

THAILAND'S BCG TRANSFORMATION

40 Case Studies on the Bio-Circular-Green (BCG) Strategy and the Sufficiency Economy Philosophy in Action

SUMMARY

จากการเคลื่อนไหวระดับโลกเพื่อลดการปล่อยคาร์บอน ทำให้ทุกประเทศต้องเร่งทบทวนระบบเศรษฐกิจในแง่การจัดการทรัพยากรให้มีประสิทธิภาพมากขึ้น ประเทศไทยนับเป็นประเทศที่มีความหลากหลายทางชีวภาพและวัฒนธรรมในระดับสูง และมุ่งจะก้าวสู่ความเป็นผู้นำในภูมิภาคอาเซียนในการบรรลุพันธกรณีด้านสภาพอากาศนี้ ด้วยการคิดค้นแนวทางแก้ไข ปัญหาและป้องกันผลกระทบที่จะตามมาจากความแปรปรวนของสภาพภูมิอากาศในช่วงทศวรรษหน้า ล่าสุดประเทศไทยได้ประกาศใช้กลยุทธ์ **BCG (Bio-Circular-Green Economic Strategy)** ภายใต้กรอบ**ปรัชญาของเศรษฐกิจพอเพียง (Sufficiency Economy Philosophy)** เป็นหนึ่งกลยุทธ์หลักของประเทศเพื่อบรรลุเป้าหมายการพัฒนาที่ยั่งยืน SDGs โดยมุ่งให้เกิดการดำเนินการในทุกระดับ ตั้งแต่ระดับบุคคล ชุมชน ไปจนถึงธุรกิจเอกชนและโครงการของรัฐ



หนังสือ **THAILAND'S BCG TRANSFORMATION** นับเป็นส่วนขยายของการทำงานตลอด 7 ปีที่ผ่านมาของทีมงาน เพื่อสร้างแรงบันดาลใจและช่วยให้เกิดการขยายผลอย่างเป็นรูปธรรม ผ่านการเผยแพร่องค์ความรู้และแนวปฏิบัติที่เป็นเลิศ ซึ่งนอกจากจะช่วยให้ผู้กำหนดนโยบาย นักวางแผน ผู้ปฏิบัติงาน ในทุกภาคส่วน และประชาชนทั่วไป สามารถนำกรณีศึกษาไปเป็นแนวทางปรับใช้ได้อย่างเข้าใจง่ายและเป็นรูปธรรมยิ่งขึ้นแล้วยังจะช่วยผลักดันให้ประเทศไทยมีกรอบแนวคิดและตัวอย่างในการแลกเปลี่ยนประสบการณ์ รวมถึงประเด็นในการพัฒนาความร่วมมือกับนานาชาติ ในการนำปรัชญาของเศรษฐกิจพอเพียงไปเป็นกรอบในการพัฒนาเพื่อให้บรรลุเป้าหมาย **การพัฒนาที่ยั่งยืน (SDGS)** ร่วมกันในอนาคตอันใกล้

วัตถุประสงค์หลักของการพัฒนาหนังสือ THAILAND'S BCG TRANSFORMATION คือ

- 1) แสดงให้เห็นถึงความเชื่อมโยง ระหว่างกลยุทธ์ BCG Strategy กับปรัชญาของเศรษฐกิจพอเพียง
- 2) รวบรวมเรื่องราวความสำเร็จของธุรกิจ หน่วยงาน ชุมชน องค์กร รวมถึงผู้คนที่ทำงานภายใต้กลยุทธ์ BCG ที่สอดคล้องกับหลักเศรษฐกิจพอเพียงในมิติต่างๆ เพื่อพัฒนาเป็นฐานข้อมูลที่มีคุณภาพ เผยแพร่ไปสู่สาธารณชนทั้งในและต่างประเทศ
- 3) เผยแพร่องค์ความรู้สู่สาธารณะ และโน้มน้าวพันธมิตร ผู้มีส่วนเกี่ยวข้อง ในการพัฒนาเศรษฐกิจและสังคม ให้เห็นถึงข้อดีของ BCG Strategy และปรัชญาของเศรษฐกิจพอเพียง เพื่อเป็นแรงบันดาลใจให้เกิดการนำองค์ความรู้และวิธีคิด ไปต่อยอดใช้ในบริษัทและสาขา การพัฒนาต่าง ๆ ในอนาคต ทั้งในและต่างประเทศ

CONTENT

หนังสือ THAILAND'S BCG Transformation คือการศึกษา และรวบรวมแบบอย่างปฏิบัติที่ดี (Best Practice Case Study) ในการพัฒนาหรือดำเนินกิจกรรมทางเศรษฐกิจด้วยกลยุทธ์ BCG ในหลายระดับและหลายภูมิภาคของประเทศไทย โดยบูรณาการแนวคิดและความเข้าใจที่เปิดกว้างต่อนิยามของ 'เศรษฐกิจพอเพียง' เป็นแนวคิดหลักในการอธิบายกิจกรรม BCG พร้อมทั้งประมวลเนื้อหาข้อมูลมานำเสนอในรูปแบบหนังสือภาษาอังกฤษ เพื่อสร้างความเข้าใจและสร้างโอกาสในการแสวงหาแนวทางความร่วมมือในการพัฒนาเศรษฐกิจ BCG ให้เติบโต และสามารถใช้เป็นกรอบความร่วมมือระหว่างภาคส่วนที่เกี่ยวข้อง ทั้งในประเทศและระหว่างประเทศ อาทิ ในการประชุม Asia-Pacific Economic Cooperation (APEC) ปี 2022 ที่ประเทศไทยจะเป็นเจ้าภาพ ภายใต้หัวข้อ "มุ่งสู่ การเติบโตที่เข้มแข็ง มั่นคง ยั่งยืนและครอบคลุม" เป็นต้น

สำหรับ 40 แบบอย่างปฏิบัติที่ดีที่ปรากฏในหนังสือเล่มนี้ จะครอบคลุมประเภทอุตสาหกรรมที่เป็นเป้าหมายหลักของกลยุทธ์ BCG ได้แก่

- **การเกษตรและอาหาร (Agricultural and Food)**
เช่น การเกษตรบนพื้นฐานเทคโนโลยี/นวัตกรรมที่ชาญฉลาดและยั่งยืน ความหลากหลายของผลิตภัณฑ์ผลิตภัณฑ์ที่มีมูลค่าสูง หรือคุณภาพระดับพรีเมียม ผลิตภัณฑ์หรือบริการที่ใช้ประโยชน์จากจุดแข็งของทรัพยากรท้องถิ่น การเพิ่มประสิทธิภาพการผลิตด้วยการลดของเสีย ลดการใช้ทรัพยากรโดยเฉพาะที่ดิน การผลิตที่เน้นความปลอดภัยของผลิตภัณฑ์และการตรวจสอบย้อนกลับ เป็นต้น
- **การแพทย์และสุขภาพ (Medical and Wellness)**
เช่น เวชศาสตร์ป้องกัน การพัฒนา ยา การเพิ่มศักยภาพการวิจัยทางคลินิก แพลตฟอร์มแบ่งปันเทคโนโลยีเพื่อปรับปรุงการดูแลสุขภาพของประชาชน เป็นต้น



- **พลังงานชีวภาพ วัสดุชีวภาพ และชีวเคมี (Bioenergy, Biomaterial and Bio-chemical)** ได้แก่ พลังงานหมุนเวียน และการแปลงชีวมวลเป็นสินค้า เช่น พลาสติกชีวภาพ เส้นใย ฯลฯ การกระจายแหล่งพลังงานและโอกาสด้านพลังงานหมุนเวียนอื่น ๆ เช่น พลังงานแสงอาทิตย์โดยใช้เทคโนโลยีใหม่
- **การท่องเที่ยวและเศรษฐกิจสร้างสรรค์ (Tourism and Creative Economy)** เช่น ผู้บุกเบิกการท่องเที่ยวยั่งยืนในประเทศไทย โครงการส่งเสริมการอนุรักษ์และความหลากหลายทางชีวภาพ โครงการท่องเที่ยวเฉพาะกลุ่มและคุณภาพสูง เช่น การท่องเที่ยวเพื่อสุขภาพ การท่องเที่ยวเชิงวัฒนธรรม การท่องเที่ยวเชิงอาหาร การท่องเที่ยวเชิงอนุรักษ์ เป็นต้น

และด้วยโอกาสอันดีขอเรียนเชิญท่าน **ร่วมเป็นเจ้าภาพ สนับสนุนหนังสือเนื้อหาฉบับสมบูรณ์** เพื่อเผยแพร่องค์ความรู้ และแบบปฏิบัติ เพื่อเป็นกรอบสร้างความร่วมมือให้บรรลุเป้าหมาย **การพัฒนาที่ยั่งยืน (SDGs)** ในอนาคต โดยการสนับสนุนหนังสือดังกล่าว มีรายละเอียดตามเอกสารที่แนบมา

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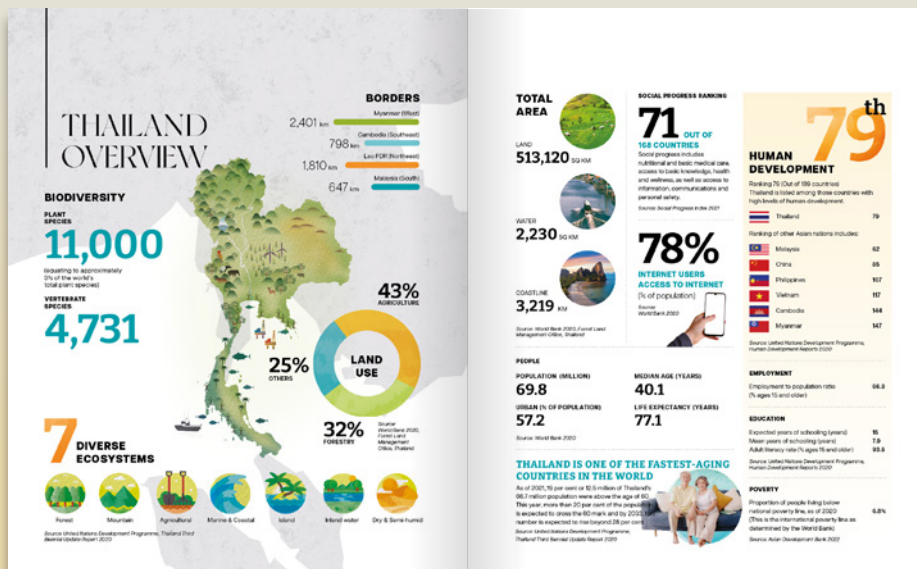
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หัวหน้าคณะผู้วิจัย



ข้อมูลหนังสือ
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INTRODUCTION

How is Thailand an exemplar: the model of development that emphasizes Green Domestic Product as the key measure of progress has come under question and has inspired calls for a change in direction toward a more balanced and socially inclusive approach, namely a growth strategy that recognizes our success as a society in areas that encompass more than just tourism.

In a complex world economy defined by global supply chains, climate change and the swift advances of mass technology and culture, how can a country like Thailand, whose identity is defined by an agrarian past based on Buddhist and community values, bring its own path? Or, perhaps, its accumulated wisdom, experiences, unique know-how and principles can provide the very strengths to turn today's challenges into exciting opportunities?

In 2020, the Thai government introduced a new economic model, its own green growth strategy that provides some solutions to the challenging questions posed by the 21st century. Called the Bio-Circular-Green (BCG) economic strategy, the government's guideline suggests that appropriate technologies, science and innovation be applied to Thailand's comparative advantages in biological and cultural diversity to drive national development in ways that balance economic, social and environmental considerations. In BCG, 'Bio' refers to the bioeconomy, such as the production of renewable biological resources and the conversion of these resources into value-added products; 'circular' refers to the need for a circular economy that reuses and recycles materials to maximize the value of limited resources; and 'green' is a large catch-all for an economy that helps economic, social and environmental concerns in balance, leading to sustainable development.

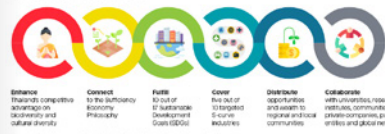
By more fully integrating and integrating these three key concepts across the country, the government believes the country can develop high-value products and services that are environmentally friendly and require less resource input, thereby conserving natural and biological resources for the future. Key economic sectors can be transformed to meet 21st century demands, while the special attributes that provide Thailand and its people their unique cultural identity can be retained.

Underpinning this initiative to advance the economy through the BCG strategy is the Sufficiency Economy Philosophy (SEP), an approach to life and conduct that is natural to the Thai people's way of living. Called *satthaithep* (phi) phi, the Thai word translates to 'just enough' or 'enough' and is a phrase coined by His Majesty King Bhumibol Adulyadej, SEP was formalized and incorporated into the popular purpose of Thailand after the Asian Financial Crisis of 1997. In his birthday speech of that year, His Majesty King Bhumibol Adulyadej advised that it was important to develop an economy where people are self-reliant and have an adequate livelihood for themselves. Similar to today's day, His Majesty the King called for an alternative to the pursuit of growth for the sake of growth. It is suggested that moderation, prudence and reasonable consumption as well as production and expenditure that follows the middle path of Buddhism, might lead to a happier and healthier society similar to the sustainable development ethos of contemporary times. His Majesty the King was not urging for a return to the past, for that to give up all their creature comforts or for development that denied growth or free market mechanisms. He encouraged that people, businesses and communities liberate behavior and act over welfare issues.



INTRODUCTION 23

BCG MODEL: 6 DIMENSIONS



Source: Royal Government, Prime Minister's Office, Science, Research and Innovation

advanced processing technology. Meanwhile, the wellness and medicine sector in Thailand can be improved by developing the local production of Active Pharmaceutical Ingredients (API) and bioprocess, enhancing the technological capability of medical device industry and cosmetics (SME), and improving the local health quality and supply chains. This would help Thailand reduce imports of drug and pharmaceutical products.

In the energy sector, the government suggests taking advantage of the country's high potential in renewable energy. NECTA notes that the abundant biomass available in Thailand – including agricultural waste and by-products is sufficient to produce renewable energy to meet the renewable energy target of 30 percent as set in Thailand's Alternative Energy Development Plan (AEDP) to 2037. Moreover, the bio-based product market is expanding worldwide due to growing concerns for the environment. With advanced technology, the value of crops and biomass can be multiplied by turning them into functional ingredients and building blocks for high-value bio-chemicals and materials such as bioplastics and carbon-based materials. Other opportunities in this sector include renewable energy production by converting a wide range of biomass and waste to RDF (refuse-derived fuel) and biogas as well as expanding the bioenergy industry for bio-based products.

Finally, the BCG model proposes that the country needs to restore damaged environmental and resources and

transition to more sustainable forms of tourism. The government argues that new types of tourist activities such as culinary tourism, agritourism and eco-tourism tourism should be promoted as a strategy to reduce tourism and enable sustainable tourism throughout the whole country while the manufacturing and service industry should employ circular design and green technology to offer eco-friendly goods and services. There is much more to the BCG model, which provides goals and strategies on many sub-sectors and industries and how they might be transformed to benefit not only the economy as a whole but also the environment and social communities. The case studies in this book offer more detailed examples of this strategy at work.

WHAT'S SEP GOT TO DO WITH IT?
Perhaps the greatest strength of the Sufficiency Economy Philosophy is how it can be applied by individuals, households, communities, businesses and even larger government projects. These guidelines are usually added when it comes to facing such contemporary quarters as global economic volatility or the increasing cost of household debt in Thailand. The SEP key principle of moderation, reasonableness and prudence can readily serve the most basic or the most sophisticated. Originated at a time when Thailand was buffeted by the trade winds of globalization and felled by the aftershocks of the economic earthquake of 1997, when many Thai still believed before such economic factors, SEP came as a

THAI TOURISM: READY TO REBOUND

The year 2019, immediately before the COVID-19 pandemic struck, was a record-breaking one for Thailand's tourism sector, accounting for US\$62 billion or almost 22 percent of the nation's GDP and featuring almost 40 million arrivals. With such great success came great pressure on the kingdom's natural resources.

The pandemic, however, has allowed the authorities to press reset on mass-market tourism and begin to address these environmental concerns. Indeed, the 'new normal' in tourism, which sees visitors opting for niche destinations and contact-free booking platforms, can complement the BCG strategy for the sector. That plan aims to spread the wealth around the country and bolster time-tested assets such as wellness and culinary tourism in new ways as well as ramp up technological innovation and new forms of digital marketing.

BOOM TO BUST

TOURISM ARRIVAL:

2019	Almost 40 million
2020	62,899

CONTRIBUTION TO GDP:

2019	22%
2020	Less than 0%

TOTAL REVENUE:

2019	US\$62 billion
2020	US\$4.4 billion

Source: Ministry of Tourism and Sports

THE BIG PICTURE

According to the government's BCG strategy, tourism emerges with many other sectors, working in key to the overall strategy success. Tourism:

- Has significant impact on the environment and biodiversity
- Acts as a driver of high-technology knowledge
- Is a key part of the creative economy
- Creates self-powered growth by the global popularity of what the country and its tourism

The government's plan to address this imbalance in a BCG way is multi-pronged:

- Provide secondary destinations by highlighting the natural and cultural attractiveness of each area, including through the promotion of unique products and activities
- Develop new sustainable tourism products and activities such as ecotourism-based tourism and water tourism
- Create new inter-province transport systems and use technology to better manage tourists and sites to alleviate overcrowding
- Promote new forms of tourism such as 'virtual' and 'digital' tourism

SPREADING THE WEALTH



BCG SOLUTION

The Biggest Challenge

The kingdom's biggest challenge is to protect its largest and widest draw-all that natural splendor and incredible biodiversity. In the *Zoo and Tourism Competitiveness Report 2020* by the World Economic Forum, the kingdom ranked 107th out of 140 countries in the environmental sustainability area. Over 40 million tourists visiting from 2019 put a massive strain on Thailand's natural resources. With other factors at work too, combating this problem will require a multi-faceted approach to designate more protected areas to reduce urban encroachment and deterioration in the country's national parks, amongst other things.

Legal Remedies

The International Network of Governance, Culture, Arts and Tourism (INGCAT), which works with tourism boards and sustainable travel groups across Europe, assessed up the problems facing Thailand and other nations in adopting a BCG-enhanced form of tourism development in its 2022 report. Developing a circular tourism economy could help to bring about the sustainable use of resources, enhance the efficiency of the tourism industry and achieve the sustainable development of tourism. However, it is difficult to comply without the relevant legislation and policies needed to support it.

As yet, these new policies and laws have not been down-up. Still, there have been successful signs of progress. On the island of Koh Samui, a new regulation that bringing single-use plastic items on the island, which were banned four years ago, could result in a fine of up to 50,000 Baht (US\$1,460) if violated, while the government is without about protecting its



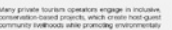
BCG SOLUTION

By its nature, the 107th new BCG strategy to draw tourists away from coastal areas is more inclined to focus on inland areas. This is also the case for other countries (once coastal or inland) in the past, as government was also experienced with closing different spaces in the south to tourists at a time to let them recover from all the road blocks coming for day trips or by cutting down coastal national parks.

THE COSTA RICA ANSWER

Famous for its successful production of Costa Rican coffee, the country has attracted attention from investors. Costa Rica is one of the world's largest sustainable tourism success stories.

- The tiny nation protects some 25 percent of its land and the national System of Conservation Areas. In contrast, Thailand's protected areas account for 10 percent of its land. The global average is about 10 percent.
- Costa Rica provides financial incentives to businesses and individuals who protect or restore the natural environment.
- It is a quality-based government intervention focusing on the world's top carbon-neutral airlines and targeting national and city goals for low-carbon strategy and green goals coming for day trips or by cutting down coastal national parks.
- Many private tourism operators engage in inclusive, community-based growth, which create high-quality community businesses while practicing environmentally sustainable tourism.



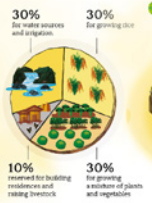
A SOLUTION FOR SMALLHOLDER FARMERS

In the name of increasing the income and security of approximately a million of Thai smallholder farmers, whose livelihoods have long been at the mercy of severe weather and global price fluctuations, the so-called 'Khok Nong Na' Model has been proposed as a solution that is also in line with the Sufficiency Economy Philosophy (SEP) and the BCG strategy. By practicing this model on their land, farmers can not only secure their own sufficiency, but also strengthen their communities and the grassroots economy by relying on resilient and stable sources of food, water and energy.

The Principle
Because Thailand suffers alternately between too much rainfall during the monsoon season and too little rainfall during the dry season, the key idea of the Khok Nong Na Model is to store rainwater on three parts of the farmer's land—marsh, second and rice field. According to Dr. Wichai Sukhathairat of the Agri Netnet Foundation, the model divides the land into four parts to address that it is derived from King Rama IX's New Theory of Agriculture. The division is such: 30 percent for water sources and irrigation, 30 percent for growing rice, 30 percent for irrigated farming growing a rotation of plants and vegetables and the remaining 10 percent for one's house and raising livestock.

That means no matter how large a farmer's plot of land is, if the land and the soil water are managed appropriately, the farm will provide self-sufficiency in the food and security and self-sustaining system. The model can also be adjusted to take into account differences in geography and topography as well as varying socio-economic factors, based on the integrity and fertility of the soil and even uniquely traditional methods. These ideas are all aligned with the sensitive approach to such issues offered by His Majesty King Bhumibol Adulyadej.

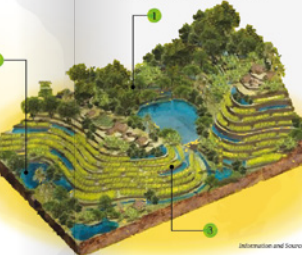
In short, the Khok Nong Na model refers to the application of indigenous farming wisdom to produce a modern-day farming method intended for a new generation of farmers across the country.



The Origin
Based on the New Theory and SEP which were both originated by His Majesty King Bhumibol Adulyadej in the 1990s, the Khok Nong Na Model is a farmer agriculture focused on water and land-based management and supported through financing provided by the Community Development Department (CDD) of the Ministry of Interior. Its ultimate goal is to allow smallholder farmers to enjoy a reasonable standard of living and balanced life overall by integrating agricultural best practices into their farms. It was officially described as a national project by the CDD in 2021 under the name 'The Model Area Development Project for Quality of Life'.



THE KHOK NONG NA MODEL



- The Components**
- 1. KHOK** refers to a mound or small hill that remains above flood waters and can be used to cultivate plants under the "3 Rows, 1 Landside" principle, which seems to grow fruits and herbs for consumption, forward for household use and commercial timber for income. The fourth benefit is the preservation of soil and waterways.
 - 2. NONG** refers to swamps, canals or ditches for taking soil that support irrigation and alleviates the effects of floods and drought.
 - 3. NA** is a rice field. Typically, it organic and applies soil rehabilitation practices.
- All of these best practices leads to better yields and less dependence on external food sources.

Illustration and Source: Community Development Department, Ministry of Interior of Thailand



THE NORTH

Mountains define the character of northern Thailand, which sits on a stretch of uplands that dangles down from the Himalayan mass. Consequently, the North's vegetation ranges from pecky fields in the well-watered valleys to subtropical, occasionally alpine forest at higher altitudes. With temperate crops such as coffee, star-fruit and cabbage possible on the mountain slopes, this region has Thailand's greatest biodiversity. Its forest food sources, coupled with its distinctive culture and creative scenes, attract entrepreneurs, artists, nature enthusiasts, retirees and transplants from Bangkok.

Using Northern Mountain and Laos, the North has also been Thailand's most restricted region, with its greatest ethnic diversity. A northern kingdom, now usually referred to as Lanun, was established with its capital at Chiang Mai in 1296, but at no time there it came under the influence of Luang Prabang. Lanun, with the Burmese took full control from the mid-sixteenth to mid-eighteenth centuries. In the twentieth century, the North was the last region to be fully integrated into Thailand, with the kingdom of Chiang Mai only abolished in 1935.

The diversity, independence and free spiritarians have helped to make Chiang Mai the country's wealthiest of the rest of the economy outside of Bangkok. A period of population, including early thousand military-level students, also contribute to this energy, as does a long tradition of arts and crafts such as lacquerware and silk weaving.

The other significant bio-circular green sectors in the North are tourism and agriculture. The tourism industry may have taken a battering from COVID-19, but some green shoots of recovery are now appearing. Visitor activities here are fairly well spread around the region,

emerging a measure of equality and sustainability, though there are still opportunities to highlight the distinctive characteristics of lower-income areas. Meanwhile, the circularity of knowledge-based tourism has been playing a big part in the North for several decades already in the form of organic cooking, meditation, massage, jewelry making and all manner of local wisdom. With its sophisticated tradition of arts and crafts, often referred to as Lanun culture, the North has tended towards a higher-value tourism product, while the experience of local tourism here is reinforced by the recent opening of the International Gateway Tourism Center at Mae Jo University just outside Chiang Mai.

Its agriculture—the main driver for BCG development in the North—will be a wide high-value agricultural system and processed food products. This will help to address some of the current challenges such as the environmental degradation caused by deforestation, pollution—much of it produced by burning agricultural waste—and overuse of agricultural chemicals. Green Regional Product per capita in the north is lower than the country, which is mostly attributable to the low income earned by agricultural operations.

Several of our featured case studies have been set up in direct response to these problems. In a little-visited part of Chiang Mai province, **Rai Kuan Rai** (see page xxx) is an agriculture farm with a learning center which processes its own high-value food products and recycles 100 percent of the organic waste. At the other end of the region in the Tai Highlands, a sustainable, smart farm, **Hiemp** (see page xxx), uses the abundant but often overlooked hemp plant to make high-value textiles. Also in the uplands, the quality coffee producer, **Alma Ana**



low page xxx), channels part of its profits into education for young villagers and was selected by the United Nations Development Programme as one of the 100 impactful enterprises of 2020. Another great example of Less for More, rather than More for Less, is **Moonbeam** (see page xxx), which produces a great crop of plants that grow well on the mountains. In order to preserve biodiversity, **Moonbeam**, Chiang Mai Design Week (see page xxx) provides exposure for hundreds of creators and gifts of hands-on fun for the thousands of tourists who attend each year. Last but not least, **Pha Pang Community Foundation** (see page xxx) introduces the agriculture, tourism and energy sectors by using bamboo gas for fuel.

These case studies point the way towards the benefits of BCG implementation in northern Thailand. Having a world-class, knowledge-based event like Design Week boosts the local economy in a sustainable way and protects Thailand's soil power. In the field of agriculture, better water management in the circular economy would reduce air and land pollution and could generate income of around 1 billion baht within five years. The introduction of higher-value crops, added-value products and smart agriculture will help to reduce inequality in the North and improve quality of life.

THE WAY TO WELLBEING: HEALTHCARE STRATEGIES

Wellbeing is a major health focus for Thai governments. However, due to the urban-rural divide, wellbeing support in different areas require different strategies. With rural areas lagging far behind, the government aims to encourage community care, prevention and education in these locations as a pathway to wellbeing. In terms of the healthcare economy, the BCG strategy is focused on manufacturing self-reliance, developing new treatment modalities and becoming a center for health and research services.

Underlying all this is valuable guidance from SDG which supports knowledge sharing within communities, accelerating existing innovators, proactively developing new by doing and re-innovation as a pathway for helping the relatively poor living in remote areas without healthcare access. Thus, investing in new appropriate strategies for urban versus rural locations and the healthcare BCG strategy while building on its SDG will guide the whole nation towards good health and wellbeing.

BCG HEALTHCARE RESEARCH FOCUSES

The BCG strategy outlines the following an area of healthcare research that would be particularly beneficial to the Thai economy:

- OMICS technology**
OMICS are branches of biological science whose names start with the suffix 'omics', such as genomics, proteomics and metabolomics. Research in this area helps expand knowledge of biological functions such as genes, proteins and metabolites, which can further help develop the medical industry.
- Genome editing and synthetic biology**
Research here would involve genetic engineering and creating organisms with self-replicating characteristics, which could help in the production of pharmaceutical products.

Key Healthcare Goals of the BCG Strategy

MANUFACTURING SELF-RELIANCE
As the largest importer and exporter of medical devices in ASEAN by value, the BCG strategy aims to increase medical manufacturing self-reliance through the domestic production of pharmaceuticals and medical equipment, allowing Thai better access to medical care at more reasonable prices.

DEVELOP PRACTICES AND TREATMENT MODALITIES
Thailand can better capitalize on its expertise in Chinese, Ayurvedic and Thai medical principles and practices, especially with regards to Thai traditional medicine, for which raw materials are prevalent.

BECOME A CENTER FOR HEALTH SERVICES AND RESEARCH
Urban areas with high populations can support world-class healthcare services and research. With a substantial patient base for clinical trials, Thailand is well-situated to develop its R&D, especially with the help of digital platforms. This will not only help residents have access to top-quality healthcare, but will boost the economy by bringing in high-income medical tourists such as those from Europe, Japan, and China. Furthermore, it will pave the way for Thailand to step into new markets in ASEAN and beyond, such as Latin America.

The Urban-rural Divide

In terms of healthcare, there is a dramatic large gap between urban and rural places. This is due to a plethora of factors, including, for instance, lack of infrastructure and the inability to attract healthcare professionals to rural locations. Thus, rural hospitals must change tactics and focus on community care, prevention and education in different sectors.

URBAN AREA STRATEGIES

- Developing more downstream medical products such as drugs, vaccines, biologics, diagnostic kits, CT scan machines, laser equipment, materials, automated health monitors and dialysis machines.
- Another special focus is which Thailand has significant potential in its precision medicine, which takes into account individual factors such as genes, environment and lifestyle for disease treatment and prevention.
- Increase research and development (R&D) capacity. Thailand is renowned for having a substantial patient base for clinical trials. In merger to R&D, it will benefit from creating digital platforms to integrate the country's clinical research.
- Establish preventive medical products.
- Targeting high-income aging healthcare.

Target customers particularly include those from Europe, Japan and China.

RURAL AREA STRATEGIES

The government's main BCG strategy for rural areas is to encourage collaboration between different sectors. Its current approach is to use businesses whose health problems such as food safety caused by pesticides, liver failure are common. Under this strategy, industries join forces and facilitate goals to decide their own products and solutions. Teams of collaboration include:

- Quality of Life Development Committee consisting of:
 - Ministry of Interior (MOI)
 - Ministry of Public Health (MOPH)
 - Ministry of Agriculture Cooperatives (MOAC)
 - Healthcare professionals
 - Other
 - Students
 - Minors

THE BENEFITS THAT URBANITES WILL GET INCLUDE:

- Better access to world-class healthcare, especially for those that require healthcare specialists (e.g. transplants, oncologists and physical therapists).
- Better urban economy as high-income patients spend money in the high-end healthcare centers.



A MODEL HEALTHCARE CENTER: THE SOMDET PHRA YUPARAT HOSPITALS

First established in 1977, the Somdet Phra Yuparat Hospitals are a model example of how healthcare can become accessible to the relatively poor living in remote places. Its unique practices show how there are truly community hospitals, providing healthcare that not only cures, but cures. First established in 1977, there are now 21 Somdet Phra Yuparat Hospitals scattered nationwide. Below are four of them, selected from different regions in Thailand.

Chomburg Hospital



Dr. Pichan Prasert
Director of Chomburg Hospital

Phra Yuparat Hospitals—Community Hospitals—Under this strategy, the hospital engages the public, as well as other sectors to solve community problems together. Collaborations decide on the main problems affecting their communities, such as traffic accidents and teenage pregnancy, and resolve the solutions in their own way. The hospital, for instance, functions as a data collector and provider on several traffic accidents and teenage pregnancy occurrences to support the other sectors to solve community issues as a successful, participative network.

• 'KON CHOMBURG MAI TING GUN'
A program that translates to Chomburg People Stand Together. The initiative is a collaboration with the hospital's foundation which gives and 50 gifts of 5,000 baht each to the underprivileged in the area.

• MOBILE STROKE UNIT
A collaboration with Srinakharinwirot, the initiative is a special bus equipped with a CT scan scanner that can be immediately dispatched to any villages in the area during an suspected of having a stroke. The CT scan results can be immediately sent to Srinak Hospital for analysis. If the patient does have a stroke, medicine can be given right away and the patient be subsequently sent to the hospital for additional treatment.

WHAT IS THE HOSPITAL DOING TO COMBAT NON-COMMUNICABLE DISEASES (NCD)?
The Chomburg Hospital has a specialized NCD clinic, where village health volunteers and staff from

LOCATION:
Chomburg, Ratchaburi

ESTABLISHED:
1978

Founded in 1978, the Chomburg Hospital, which started with only 30 beds, now has over 200 beds. According to Dr. Pichan Prasert, the director of the hospital, its focus is now on an umbrella strategy set for all the hospital.

Pua Hospital



Dr. Kitikul Kuanthamwatt
Director of Pua Hospital

LOCATION:
Pua, Nan

ESTABLISHED:
1971

A hospital for the people. According to hospital director Dr. Kitikul Kuanthamwatt, this is the least of Pua Hospital. "People should feel a sense of belonging or ownership with the hospital," he says. Established in March of 1971, the hospital was located in a "Red Zone," or area considered dangerous because of active circumstances during that time. The hospital continues to serve the elderly poor living in Pua, Nan.

Below are some of the hospital's distinctive programs:

• 'OXYGEN FOR LIFE'
Heavy smoking using open fires for cooking inside the houses and forest fires have led many people in Nan to suffer from chronic obstructive pulmonary disease (COPD), which requires them to have oxygen machines. So, the hospital launched a communication campaign to buy social media channels and add skills to collect enough money to buy oxygen machines.

Ultimately, the campaign obtained approximately 40 oxygen machines—all from the donations of ordinary people. This enabled some patients to bring on oxygen tank boxes, relieving the burden off of local hospitals.

• ORGANIC VEGETABLES FROM THE COMMUNITY
To help support the relatively poor people in the area, the hospital only buys organic vegetables from the community, making them more sustainable, such as okra, beans, and Chinese mustard greens. Available all year round, the initiative generates at least 800,000 baht per month for the community.

• MOBILE COVID-19 VACCINATION TEAM
Because 80 percent of the area in Nan is mountainous and 20 percent of people are living there, it is often difficult for villagers to travel down to the hospital to receive COVID-19 vaccinations. The hospital has a mobile COVID-19 vaccination team that travels up to these mountains to give vaccinations to these people.

WHAT IS THE HOSPITAL DOING TO COMBAT NON-COMMUNICABLE DISEASES (NCD)?
Because NCDs are usually the result of preventable behaviors, such as eating an unhealthy diet or smoking, the hospital's approach to disease diagnosis involves building psychotherapy. Practiced by nurses, the approach involves talking to each patient and teaches people to be with themselves, know themselves and find their own purpose.

Source: Interview with Dr. Kitikul Kuanthamwatt, Director of Pua Hospital.

TURNING FOOD WASTE INTO FARM WEALTH

An art director-turned farmer has tackled some enormous problems, such as food waste and soil quality, by employing the smallest of solutions—raising worms with biotechnology. Every year, Charne Boonyavith, the founder of Uncle Ree Farm and his millions of earthworms transform some 2,000 tons of food waste, which would have contributed to the greenhouse gases warming our planet into quality soil for urban farmers. eager to change mindsets and create alliances, Charne has also become renowned for his workshops on raising earthworms and building a new network of farmers using biotechnology to groundbreaking effects.

LOCATION:
Phra Charoen, Bangkok

ESTABLISHED:
2011



According to the UN's Food and Agriculture Organization (FAO), around 1.3 tons of edible food is wasted every year, adding up to some US\$170 billion dollar. This international agreement to address food waste has been gathering momentum for the past decade with various non-profits leading the way in Europe and Australia by repurposing leftovers from hotel buffets or donating surplus goods to soup kitchens to feed the poor.

Here in Thailand, however, Charne Boonyavith has found a different way to turn waste into wealth. As a prep cook in a Los Angeles restaurant, he got a first-hand view of how much edible food is squandered, either returning to Thailand and ending up as a snack at a rural temple in Phra Pradaeng province, he learned about cultivating earthworms for agricultural practices from another cook.

In 2011, Charne decided to move away from art director to farmer and raised his garage into a farm for earthworms. That was the beginning of Uncle Ree Farm. The concept could not be simpler: He feeds the worms vegetable waste and they produce compost for farming.

Within a year he had turned his hobby into a brand that with a handful of products such as organic fertilizers and the so-called 'worm tea' a liquid form of the product. In seven years, he has expanded his product line to include

fresh mushrooms and microgreens, as well as a so-called '30 days kit' for composting food waste.

Up and Down of Urban Farming

The Uncle Ree Farm is not attracting professional farmers in the countryside. Their focus is on urban farmers. Around the world, from Bangkok to Shanghai and Seattle, this niche market is becoming mainstream. Nowadays, the field micro-companies every thing from biotechnology to fresh herbs to rooftop gardens and community plots for growing vegetables in condominiums. These small-scale enterprises were at both sources of fresh food and of legitimate businesses.

In Bangkok, one of the first urban gardens were developed by the NGO known as the Thailand Environment Institute in the year 2000 with three main goals: no-rush communication about the benefits of such urban green spaces to create a social framework to plan, implement and maintain them; and create a process to balance the needs of the community with the needs of larger environmental concerns.

In the Thai capital, these kinds of farm proliferated—backyard vegetable gardens, orchards and gardens on the outskirts of the city and rooftop vegetable gardens.

LIVING SUFFICIENCY

Under SDG knowledge application is a core requirement, one that is clearly seen in the case study of Uncle Ree Farm. As an artist, Charne wanted to create art installations but he did not know when, seen within his time as a cook in a Los Angeles restaurant, he learned about cultivating earthworms for agricultural practices from another cook. The knowledge that he applied was especially appropriate for his target—urbanites with little space, time and energy. Charne's method of raising earthworms is perfect for such conditions, enabling people to grow fresh microorganisms at home.

Uncle Ree Farm's approach is also based on urban—another underlying principle is SDG 11: Cities and Communities. The idea only came for his own benefit. But, since his goal was to improve the productivity of his own farm, he is now for raising awareness on urban farmers. Additionally, he is collaborating with local authorities and businesses, sharing his expertise on biotechnology and projects to improve local waste.

A SECOND SPRING FOR SONGKHLA

'Made in Songkhla' is an outstanding example of an economic and social development project in line with the Thai government's Bio-Circular-Green strategy. It is a collaborative project between the Creative Economy Agency (CEA), Thailand Creative and Design Center (TCDC) and local art galleries, easy spaces, to help traditional businesses in the old town district keep up with the contemporary world. Songkhla's unique multicultural history affords a rich foundation for high-quality, distinctive local products. The six-month project matched twelve historical stores, mostly food businesses, with new modern designers. The resulting design solutions addressed business problems, promoted sustainable trading opportunities and developed a more resilient neighborhood business ecosystem.

Made in Songkhla



LOCATION: Songkhla Town, Songkhla

ESTABLISHED: 2021



Since ancient times, Songkhla has been an important regional harbor, linking the Gulf of Thailand with a thousand square kilometers of lagoons, Songkhla Lake. Conveniently positioned on a coastline trade route, the port attracted seafarers from China to the west and India, the Middle East and Europe to the west. Scores of these sailors and traders even decided to settle down in the area, creating a melting pot of ethnic diversity and multicultural skills and wisdom. This complex heritage is especially evident in the old town on Mahaback Road, Nakhon Si Thammaraj and King Nares Road.

Currently, there are plans to culturally upgrade Songkhla's infrastructure. Some southern districts of Songkhla province are affected by a Madden seawater intrusion and Songkhla town itself has occasionally been caught up in the trouble, but it does have tremendous potential for vibrant tourism. The Thai government sees the old town by the lake as a candidate for UNESCO World Heritage status, which would be a great boost for the development of the town and the implied region around it. To cement these efforts, the community, stakeholders and business operators in the town believe that everyone must truly buy into the development plan to be successful.

of the Prime Minister's Office tasked with supporting entrepreneurs and developing a creative ecosystem, plans to launch the Songkhla Creative and Design Center, which is named Songkhla to join Chiang Mai and Khon Kaen in having a branch of Bangkok's TCDC. This new center will give a shot at the town to build a creative economy and tourism. In the run-up to the opening, the CEA has been working to get local people on board with the project. Early through the Songkhla Creative District Festival in 2020, the event featured a parade of Songkhla, a photo exhibition that told the stories of 76 families that have contributed to the old town's character.

The 2021 project 'Made in Songkhla' embraced the economic potential of the city's multicultural heritage. Pabon Buchcharoen, owner of a jewelry store and gallery, explains: "For the 'Made in Songkhla' project, the CEA collaborated with nine designers from Bangkok and twelve long-established shops in Songkhla. Over six months, designers traveled on daily visits to these shops to truly understand the issues that each of these people face and how they can work together to help the stores create new products and services and remain relevant with current consumption trends."

Songkhla and the CEA
In 2022, the Creative Economy Agency (CEA) an agency

Challenges
All businesses in the 'Made in Songkhla' project have been

LIVING SUFFICIENCY

Made in Songkhla is a project based in Songkhla, a historically coastal on maritime trade routes where Chinese, Indian, Middle Eastern, and European people used to come to trade with each other. It is a blend of ethnic diversity and multicultural skills, bringing the specialties of each a history and uniqueness is first, measurable. They can make more about the economy, however, such a strategy must be accompanied by modernization, making what is really available to the world. So these projects will be high-quality, diverse and distinctive local projects. Thus, the

project proceeded with precision. The collaborations presented what was able to selling products and provided diversified business solutions, which were also reasonable in financial cost. As these SGP projects are based on the conditions of knowledge and skills to gain knowledge, design and part of local to modern learning about products, customers and even the owners themselves. Thus, they come up with new products that proved resilient to economic consumption trends.

The vision part is that the customers and the local producers themselves are able to sustain and grow in Songkhla's creative heritage.

The end result is one of balanced development in terms of economic, community and agriculture sectors. The collaborations helped make products resilient to a changing market and boost the local economy. To cement these efforts, the whole community worked to be in the project with their all

DIGITALIZATION AND THE AGRICULTURAL SECTOR

Digitalization is increasingly transforming Thailand and playing a prominent role in the BCG strategy. This includes the four main BCG sectors—energy, materials and biochemicals, tourism and creative economy, health and medicine and food and agriculture. However, the sector likely to be most impacted by digitalization is the last sector, particularly agriculture.

Thailand is the world's 12th largest exporter of food. About 63 percent of the kingdom's land area is dedicated for agriculture. However, with about 6 million farms, plot size is generally small, which incurs problems of economies of scale in buying new technology. These small farmers also wield little bargaining power in an agricultural market with a notoriously long supply chain. The sector accounts for only about 8 percent of GDP and is heavily dependent on government support. Meanwhile, the government's twenty-year plan for agriculture, announced in 2017, envisages a farmer's average income rising to 300,000 baht per year, tying in with one of the key desired impacts of the BCG strategy—to improve income inequality. However, that represents a nearly six-fold increase, so many changes will have to take place before 2036 for Thailand's agricultural sector to truly embrace digitalization.

The Digital Agrarian Revolution
Meanwhile, digitalization is taking agriculture by storm. Most of the innovations are based on sensor technology, while all, to be most effective, should form part of an overarching farm management system that employs the Internet of Things. The technology is also becoming more affordable. Drones, for example, are within the price bracket of many smallholders; they may be used to dispense weed control or fertilizers as well as precisely obtain crop data, such as the likelihood of plant disease. Thus, many rural farms are finding digitized farming within their reach.

of fertilizers and pesticides. Less water is also used, aligning with the BCG goal of reducing natural resource consumption. Producers become more resilient, allowing farmers, even smallholders, to grow premium products for higher income and increase the diversity of farm produce—helping to shield the sector from global price volatility, in line with the BCG strategy. AI helps forecast potential epidemics and outbreaks. Big Data can predict a farm's productivity and reduce risk, smart logistics can help support quality tracking systems and better packaging technologies as well as reduce spoilage. Today many smallholders even use QR codes to obtain data for more precise farming.

Overcoming all this are new farm management technologies, such as matching farmers' products with markets. Even the COVID-19 pandemic may have had a silver lining in terms of knowledge exchange, as it prompted more Thai urban migrants to return to their hometowns to farm and spurred interest in agriculture among city folk.



KEY CHALLENGES

Lack of access to new technologies

Challenges for the Agricultural Sector, Potential Technological Solutions and Support Needed for Sustainable Development

CHALLENGES	POTENTIAL TECHNOLOGICAL SOLUTIONS
<p>Aging rural population</p> <ul style="list-style-type: none"> The average age of the head of a farm household in Thailand is now 56. 	<ul style="list-style-type: none"> Automated systems to reduce labor burdens
<p>Declining labor force due to urbanization</p> <ul style="list-style-type: none"> The agricultural labor force is declining by one Tripart per annum. Increased use of migrant workers lacking fundamental labor rights 	<ul style="list-style-type: none"> Provision farming-related education of chemicals used
<p>Pollution and pesticides poisoning</p> <ul style="list-style-type: none"> There are around 500 deaths from pesticide poisoning each year in Thailand. 	<ul style="list-style-type: none"> AI helps to forecast weather and potential disasters in advance Decision farming uses less water and reduces environmental footprints
<p>Climate change</p> <ul style="list-style-type: none"> Southeast Asia is one of the most vulnerable regions in the world to climate change with Thailand in the higher most affected countries by extreme weather events in recent years. 	<ul style="list-style-type: none"> Enable farmers to increase crop diversity
<p>Biodiversity loss</p> <ul style="list-style-type: none"> 60 percent of Thailand's unutilized land is used to grow just six crops: cassava, sugarcane, maize, rubber and oil palm. 	<ul style="list-style-type: none"> Increasing production potential and efficiency enabling high-quality and high-value products, reducing day-to-day costs, reducing ecological problems, increasing food stability and security, matching products to markets
<p>Low productivity, low profit</p> <ul style="list-style-type: none"> The Thai agricultural sector's GDP has shrunk in each of the past five years. The export price of sugar cane, for example, dropped from 1720 baht about US\$440 per ton in 2016 to 840 baht (about US\$126 per ton) in 2020. 	<p>SUPPORT NEEDED</p> <ul style="list-style-type: none"> Short-term courses for farmers and training centers for farmers and regional organizations
<p>CHALLENGES</p> <ul style="list-style-type: none"> Lack of technological skills 	

Digital Innovations: From Preparing the Ground to Going to Market



THE DIGITAL VILLAGE INITIATIVE

The Digital Village Initiative helps villages take smart farming based on the Internet of Things (IoT), drones and satellite applications, creating a smart farm for elevated crops in Rungtong Province. It is promoted by the United Nations Food and Agriculture Organization.

In 2019, the Ministry of Agriculture and Cooperatives (MOAC), the Digital Economy Promotion Agency (DEPA) and the National Innovation Agency (NIA) developed an exhibition project involving 100 maize farmers in Nakhon Si Thammaraj Province.

This helps reduce soil erosion and keep moisture on the surface. The rice farms, smart-activated based on the soil nutrients based on plant leaf color.

In 2016, Thailand's Rice Department helped Ban Tuan Tiao Rice Farming Group in Suphanburi Province to implement smart farming practices. The following year, the Department of Agriculture Extension and Research University introduced digitalized farming to 60 mango growers in Subhothai Province, Saraburi.

On the pink farms, tractors with GPS and automated steering wheels help the growers level plots more quickly and plant seeds more precisely. AI-guided spraying drones can cover 1 ha of 4.4 acres in three minutes. In Nakhon Si Thammaraj, the CropSpec machine analyzes the nutritional needs of each plant, enabling farmers to decide how much fertilizer to use.

The advantages of these technologies are quantifiable. Coupled with quality seeds and improved weather data, crop productivity has improved substantially for farmers, increasing crop yield reached 68 percent on the Nakhon Si Thammaraj farms, 27 percent for the Suphanburi rice and 23 percent for mango farmers in Saraburi. Meanwhile, the use of fertilizers and pesticides was cut by 30 to 50 percent.



Kubota Farm

EQUIPPING FARMERS WITH TECHNOLOGICAL KNOW-HOW

Founded in 1890 in Japan, Kubota Corporation now exports its farm machinery to more than 120 countries around the world. In its home country, where the rural population is rapidly declining and the average age of farmers is now up to 67, the use of new agricultural technologies is at a particularly advanced level. They include driverless tractors (from which data is collected for a cloud-based farm management system), weeding robots and even robotic sowing suits that farmers wear to help them load and unload the harvest.

To develop machinery customized for farm conditions in Southeast Asia, Kubota opened an R&D centre in Pathum Thani in eastern Thailand in 2016. Meanwhile, Kubota (Agri) Solutions (KAS) offers a crop calendar app for Thai farmers, which uses the Internet of Things to help them manage their rice, maize, cassava and sugar cane fields. In 2022, Kubota announced a new joint venture with Siam Cement Group, Kasetkorn (Kaset) in Thai smart farming. Innovations include the K-iPaaS app, a farm management system, and the e-commerce platform, Kasetkorn Market. All of this ties in with the BCG strategy's desire to connect with multinational organizations to enhance Thailand's development.

The centerpiece of Kubota's efforts to bring cutting-edge methods to Thai agriculture is the impressive Kubota Farm, which opened in Chonburi Province in eastern Thailand in 2020. The first educational and experiential modern farm in ASEAN, the area is a practical hands-on attempt to reach out to farmers and overcome any scepticism and technological resistance. Here, on a large plot that spans 67 acres, farmers can truly get to know and test out the innovations themselves. There is also a research zone, a training zone, a consultancy zone and even an experience zone, where visitors can take the latest gallery out for a spin.

LOCATION: Ban Buri, Chon Buri

ESTABLISHED: 2018

