centres called Atal Incubation Centres (AICs) that would nurture innovative start-up businesses in their pursuit to become scalable and sustainable enterprises. The AICs would create world class incubation facilities across various parts of India with suitable physical infrastructure in terms of capital equipment and operating facilities, coupled with the availability of sectoral experts for mentoring the start-ups, business planning support, access to seed capital, industry partners, trainings and other relevant components required for encouraging innovative start-ups. Moreover, AICs would be established in subject specific areas such as manufacturing, transport, energy, health, education, agriculture, water and sanitation etc.

Atal New India Challenge (ANIC)

One of Atal Innovation Mission's primary goals is to incentivize innovation in areas critical to India's growth. The innovative solutions in the areas like health, housing, hygiene, energy and water can impact directly on livelihood of all sections of society. Researchers have long talked of the 'Valleys of Death' at the early stage and commercialization stage in taking innovations to market. The Atal New India Challenge aims to address the second Commercialization Valley of Death, in which innovators are unable to access resources for piloting, testing, and market creation.

Mentor of Change Program

Mentor of Change Program is a strategic nation building initiative to engage leaders who can guide and mentor students in thousands of Atal Tinkering Labs and startups and incubators under the programs of Atal Innovation Mission across India. We are looking for leaders who can spend 1 to 2 hours every week in one or more such labs or with the startups/incubators and enable them to experience, learn and practice future skills such as design and computational thinking and inculcate the spark of innovation and entrepreneurship. These labs are non-prescriptive by nature, and mentors are expected to be enablers rather than instructors.

Atal Community Innovation Center

Atal Innovation Mission has taken this new initiative to support community innovation drive in the country. The program is directed to encourage the spirit of innovation through solution driven design thinking to serve the society. It will focus on undeserved/unserved regions of the country which at present lack a vibrant startup and innovation ecosystem.

Atal Research & Innovation for Small Enterprises (ARISE)

ARISE is an initiative to promote research, innovation and competitiveness of Indian startups and small enterprises including Micro, Small, and Medium enterprises. The program's objective is to catalyze research, innovation, find solutions to the sectoral problems and subsequently trigger creation of new industrial sectors, through support of Central Government Ministries / Departments, who will become the first buyer of the solutions / products innovated under the ARISE program by start-ups and small enterprises. ARISE will be a multi-phase, multi-sector, and multi-stakeholder program to identify, fund, guide, hand-hold, and procure from Indian startups and small enterprises. It aims to inculcate a culture and mindset of engaging and co-creating amongst the industry as well as the government, to improve India's import substitution capabilities, develop export leadership in nation-critical sectors, and provide indigenous solutions for challenges in India.

Green technology in Malaysia

Malaysian Investment Development Authority (MIDA)
https://www.mida.gov.my

In line with Malaysia's aim to become an inclusive and sustainable advanced nation by 2020, Green Technology (GT) has been identified as one of the drivers of the future economy for the nation that would contribute to the overall Green Growth and Sustainable Development. Under the National Green Technology Policy, the cross-sectoral GT focuses on four sectors namely energy, building, waste management and transportation.

Renewable energy

Malaysia is emphasizing greater importance for Renewable Energy (RE) generation through specifically formulated policies and initiatives to spur the growth of the sector as a major step towards green economy. Other than the Feed-in-Tariff (FiT) mechanism, the Net Energy Metering (NEM) and Large Scale Solar (LSS) Photovoltaic plant schemes were introduced in 2016 to boost RE generation. NEM benefits users in terms of savings in electricity bill through lower electricity usage and energy credit from solar power generation while LSS allows developers to produce renewable energy in larger capacities.

In 2019, a total of 350 projects in renewable energy with total investments of RM3.78 billion were approved incentives. Out of the total, 88.5 per cent was contributed by domestic investments and 11.5 per cent by foreign investments. Solar energy projects made up the bulk with 330 projects amounting to RM2.10 billion comprising of 314 solar self-consumption projects worth RM413.35 million and 16 large scale solar projects valued at RM1.69 billion. In that period, six mini-hydro projects worth RM1.52 billion were also approved, while the remaining approved projects were made up of 13 biogas projects worth RM149.33 million, and one biomass project worth RM6.58 million. These projects are expected to create 761 employment opportunities in this sub-sector.

Energy efficiency/energy conservation

As price of energy steadily increases over the years, there is a need to adopt energy efficiency measures to ensure productive use of energy and minimize waste. The use and adoption of energy efficiency systems and technology is encouraged through introduction of incentives and import duty exemptions on qualified machines and components. Consecutively, energy efficiency activities also open up opportunities for energy service companies (ESCOs) to provide energy efficiency services to potential clients.

In 2019, a total of 75 projects in energy efficiency/energy conservation with total investments of RM536.44 million were approved incentives. Investments were mainly from domestic sources i.e. RM168.86 million meanwhile RM367.58 million were from foreign sources. These investments are expected to provide 148 employment opportunities in the sub-sector.

Green technology incentive

Under the provision of Budget 2014, tax incentives for Green Technology in the form of Green Investment Tax Allowance (ITA) for the purchase of green technology assets and Income Tax Exemption (ITE) on the use of green technology services and system were introduced to further strengthen the development of green technology.

Application for incentive is to be submitted to MIDA for green technology projects and services, and to Malaysian Green Technology Corporation (MGTC) for purchase of green technology assets as listed in MyHijau Directory, by 31 December 2020. Projects which qualify for this incentive are renewable energy; energy efficiency; integrated waste management and green building / green data centre. In addition, eligible services activities include system integration of renewable energy; energy services; services related to green building / green data centre; green certification of products, equipment & building; and green township.

Source: MIDA Investment Performance Report 2019

WIPO GREEN – The Marketplace for Sustainable Technology

WIPO GREEN is an online platform for technology exchange. It supports global efforts to address climate change by connecting providers and seekers of environmentally friendly technologies. Through its database, network and acceleration projects, it brings together key players to catalyze green technology innovation and diffusion. The WIPO GREEN database is a unique catalogue of sustainable solutions and needs across the world. It offers technologies from prototype to marketable products, available for license, collaboration, joint ventures, and sale. It also contains needs defined by companies, institutions, and non-governmental organizations looking for technologies to address specific environmental or climate change problems.

For more information, access:
https://www3.wipo.int/wipogreen/en/

Cleaner production in Sri Lanka

National Cleaner Production Centre, Sri Lanka

http://www.ncpcsrilanka.org

Resource Efficient and Cleaner Production (RECP) assessments

A cleaner production (CP) audit is often the first step towards managing, controlling and improving the environmental performance of a company. If a company was not previously concerned about the environmental impacts of its production, an audit is the best way to establish the actual status and determine the best approach to reducing waste, wastewater and emissions. It analyses and quantifies input, output and waste generation at each step of a production process. As a proactive environmental measure CP helps companies to comply with rules and regulations. There are three types of audits focuses on improving resource efficiency.

GHG assertion

National Cleaner Production Centre (NCPC) of Sri Lanka has the expertise and capacity to measure and report your organization carbon footprint. Our services are ranging from organization level to product level in line with GHG Protocol, ISO 14064-1 & 2, ISO 14067 and PAS 2050 carbon foot printing standard. Our inhouse expertise in cleaner production and energy will help to propose comprehensive GHG mitigation opportunities to the company.

Quantification of GHG Emissions of your business activities or product will help to;

- Understand the impact that your product/ business has on the climate at each stage of its life cycle.
- Identify the most effective way of reducing emissions, whether it is in your own operations, with your suppliers, or in how your customers use and dispose of your product.
- Reduce costs through greater energy efficiency and waste reduction.
- Respond to customer demand – and enhance your brand reputation (credible, confident and positive external messaging)
- Develop successful, long-term and economically competitive relationships with suppliers.
- Minimize risk by ensuring compliance with the carbon legislation

Product Carbon Footprint (PCF)

The PCF sums up the total greenhouse gas emissions generated by a product over the different stages of its life cycle. Different types of PCFs exist.

- "Cradle to Gate"- From raw material extraction to point of distribution
- "Cradle to Grave" -From raw material extraction to point of consumption & disposal
- "Cradle to Cradle"- From raw material extraction to point of reuse

There are three main Product Carbon Footprint standards that are or will be applied worldwide:

- PAS 2050
- GHG Protocol
- ISO 14067>

Environment management

Centre conducts water and energy audits and facilitates the clients' relevant information on enhancing their water and energy performances. NCPC has been registered as an ESCO (Energy Service Company) with the Sustainable Energy Authority (SEA) since 2009. NCPC has acquired modern energy measuring equipment to carry out electrical and thermal energy measurements.

Energy management

The concern on energy consumption and energy cost has been increasing across all energy intensive industry sectors not only because of its immediate impact on production costs, but also because of environmental impacts. Cost of energy in any organization can potentially bring significantly down to improve business benefits, through proper energy services. NCPC, Sri Lanka is a member of "RECPnet" global network, leading the global Cleaner Production agenda, with a network of over 70 such Centres around the globe. As such, there is no organization better equipped to deliver a robust solution that best suits your energy efficiency needs.

Chemical management

This component is carried out according to Responsible Production which is a unique initiative that drives continuous improvement in health, safety and environmental performance.

Water auditing and water footprint

Water is an indispensable but scarce resource today, hence demonstration of the corporate commitment to protect the fresh water resources through conducting water audits & implementing the recommendations, quantifying the water footprint (ISO 14046) inevitably boost the corporate image of a company. Using water efficiently support in savings of energy and raw materials as well as to cut down waste water treatment costs. Every business is a little different, but a water audit is an easy way to start.

Mosquito-larvae killing pesticides

Our partner, a Hungarian Institute has developed a novel way for the production of carrier materials for mosquito-larvae killing pesticides. They are interested in a license agreement for the production of pesticide carrier substrate or selling of production equipment or the carrier material itself.

Area of Application

- Environment protection
- Agriculture
- Tourism
- War against malaria, dengue and mosquito-spread diseases

Advantages

- The special low-density highly porous carrier material can absorb a lot of liquid (ca. double of its weight), namely the fermentation liquor containing larvicides
- The air-drying in mild conditions gives a stabilized encapsulated biological mosquito killing agent without lyophilization step
- The chemical composition of the granules gives an appropriate medium to stabilize and enhance the effectivity of the enzymes of larvicides

Advantages of the product

- Low-density and sizes
- Cheap air-spreadability
- High surface density on water
- Controlled larvicide capacity
- Floatability and time-dependent sinkability
- Low production costs
- Selectivity for blood-sucking mosquitoes
- Combinability with other active ingredients
- No environmental pollution
- Long storage ability
- Combination with attractants for female mosquitoes to put larva in a treated area

Environmental Aspects

- Cleaner production
- Energy efficiency

Development Status

Pilot plant

Legal Protection

Patent

Technical specifications

The subject of the present invention are carrier materials for mosquito-larvae killing pesticides (carrier composites). Numerous insecticide preparations have already been developed for exterminating

Transfer Terms

- Technical services
- Technology licensing
- Equipment supply

Target Countries

World-wide

Continuous room-temperature biodiesel production

Our partner, a Hungarian Institute has developed a novel continuous process for the room-temperature production of biodiesel. The main advantage of this technology is the avoidance of soap formation which so far cause many problems during biodiesel production (emulsion formation, washing problems, slow phase splitting, etc.) They are interested in a license agreement or selling of production equipments.

Area of Application

Biofuel production plants, fuel mixing firms

Advantages

- Room temperature process, energy saving
- Avoidance of soap formation, thus many other problems do not occur, like:
- Problems during emulsion formation; Washing problems; Slow phase splitting
- Continuous production technology in a simple apparatus (tube reactor)
- Cheap catalyst removing ($KHSO_4$ or H_2SO_4) by recyclization of catalyst-removing $KHSO_4$ (acid) with regenerable ion-exchangers
- The byproducts (K_2SO_4, glycerol or methanol)) can be used as rapeseed production fertilizer or starting material for biogas production
- No water in glycerol phase
- Low methanol and potassium content in the raw ester phase

Environmental Aspects

- Cleaner production
- Energy efficiency

Development Status

Pilot plant

Legal Protection

Patent

Technical specifications

Vegetable oil methyl esters are generally produced at 60 °C in the presence of 1 % KOH/NaOMe catalyst with stirring for 15-60 min.

Transfer Terms

- Technical services
- Technology licensing
- Equipment supply

Technology Offers

Target Countries
World-wide

For the above two offers, contact:
Laser Consult Ltd (Hungary)
H-6701 PO Box 1191
Szeged
Hungary

INDIA

Chitin and chitosan

Chitin and chitosan are important byproducts form the shell of shellfishes. Chitin is the most important organic constituent of the exoskeletal material of invertebrates and the important economical source of this material is the shrimp processing industry. Chitin and its derivatives, chitosan find various industrial applications like, biotechnology, food processing, pharmacy and medicine.

Area of Application
Various industrial applications like, biotechnology, food processing, pharmacy and medicine.

Advantages
Chitin and its derivatives, particularly chitosan find industrial application in various fields namely flocculation, paper making, textile printing and sizing, ion exchange chromatography, removal of metal ions from industrial effluents, manufacture of pharmaceuticals and cosmetics and as an additive in food industry.

Environmental Aspects
Waste utilization

Development Status

- Pilot plant
- Fully commercialized

Transfer Terms

- Consultancy
- Technology licensing

Contact:
Central Institute of Fisheries Technology
CIFT Junction, Matsyapuri, Willingdon Island
Cochin 682029
India

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. 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.

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

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

- Joint venture
- Technology licensing
- Research partnerships

Target Countries
World-wide

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

Novel transducer matrix for biosensors

The principal objective of the present invention is to provide a process for the synthesis of nanostructured conducting polymer (NSCPs) by using structure directing agents. In addition, this invention also provides a process to develop a nanostructured conducting polymer with high electrical conductivity. Another objective of the present invention is to use the synthesized nanostructured conducting polymers as a transduction matrix for the development of biosensor. Yet another objective of the present invention is to provide a method for the development of optical biosensor by using synthesized nanostructured conducting polymers as a transduction matrix.

Area of Application
An optical glucose biosensor has a potential application in the testing of biological samples.

Environmental Aspects
Environment friendly

Development Status
Laboratory model

Legal Protection
Patent

Transfer Terms

- Consultancy
- Technical services
- Technology licensing

Plant biomass-based metal sorption column

The present invention provides a process for developing a plant biomass based biosorption column for the removal of metal ions. The biomaterial comprising of leaves of Jatropha is immobilized on a modified silica gel. The silica gel is modified with cationic polymers for improving the binding of the biomaterial, porosity of the column and to maintain uniform flow rate. The biosorption column may have possible application in the removal of specific ions from contaminated sites or wastewater. The prepared biosorbent column is very cheap, recyclable and can be used for selective sorption of Cr (VI) and Cu (II) ions from synthetic multi-elemental water samples

Area of Application
The prepared biosorbent can be used for purification of water in terms of heavy metals.

Advantages
The prepared biosorbent column are very cheap, recyclable and can be used for selective sorption of Cr (VI) and Cu (II) ions from synthetic multi-elemental water samples.

Environmental Aspects
Environment friendly

Development Status
Laboratory model

Legal Protection
Patent

Transfer Terms

- Consultancy
- Technical services
- Technology licensing

Tea catechins as anti-aging compounds

The present invention relates to the preparation of consumable composition for oral administration that contains tea catechins. The composition prepared by the process of this invention is useful in providing controlled release of catechins contained therein. In a preferred embodiment of the present invention, consumable composition containing tea catechins dispersed therein is provided. The present invention provides consumable composition for oral administration containing tea catechins. The composition prepared by the process of this invention is useful in providing controlled release of catechins contained therein.

Area of Application
Application includes antiaging agents

Environmental Aspects
Environment friendly

Development Status
Laboratory model

Legal Protection
Patent

Transfer Terms

- Consultancy
- Technical services
- Technology licensing

For the above three offers, contact:
Amity University
Sector-125, Noida
Gautam Buddha Nagar 201303
India

Novel drug delivery for AIDS

In order to achieve distinct therapeutic objectives and advantages, the technology suggests an alternative pharmaceutical composition i.e an antiretroviral drug encapsulated in a vesicle. This pharmaceutical composition is considered to obtain a reduction in the frequency of dosing, a reduction in the amount of drug consumed by the patient. The pharmaceutical composition comprising of vesicles, liposomes are lipid bilayers surrounding an aqueous space. The drug substances are encapsulated within the liposomes. The ability of liposomes consisting of components other than phospholipids and cholesterol or their semisynthetic derivatives to enhance the encapsulation of bioactive substances provides new promising perspectives for establishing new, efficient and stable carriers for drug delivery.

Area of Application
Pharma industry

Advantages

- Facilitates controlled & direct delivery of the drug.
- Reduces frequency of dose.
- Overcomes first pass and other pre systemic drug degradation of biologically active ingredients.
- Reduction in the amount of drug consumed by the patient.
- Vesicles can be incorporated into the biological system via different routes of administration.
- Minimizes the dose dependent debilitating toxic effects.
- Liposomal formulation developed has therapeutic superiority.
- Maintains Minimum Viral Inhibitory Concentration throughout the therapy.

Development Status
Laboratory model

Technology Offers

Legal Protection
Patent applied for

Transfer Terms
Technology licensing

Dengue tetravalent vaccine

The technology describes a novel recombinant envelop domain-III based tetravalent protein which elicits protective immune responses against each of the four serotypes of dengue virus, DEN-1, DEN-2, DEN-3 and DEN-4. Hence it is capable of inhibiting the infectivity of each dengue virus serotype which is responsible for different form of dengue fever. The technology further suggests a process for the preparation of this tetravalent protein which involves codon optimizing the sequence, followed by cloning, transforming and purifying the novel recombinant tetravalent protein. This technology has been tested on mice.

Area of Application
Medical industry

Advantages

- It is a tetravalent vaccine against four different serotypes of dengue virus i.e. DEN-1, DEN-2, DEN-3 and DEN-4.
- Effective against different types of dengue serotypes.
- It inhibits the infectivity of each dengue virus serotype.
- Cost effective option in comparison to existing treatments.

Development Status
Laboratory model

Transfer Terms
Technology Licensing

For the above two offers, contact:
SkyQuest Technology Consulting Pvt. Ltd.
501, Krishna Complex, Opp. Devashish School,
Bodakdev, Ahmedabad 380054
India

Nanogold-loaded carbon bullets as gene carriers

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 potential 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

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

Microfine ginger powder with high drug and spice values

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
- Food 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

Transfer Terms
Turnkey

Contact:
Department of agriculture
Innova Reserach Centre Pvt Ltd
Ochanthuruth, Kochi, 682508, india

Dehydrated fruits by freeze drying technique

Thai government organization offers technology for fruit dehydration by freeze drying technique. Freeze drying is a process in which water in the sample is frozen at very low temperature (between -20°C and -40°C) and then sublimed under vacuum and low temperature (below -50°C). This technique was applied to produce various kinds of dehydrated fruits, namely jack fruit, rambutan, lychee, longan and durian.

Area of Application
Dehydration of various types of fruits. In addition to the fruits listed above, the technique can be applied to other fruits as well by applying specific conditions to different fruits.

Advantages
The advantage of freeze-drying technique compared to other drying techniques are: good physical appearance; chemical stability; biological activity; and product recovery and reproducibility

Development Status
Commercial prototype

Transfer Terms
Consultancy

Contact:
Biological Science Division
Department of Science Service
Rama VI Road, Ratchathewi District
Bangkok 10400
Tel: +(622) 2458993
Fax: +(622) 2458993

THAILAND

Bio-digestor

The Company acts by dealing with the causes of pollution: wastes, especially the biomass wastes or fresh wastes which cannot be efficiently dealt with. Since biomass wastes increase every day and accumulate more and more, the provision for landfills starts to be inadequate. Therefore, we focus on researching systems and machines that can deal with wastes continuously, on a daily basis. That is, we will process wastes and turn them into organic fertilizer of good quality to benefit agriculture. This is our process to create maximum value, help reduce the pollution problem and create benefits from solving the problem.

Area of Application

Environment, Energy, Innovative of products

Environmental Aspects

- Cleaner production
- Waste utilization
- Energy efficiency
- Systems integration

Development Status

- Idea
- Design
- Laboratory model
- Pilot plant
- Commercial prototype
- Fully commercialized

Legal Protection

- Trade Mark
- Patent
- Technology license and copy right

Technical Specifications

- Capacities size: 2-10 ton/day (wastes)
- Organic fertilizer: 20% of wastes
- Electrical: 3 phase 380/220 VAC. 23KVA
- Machine size: 1.5 x 10 x 3.5 m. (up to Capacities)
- Control panel: 0.95

Transfer Terms

- Consultancy
- Subcontracting
- Joint venture
- Technical services
- Technology licensing
- Equipment supply
- Turnkey

Contact:
Thai Central Mechanics Co.Ltd.(Thailand)
1 moo 10 Soi Watmahawong, Poochaosamingprai Rd,
T.Samrong A.Phrapradaeng
Samutprakarn
Thailand 10130

Asia-Pacific Tech Monitor

Readers are requested to complete the Response Form to the best of their knowledge/opinion and return it to APCTT by fax or email. We look forward to your cooperation to serve you better.

Technology Intelligence
Asian and Pacific Centre for Transfer of Technology (APCTT)
C-2 Qutab Institutional Area, New Delhi -110016, India
Fax: +91) (11) 26856274, Email: sahus@un.org, dasm@un.org

I read Tech Monitor

☐ Always ☐ Often ☐ Sometimes ☐ Never

1. **I find the design and layout of the Tech Monitor**

   ☐ Excellent ☐ Very Good ☐ Good ☐ Not Good

2. **I find the language used in the Tech Monitor**

   ☐ Easy to understand ☐ Little difficult to understand ☐ Difficult to understand

3. **I find the Tech Monitor**

   ☐ Very valuable ☐ Generally valuable/interesting ☐ Somewhat valuable/ interesting

   ☐ Little value ☐ No value

   I read Tech Monitor because I appreciate

   ☐ Technology Market Scan ☐Technology Scan ☐ Special Feature (articles)

   ☐Tech Events ☐Technology Opportunities ☐Business Coach

4. **I find the following sections**

	Very useful	**Useful**	**Less useful**	**No use**
Technology Market Scan	☐	☐	☐	☐
Technology Scan	☐	☐	☐	☐
Special Feature (articles)	☐	☐	☐	☐
Tech Events	☐	☐	☐	☐
Technology Opportunities	☐	☐	☐	☐
Business Coach	☐	☐	☐	☐

5. **Tech Monitor facilitated/contributed to:**

☐ Understand issues related to technology development and transfer
☐ Enhance my knowledge on latest technological developments and events
☐ Identity technology/business partners
☐ Negotiate technology/business transactions
☐ Establish contact with institutions/authors/experts
☐ Conclude a technology transfer
☐ Acquire a technology
☐ Selling a technology
☐ (Any other, please specify)

6. **To get similar information, I read other periodicals like:**

7. **I would like Tech Monitor to cover the following:**

About Myself

Name:

Gender: ☐Female ☐Male

Nationality:

Profession:

☐ Policy Maker ☐ Small and Medium-sized Enterprise (SME)

☐ Consultant ☐ Financier ☐ Researcher

☐ Professor/ Teacher ☐ Student ☐ Others (Please specify)

Contact details:

Organization:

Designation:

Street Address:

P.O Box:

Country:

Telephone:

Fax:

E-mail:

Website:

Note: *The survey results would be used for APCTT's internal purposes only.*

Selected Analytical Reports and Technology Platforms & Databases of APCTT

Analytical Reports (available online)

1. National Assessment Framework on Enabling Environment, Technology Innovation Ecosystem for Making Sustainable Energy Options Affordable and Accessible (For Indonesia and Lao People's Democratic Republic), January 2014

   http://apctt.org/nis/sites/all/themes/nis/pdf/National-assessment-framework_-final_ESCAP.pdf

2. Report on the National Assessment Framework of Enabling Environment and Technology Innovation Eco-system for Making Sustainable Energy Options Affordable and Accessible – Indonesia, May 2014

   http://apctt.org/nis/sites/all/themes/nis/pdf/Indonesia_Report-on-National-Assessment-of-Sustainable-Energy_optimized.pdf

3. Indonesia National Sustainable Energy Strategy Report on Enabling Environment and Technology Innovation Ecosystem for Affordable Sustainable Energy Options, May 2014

   http://apctt.org/nis/sites/all/themes/nis/pdf/Indonesia-National-Strategy-Report_final.pdf

4. Report on the National Assessment Framework of Enabling Environment and Technology Innovation Ecosystem for Making Sustainable Energy Options Affordable and Accessible - LAO PDR, May 2014

   http://apctt.org/nis/sites/all/themes/nis/pdf/Lao_Report-on-National-Assessment-of-Sustainable-Energy.pdf

5. Lao People's Democratic Republic National Sustainable Energy Strategy Report on Enabling Environment and Technology Innovation Ecosystem for Affordable Sustainable Energy Options, May 2014

   http://apctt.org/nis/sites/all/themes/nis/pdf/Lao-National-Strategy-Report_final.pdf

6. National Innovation System (NIS) training manual - "NIS Diagnosis and STI Strategy Development to Achieve National Sustainable Development Goals", 2016

   http://apctt.org/nis/sites/all/themes/nis/pdf/NIS%20Training%20Manual.pdf

Technology Platforms and Databases

1. APCTT's Technology4SME Database

   The Technology4SME Database serves as an online platform for information exchange on the availability and sourcing of technologies for small and medium enterprises in countries in the Asia Pacific region.

   http://apctt.org/technology-transfer

2. Renewable Energy Technology Bank

   The primary objective of the Renewable Energy Cooperation-Network for the Asia Pacific (RECAP) established by APCTT is to facilitate technology transfer cooperation among countries in the Asia-Pacific region in the area of renewable energy. RET-Bank provides tested and proven renewable energy technologies (RETs) initially in the areas of solar, biomass, wind, mini-hydro power and geo-thermal energy.

   http://apctt.org/recap/renewable-energy-technology-bank

3. Global Technology Databases

   APCTT has compiled a list of global as well as country-wise technology databases that deal with the technology transfer related services for SMEs and entrepreneurs.

   http://apctt.org/aptitude/