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Asian Innovation in Pharmaceutical and Medical Technology

Asia is facing a division of classes known as the ‘Two Faces of Asia’. Gabrielle Babbington looks at the demands of innovation in medical technology and healthcare delivery.

GABRIELLE BABBINGTON

Gabrielle Babbington is an independent consultant with a background in global health, journalism and corporate social responsibility. She has 15 years of leadership experience in the private, public and third sectors. Babbington has consulted across the Asia-Pacific region, for clients including The Economist, Hong Kong University, UMB Medica, and Australia’s largest private health insurer.

The disease burden in Asia — or the years of healthy life lost through disabling disease and premature death — has traditionally been dominated by preventable infectious diseases related to poverty, poor sanitation and inequitable access to healthcare. Despite the doubling of per capita incomes since 2000, Asia’s rapid economic growth has barely ameliorated this situation. Half of Asia’s population still lives without basic sanitation, and one in five people live on less than US$1 a day.

The Asian Development Bank calls this duality in Asia’s socioeconomic development — while some live in poverty, others enjoy middle or high incomes — the ‘Two Faces of Asia’. This situation presents diverse opportunities for healthcare innovation, because it creates a similar duality in Asia’s disease burden. While the diseases of poverty remain, higher incomes have led to a whole new set of health problems. There is a rising incidence of non-communicable diseases, such as heart disease and Type II diabetes, as those in Asia — better off than they were, but not quite affluent by Western standards — live longer, overeat, maintain sedentary lifestyles, and smoke.

This problematic rise in lifestyle diseases has sparked some innovative solutions.
For example, the race is on to develop a polypill — a single tablet containing multiple medicines — for heart disease, which is the number one cause of death globally, and which puts enormous strain on health systems. The polypill will contain a cholesterol-lowering drug, a couple of blood pressure-lowering drugs, and aspirin. Although not without its critics, proponents of the polypill say it will keep treatment costs at a minimum and improve treatment compliance among the high-risk patients for whom it is intended.

However, healthcare innovation should also be driven by conditions that adversely impact quality of life, even if they will not necessarily cause death. After all, life without wellbeing is no life at all. Depression affects up to one in ten people in Asia at any given time; and the World Health Organization predicts depression will become the leading cause of the global health burden by 2030. Furthermore, some academic estimates suggest that the financial impact of depression on national productivity amounts to more than 20 times the cost of providing adequate mental health services.

Governments across Asia need to give community mental health services a much higher priority. “At least half of Asia directs less than one per cent of their total health budget to mental health services,” says Associate Professor Chee Ng, Co-Director of Asia-Australia Mental Health. The medical technology industry can help improve mental health services, by harnessing mobile communications technologies to train staff and deliver Cognitive Behavioural Therapy (CBT) skills programmes to patients far and wide. The pharmaceutical industry can help too, by developing more effective and less costly antidepressant medication. Studies show the most effective treatment strategy for depression is the combination of psychosocial interventions, such as CBT, and an antidepressant medication.

Governments across Asia need to give community mental health services a much higher priority, from analysing health needs to identifying the most culturally appropriate responses and from designing and gaining regulatory approval for solutions to marketing cost-effective and accessible products and services, PPPs have a synergistic effect on innovation.
Take drug discovery for neglected tropical diseases for example. At their best, PPPs bring together multidisciplinary and cross-sector networks of investigators, who openly share drug development information and technology across both developed and developing countries. This momentum not only fosters innovation, it also builds innovation capacity in emerging markets, where it is most needed. In addition, when there are various agencies carrying the load, the development of new vaccines, diagnostics and drugs becomes cheaper, faster and less of a commercial risk. Medicines for Malaria Venture and the Drugs for Neglected Diseases Initiative are two examples of the PPP approach to healthcare innovation.

The pharmaceutical industry has joined this fight against neglected tropical diseases, especially against malaria. A PPP between GlaxoSmithKline and the non-governmental organisation PATH Malaria Vaccine Initiative, with funding from the Bill and Melinda Gates Foundation, is on the cusp of developing a new malaria vaccine called RTS,S. Elsewhere in the world, Novartis has partnered with the Singapore Immunology Network, the Swiss Tropical and Public Health Institute, and The Scripps Research Institute. Together, they have discovered a new drug against malaria called spiroindolone NITD609. This breakthrough comes at a time when drug-resistant strains are becoming an increasing threat in the region due to irrational drug use and poor-quality or counterfeit medicines.

There is also the challenge of providing equitable access to essential medicines — a human right that is often neglected. There is hot debate over how major pharmaceutical corporations can meet their human rights responsibilities, as their products are often too expensive for emerging markets. Some of them donate billions of doses of drugs to disease-elimination programmes, but market-based solutions are more sustainable than aid-based ones.

Perhaps better placed to respond to these challenges, than such corporations, are emerging-market firms that keep costs to a minimum with frugal engineering, while...
embracing technological leapfrogging. The Serum Institute, for example, uses technology from the Netherlands to dramatically scale up vaccine production, mixing 3,000 litres of product at a time, instead of the traditional amount of about 100 litres. This produces six million low-cost vaccine doses in one go — a single measles vaccination costs 19 US cents — and the innovation has given the Serum Institute the greatest market share in the developing world vaccine industry.

Unlike in the West, medical technology in Asia needs to cost less, use locally sourced material, have reusable components, be able to withstand harsh conditions, and be easy to operate. Take for example the problem of premature infants dying of hypothermia in poor and remote communities. A social enterprise called Embrace has developed a baby-warmer that costs less than one per cent the cost of a traditional incubator. Social enterprises take humanitarian ideals and bring them to fruition using tried and true business methods that are well suited to local markets.

The humble mobile phone is also a perfect fit for Asia’s healthcare industry. It is cheap, portable and easily replaceable, and it can do many things at once. Besides collecting real-time data on disease outbreaks, the mobile phone can facilitate patient follow-up, connect primary, secondary and tertiary health services, and provide health workers with decision-making tools and training.

As great as the non-governmental and private sector contributions to healthcare innovation in Asia are, we cannot forget the responsibility of the public sector to better meet health needs. Besides fostering PPPs to fill any innovation gaps in required drugs and medical technology, governments need to streamline regulatory approval processes, improve quality control, build the capacity of their health systems, collect better epidemiological data, combat corruption, and ultimately provide universal healthcare coverage.

However, governments do not have to do it alone; it can be a group effort. Collectively, everyone involved in battling Asia’s multiple disease burdens needs to work towards a common goal: providing equitable and transparent healthcare coverage across the region’s markets, while meeting the soaring demand for innovative drugs and new medical technologies that are ideally suited to the local context.
SINGAPORE’S Minister of State for Trade and Industry, Teo Ser Luck, was the guest-of-honour at the Global Space and Technology Convention 2012 — a premier space convention, which was held at the Sheraton Towers Singapore. Satellite technology manufacturing and services are new growth areas for Asia and together is an industry the Singapore Economic Development Board has recently started exploring. The industry has been growing globally at a CAGR of 8.2 per cent since 2005, and in 2010 was reported to be worth an estimated US$276 billion.

Asia’s space agenda began in 1970 with the successful launch of China’s first satellite, Dong Fang Hong I. Since then, other Asian nations that have put satellites into space include India, Japan, Korea, and Malaysia. Satellites have since become integral to people’s everyday activities, and the market potential in Asia is tremendous. Astrium Satellite Services, Arianespace, DigitalGlobe, GeoEye, Intelsat and Iridium are just some of the global players that have Singapore offices, mostly their Asia-Pacific headquarters.

In 2011, Singapore witnessed the successful deployment of its first indigenous satellite, designed and developed locally at Nanyang Technological University. The satellite development capability has since been commercialised under ST Electronics, a leading provider of satellite communication systems, which will design, develop and produce advanced Earth observation satellites. Beyond satellite development, Singapore has a strong base of communications equipment manufacturers, satellite service providers and capabilities in Earth observation.

Jonathan Hung, founder of the Singapore Space and Technology Association, said in an interview with Aviation Week, “The rapid growth of the space industry and space technology’s facilitation of high-value services are reasons why the Singaporean government considers this segment to be of such importance and impact to the country’s economic development.”

Riding on Singapore’s existing strengths in research and innovation, particularly in adjacent industries including aerospace, precision engineering, communications and electronics sectors. Singapore can capture the opportunities in these sectors which the space industry presents. The city-state is also a neutral platform where the latest concepts and solutions in the space domain can be explored.
New global headquarters in Singapore for Optitune

OPTITUNE International, which specialises in solar efficiency-enhancing coatings, plans to expand its research and development (R&D) capabilities here and use Singapore as its global management and operations hub, said its chief executive officer, Jerry Lee-Barber in February. In addition, Optitune works on developing a broad range of innovative technologies for diverse industries. These include hydrogenation, passivation and anti-reflective coating materials for solar cell production, and specialised coatings for touch panel displays.

Building on its newly established facility at the Solar Energy Research Institute of Singapore, Optitune plans to invest S$40 million in the country over the next five years. This will cover the establishment of a new manufacturing facility in Jurong, which will employ 60 production staff, as well as an increase in its R&D workforce to about 30 engineers. Across the region, Optitune will be expanding its operations into China during 2012 to capitalise on the demand for increased efficiency within solar production.

Optitune has been in operation in Asia for over four years, with a presence in Hong Kong since 2007 and now also in Taiwan. The company offers a complete range of environmentally friendly products, which include performance-enhancing coatings for solar glass and silicon, as well as coatings for touch panel devices. Currently, Optitune is working on energy-efficient coatings for the building glass market.

Lee-Barber said that Singapore’s high-quality workforce and infrastructure, such as its supply-chain and logistical facilities, were key factors that led the company to set up global headquarters here.

"From here, we can make our products and ship them all over Asia, but predominantly through to Taiwan, China and Japan. This is a great environment to have secure production, and a great logistical hub to ship products out from," he said.

By using liquid-coating technology, Optitune claims that its manufacturing process results in products that are 90 per cent more cost-efficient than current alternatives. It is ideal for high-speed in-line production.

“The scientific breakthroughs that we’ve had enable huge cost reductions because we don’t need all that expensive vacuum machinery,” he said.

Opening of DMG Mori Seiki Southeast Asia promises successful collaboration

DMG MORI SEIKI’s newly designed Singapore Technology Centre will house DMG Asia-Pacific’s current operations, and provide a new home to a successful collaboration. Hosting a service and applications centre, a warehouse, seminar rooms, 568 square metres of showroom space for new machines and additional 246 square metres for used machines, the service hub serves the region with a unique range of facilities and services. The training centre featuring comprehensive programmes and a spare parts store with maximum availability, emphasise the collaboration’s strong position in Southeast Asia.

DMG Asia-Pacific also houses a showroom for its comprehensive product spectrum and pioneering cutting technology, as well as a training centre for its customers and employees from the region. DMG AP serves as the procurement arm for Gildemeister AG’s operations in Asia, buying the machines from Germany and selling it the various Gildemeister AG trading companies in Asia.

“Our newly designed premises in Singapore are living proof of the combined strength of our partnership,” said Dr Jens Hardenacke, Chief Executive Officer of DMG Asia tells Manufacture Link in an interview. Hardenacke adds, “Here, we provide the ideal framework for DMG Mori Seiki’s superior standards in serving our customers with best-in-class solutions and maximum support in both sales and services."

The Singapore government has established a S$250 million Partnership for Capability Transformation, or PACT, to assist locally based suppliers to gain entry into new and demanding markets through qualification by original equipment manufacturers, or OEMs. Companies such as DMG Mori Seiki can tap into this scheme to establish a network of locally based suppliers to support their growth in the region.
Nike opens global trading company office in Singapore

NIKE Inc. (Nike), the world’s leading designer, marketer and distributor of authentic athletic footwear, apparel, equipment and accessories, has established a global trading company office in Singapore to facilitate key business activities for the company.

The Singapore office will enable flexible supply-chain operations for worldwide fulfilment, centralise foreign exchange risk management, and establish a shared-service operational platform to maximise business proficiency.

This move builds on the long-standing presence Nike has had in the country. Nike-owned footwear and apparel manufacturer Converse set up its global trading hub in Singapore in 2009 to leverage Singapore’s strengths as a financial centre and efficient global business hub to undertake centralised global product sourcing, logistics and brand protection in addition to related financial, human resource and operations functions. Nike Southeast Asia’s Sales and Marketing office is also based in Singapore and has provided regional headquarters support to the region since 1998.

To support the company’s expanded footprint in Singapore, Nike officially opened its new business operations hub at the Mapletree Business City, Pasir Panjang on 6 February. The new office allows the company to bring all Singapore-based business operations together in one central location and at the same time enables the company to leverage and share common resources that improve on the company’s overall efficiency and effectiveness.

Quek Swee Kuan, Assistant Managing Director, Singapore Economic Development Board said, “Singapore has invested considerable resources to develop the sports industry in recent years. Nike’s presence in Singapore is a significant and vibrant addition to the existing ecosystem of sports companies. We are delighted that Nike has chosen Singapore as its global trading hub. This is a strong testament to our value as a strategic base for companies to drive global operational efficiency and growth strategies.”

At a ribbon-cutting ceremony for Nike’s new business hub. Singapore Economic Development Board Assistant Managing Director Quek Swee Kuan (third from right) with Nike’s senior leadership team.

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Innovative Collaboration Behind

Asia’s Drug Boom

Asia with its vast booming markets and access to fresh capital, has fast become the global centre for drug discovery and development. Yet many barriers still remain. Industry players have adopted a new model built around collaboration rather than competition, but how viable is this model and what successes has it registered to date?

Overview

Asia is the new frontier for global drug development. Against the backdrop of housing over half of the world’s population, a 2010 report published by market research firm RNCOS E-Services, estimated the region’s drug industry to be worth US$168 billion and growing at a rate of over 12 per cent per annum. The reasons behind such an increase are multiple and are influenced by a variety of governmental, corporate and lifestyle factors.

As Asian countries develop their economies, their healthcare expenditure is also increasing exponentially. Regulatory reform and the investment of billions of dollars into medical research and development (R&D) have become widespread. Both public and private sector organisations are introducing health insurance schemes, which have also increased the demand for drugs and medication.

This rise in public and private sector expenditure on healthcare has coincided with both a growing middle class and ageing populations across Asia. These two demographic developments have increased the market demand for non-essential and therapeutic treatments. The incidence of lifestyle-related illnesses has increased with higher standards of living and longer lifespans — for example, the increasing number of Asians with heart disease, which is linked to overconsumption of fatty foods, and lung cancer due to smoking, has created an increasingly important market for the drug industry.

In Asia, drug companies have leveraged their partnerships with local firms, public research institutes and government-owned enterprises, as well as the relatively lower cost of the region’s labour force.

An example of this can be seen in the recent joint venture between Singapore’s ASLAN Pharmaceuticals and US-based Array
BioPharma, where both companies entered into an agreement to fund and develop an inhibitor for gastric cancer in July 2011. The drug is currently in the early stages of its clinical trials, and when these trials attain success, ASLAN will identify a global partner for the next phase of development, with the final aim being commercialisation.

Asia’s drug industry employs a collaborative business model involving several different entities at various stages of the value chain. It is a method that has been identified by both scholars and industry professionals to be the secret behind the success of Asia’s drug industry.

“One must first become familiar with a drug’s life cycle to understand drug development,” claims Dr Amar Kureishi, Vice-President and Chief Medical Officer for the Asia-Pacific region and Head of Strategic Drug Development for Asia at Quintiles, the world’s largest biopharmaceutical company, in his white paper Asia: A New Frontier in Strategic Drug Development.

In order to understand the varying roles of both public and private entities at different stages of the drug development process, one must first become familiar with a drug’s life cycle.

In accordance to rules set out by the United States Food and Drug Administration, the drug development value chain is divided into three stages: pre-clinical, clinical trials and post-marketing surveillance. The value chain is long, laborious and can last up to 15 years.

Currently, few Western pharmaceuticals employ or attract the specialists required for all stages of the drug-value chain and have thus been unable to offer comprehensive solutions to each stage of drug development. In comparison, Asia’s pharmaceutical sector engages a number of specialists at various stages of a drug’s life cycle.

Asia’s universities and specialist laboratories — many backed by government funding — are highly active in the pre-clinical stages. So too, are local biotechs — specialist R&D companies that have expertise in a particular field of medical science — with local pharmaceutical companies seeking to develop drugs at the clinical trial stage. Global multinational corporations (MNCs) generally get involved towards the later stages of the clinical trials, as this later stage requires substantially more capital, and accounts for approximately 90 per cent of a drug’s R&D budget. MNCs are also able to provide the vast international exposure required to test and produce the drug en masse globally.

More often than not all MNCs have the capabilities to execute the later stages of drug development, especially with regards to distribution and global reach. Any gaps in the early stages of the value chain will be outsourced to a contract research organisation (CRO), a boutique service provider that can support an array of tasks. This business model offers all parties a stake in the development process, and is a collaborative one that is based upon trust, collective input and general goodwill.

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Facts on the Ground

The Singapore government is investing heavily in R&D programmes, as well as drug manufacturing. The country is well positioned to help companies accelerate innovation and commercialisation, through translational and clinical research, and by encouraging multidisciplinary public-private partnerships. This is set against the backdrop of the city’s unique geographical location at the heart of the Asia-Pacific, with regional pharmaceutical hubs, such as those of India, Japan and South Korea, reachable from Singapore within seven hours of flight time.

Singapore not only boasts state-of-the-art laboratories and government-sponsored facilities, but also houses the regional headquarters of eight top-ranked pharmaceutical companies — including Johnson & Johnson, Abbott, Novartis, GlaxoSmithKline and Merck Sharp & Dohme. A plethora of local biotechs and CROs, as well as several native Asian pharmaceuticals can also be found here — all with the aim of developing drugs to cure the diseases prevalent throughout the region.

All diseases are either infectious (i.e. those that can be passed between living organisms) or non-communicable (i.e. those incapable of being transmitted). Combating them requires massive amounts of time, expenditure and resources. In Asia, one of the most prevalent non-communicable diseases is cancer.

In a bid to combat cancer and other diseases, in January 2010, Swiss MNC Roche teamed up with a number of Singapore’s scientific and medical institutions as part of the company’s translational medicine research hub. Following the announcement of an initial investment of 100 million Swiss francs (S$137.5 million), Roche has since conducted research in conjunction with the National University of Singapore, the National University Hospital (including the National University Cancer Institute) and Singapore Health Services (SingHealth) — the city-state’s largest healthcare provider. These partnerships have since enabled Roche to advance its drug pipeline and speed up the company’s drug discovery timeline.

Similarly, Bayer HealthCare Singapore, a subsidiary of Germany-based Bayer AG, announced in December 2010 that it would invest an additional S$14.5 million into R&D activities to facilitate the early diagnosis and treatment of cancer.

Bayer HealthCare Singapore launched five new projects to investigate new approaches to diagnose and treat cancers, with a particular focus on those cancers prevalent throughout Asia, such as liver, lung and breast cancer. These new projects were launched in partnership with the National University of Singapore, National University Health System, SingHealth and the Singapore Bioimaging Consortium, a member of the Agency for Science, Technology and Research (A*STAR). This integrative approach to better understand Asian disease biology is working well for companies like Roche and Bayer Healthcare. Now in their second year, the partnerships Bayer Healthcare has formed have accelerated its drug discovery and development programme in Asia.

Amongst infectious diseases, the World Health Organization ranks dengue fever, malaria and influenza as three of the most threatening diseases throughout the Asia-Pacific.

Singapore has taken a leading role in developing drugs to combat these diseases through a number of government-driven public-private partnerships. In 2002, the city-state’s Economic
Development Board partnered with Swiss pharmaceutical MNC Novartis to establish the Novartis Institute for Tropical Diseases (NITD), the world’s largest drug discovery centre in the field of dengue fever. Employing over 100 scientists, NITD serves as a training centre for undergraduate and postgraduate students. It works with partners from around the world, including the Novartis Institute for BioMedical Research in Switzerland, the University of Dundee in the UK, the Genomics Institute of the Novartis Research Foundation in the USA, Singapore’s Nanyang Technological University, and the Genome Institute of Singapore. Currently, the centre and its partners are focusing on the early stages of drug development in the fields of tuberculosis, dengue fever and malaria.

This partnership between the public and private sectors is illustrated by the development of the anti-malaria drug, spiroindolone NITD609. Work on the drug was led by the Singapore Immunology Network, a division of A*STAR, and supported by a number of international partners, including Novartis, the Swiss Tropical and Public Health Institute and The Scripps Research Institute. The success of the project led to a publication in the leading scientific journal, Science.

With a fatality rate of around 50 per cent, avian influenza (also known as bird flu) is another highly infectious disease that is of particular concern to Asian governments, especially if the virus mutates and is transmitted from one human to another. Singapore’s Temasek Life Sciences Ventures and US-based Emergent BioSolutions formed EPIC Bio Pte Ltd in 2010, a joint venture located in Singapore with the aim of building a comprehensive range of capabilities to support the R&D of the H5N1 influenza (avian influenza) vaccine and monoclonal antibody. These capabilities span vaccinology, immunology, epidemiology, assay development, quality assurance, regulatory affairs, and R&D project management, as well as market and technology assessment.

Singapore has shown that international companies can successfully improve their R&D productivity and cost efficiency by establishing new models of collaboration with Singapore’s public research institutes, hospitals and CROs.

The Singapore Difference

Singapore is one of the world’s largest drug discovery and development centres. Its facilities are second-to-none globally and have contributed to the city-state attracting many leading drug scientists.
One of Singapore’s significant contributions to the field of drug discovery and development has been the building of Biopolis, an international R&D centre that co-locates public sector research institutes with private laboratories, resulting in significant reductions in R&D costs.

An example of this can be seen in work jointly carried out by Siena Biotech and A*STAR’s Experimental Therapeutics Centre. By co-locating at Biopolis, the partnership has yielded molecular inhibitors used to combat difficult-to-treat cancers, such as gastric cancer, leukaemia and brain cancer.

The private sector, too, has invested substantially in drug development over the past few years. In 2009, GlaxoSmithKline (GSK) opened a S$700 million bulk-manufacturing facility for paediatric vaccines in Singapore, which marked the company’s first and largest investment in Asia.

GSK is not alone in expanding their manufacturing arm. Other MNCs that have established manufacturing facilities in Singapore include Lonza, Novartis, Pfizer, Roche and Sanofi. These highly advanced manufacturing facilities continue to place the city-state at the forefront of manufacturing technology, providing potential pharmaceutical and biotechnology companies with customisable manufacturing needs. Singapore’s pro-business environment also enables companies to be incorporated in less than 15 minutes, clinical trials to receive approval within three weeks, and manufacturing facilities to become operational in less than three years.

This combination of multidisciplinary public-private partnerships, government-led initiatives on translational and clinical research, and comprehensive infrastructure, has created the foundations necessary for drug development to thrive in Singapore. The country attracts some of the world’s top talent: Among the 36,000 scientists carrying out research in the city-state are acclaimed figures such as Professor Sir George Charles Radda, who pioneered efforts in using spectroscopic techniques for metabolic studies, and Professor Edward Holmes, whose research has focused on the molecular bases of human disease.

In addition, Singapore recognises the need to develop the next generation of scientists. In 2001, A*STAR launched a national scholarship programme that nurtured 1,000 local graduates at the world’s top universities. Singapore has also made significant progress in translational and clinical research. Key facilities, such as the investigational medicine units dedicated for early-phase trials in public hospitals, as well as the Singapore Clinical Research Institute, which focuses on supporting later-stage trials, help develop the growing community of clinician scientists in Singapore.

Highly advanced manufacturing facilities continue to place the city-state at the forefront of manufacturing technology, providing companies with customisable manufacturing needs.

The country is strategically and structurally positioned to accelerate global drug discovery and development. The results of this investment in time, money and resources can be seen in the way Singapore has become Asia’s leading drug development centre.

For Asian and global companies in the pharmaceutical and biotechnology sectors, Singapore represents a thriving global R&D hub that stands at the forefront of innovative solutions in the field of drug development and discovery.
Singapore Business News is a monthly publication that updates readers on the latest industry trends in Asia, with a uniquely Singaporean perspective. Highlights include Singaporean business stories and special opinion pieces on opportunities in Asia, how global companies are leveraging Singapore to tap into pan-Asian growth opportunities, and how Asian enterprises are globalising via Singapore. Singapore Business News also provides case studies on how Singapore partners businesses to deliver future-ready solutions.

Singapore Business News is a publication of the Singapore Economic Development Board.

Singapore: Future Ready articulates the nation’s aspirations to be a partner for global businesses as they develop their ideas for tomorrow’s solutions. Singapore does so by recognising the value of long term partnerships, adopting a forward-looking approach, demonstrating ingenuity, and taking on challenges with a can-do spirit.

About EDB

The Singapore Economic Development Board (EDB) is the lead government agency for planning and executing strategies to enhance Singapore’s position as a global business centre. EDB dreams, designs and delivers solutions that create value for investors and companies in Singapore. Our missions is to create for Singapore, sustainable economic growth with vibrant business and good job opportunities.

EDB’s ‘Host to Home’ strategy articulates how we are positioning Singapore for the future. It is about extending Singapore’s value proposition to businesses not just to help them improve their bottom line, but also to help them grow their top line through establishing and deepening strategic activities in Singapore to drive their business, innovation and talent objectives in Asia and globally.