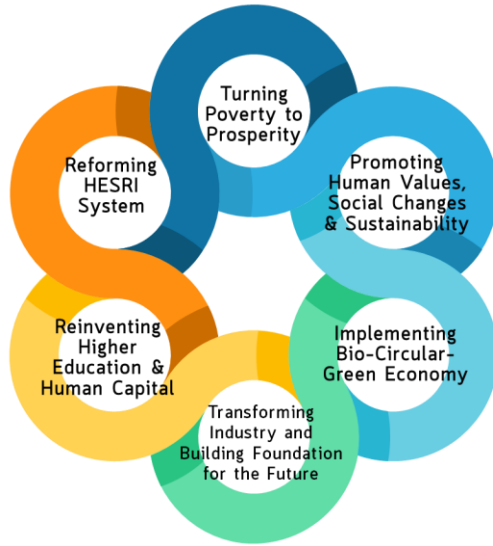


# **Higher Education, Science, Research and Innovation Strategic Direction for Post-COVID-19 Recovery**

The COVID-19 pandemic has revealed Thailand's multiple vulnerabilities, including imbalanced development stemming from prioritizing economic growth over societal and environmental objective; dependency on foreign tourism revenue, healthcare and technology; and the lack of support for a local economy leading to social disparity. As the country is setting a path to post-COVID recovery, a paradigm shift in developmental strategy is needed to warrant sustainable development and immunity to future changes and disruptions. The design of a new developmental paradigm is based on: 1) balancing between economic, social and environmental development to build change resilience; 2) placing priority on human security in four aspects: food, healthcare, energy and employment; 3) building strength from within by promoting the grassroots economy to enable fair wealth distribution and self reliance in accordance with the Sufficiency Economy Philosophy; 4) creating an innovation-based economy by nurturing locally-developed innovations; and 5) preparing for social and technological disruptions and creating new business opportunities from disruptive innovations.

Higher education, science, research and innovation (HESRI) are key enablers to transform Thailand into an innovation-based country with balanced development, freeing it from the middle-income trap to become a high-income nation, creating fair wealth distribution to fight off social disparity, embracing responsible production and consumption to conserve limited resources, and bringing happiness and well-being to the society. The HESRI strategy for post-COVID recovery consists of the following directions: 1) Turning Poverty to Prosperity, 2) Promoting Human Values, Social Changes and Sustainability, 3) Implementing Bio-Circular-Green Economy, 4) Transforming Industry and Building Foundation for the Future, 5) Reinventing Higher Education and Human Capital, and 6) Reforming Higher Education, Science, Research and Innovation System.

## Higher Education, Science, Research and Innovation Strategic Direction for Post-COVID-19 Recovery



- 1** Turning Poverty to Prosperity
- 2** Promoting Human Values, Social Changes and Sustainability
- 3** Implementing Bio-Circular-Green Economy
- 4** Transforming Industry and Building Foundation for the Future
- 5** Reinventing Higher Education and Human Capital
- 6** Reforming Higher Education, Science, Research and Innovation System

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#### #1 Targeted Poverty Eradication

- 1.1 Targeted Poverty Eradication

#### #2 Regional Economic Corridor

- 1.2 Regional Innovation Corridor
- 1.3 Community Growth Pole

#### #3 Inclusive Innovation

- 1.4 Inclusive Innovation

#### #4 Human Security & Human Development

- 2.1 Human Security & Development
- 2.2 Health Systems & Wellbeing

#### #5 Social, Cultural and Political Movement

- 2.3 Arts & Cultural Diversity
- 2.4 Sustainable Urbanization & Social Space
- 2.5 Open Society
- 2.6 New Geopolitics

#### #6 Sustainable Management of Environment and Natural Resources

- 2.7 Water, Natural Resources & Biodiversity
- 2.8 Pollution, Disaster & Risk Governance
- 2.9 Climate Change

#### #7 Resilience to Disruptive Technology

- 2.10 Human & Technology Disruptions

#### #8 BCG in Four Target Sectors

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- 3.2 Bioenergy, Biomaterial and Biochemical
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- 3.5 Circular Economy Transformation

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- 3.6 BCG Infrastructure
- 3.7 Ease of Doing BCG



#### #11 Innovation Driven Enterprise Development

- 4.1 Innovation Driven Enterprise Development

#### #12 Next-Generation Manufacturing and Service Industry

- 4.2 Thai Digital Trade Platform
- 4.3 Digitalization & AI
- 4.4 Future Mobility
- 4.5 National Quality Infrastructure
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- 5.3 Competency-based Graduate
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- 5.5 Education Innovation Platform

#### #16 Brainpower Planning and Management

- 5.6 Future Skill Demand from Strategic Industry
- 5.7 Brainpower Planning & Management



#### #17 System Reorganization

- 6.1 Restructuring HESRI Organization System
- 6.2 Administrative System Reform
- 6.3 Innovation Ecosystem

#### #18 Organization Development

- 6.4 Institutional Competency Development
- 6.5 Capacity Building





## **Turning Poverty to Prosperity**

Thailand’s poverty situation improved over the past three decades as the country transitioned from an agricultural-based to a manufacturing-based economy. However, the poverty rate has lately been on the rise and is linked to declining economic and environmental conditions. The pandemic exacerbates the poverty risks even further. HESRI has the potential to transform poverty to prosperity through job creation, income generation and quality of life improvement, putting an emphasis on grassroots groups.

### **#1 Targeted Poverty Eradication**

Targeted poverty eradication takes a scientific approach to solving poverty which has been a persistent problem in Thailand for a long time. To do so, data and information of each individual household are to be collected and systematically analyzed to identify the root cause of problems. Solutions and projects to uplift the economic and social hardship of each community – e.g., water supply, soil enrichment, household accounting and financial management, knowledge development in agriculture, food, tourism and creative economy - can then be designed and implemented according to economic problems identified from the root cause analysis. Data collected will also be integrated into the government’s poverty map for monitoring the progress of poverty alleviation projects. Universities and research institutes, especially the ones based in the area, will play a central role in this initiative from data collection to project implementation in coordination with local administrative offices.

### **#2 Regional Economic Corridor**

Science parks serve as a conduit connecting academic and research institutes to entrepreneurs and industry to boost enterprise innovation in their respective geographical region. The government has established Thailand Science Park located in central Thailand and three regional science parks in the north, northeast and south of Thailand. The Eastern Economic Corridor of Innovation (EECi) is being constructed in the east. Along with the transfer of technology, these innovation zones also offer incubation programs, acceleration programs, manpower development programs and market access support to foster local entrepreneurs and build innovation-based enterprises, resulting in the flourish of regional innovation corridors.

Community growth pole is an engine used to drive economic development for communities. Establishing such a growth pole will entail physical and digital infrastructure development, city and industry development, unveiling financial incentives and instruments to stimulate core industries and creating supportive platforms such as creative economy platform and research and data economy platform. Local universities and research institutes are essential players to help identify and support core industries for each individual community growth pole.

## **#3 Inclusive Innovation**

Innovation shall not be exclusive to enterprises, but in fact more should be developed for the disadvantaged, e.g., people with low income or disabilities, and made available at an accessible price in order to effectively fight poverty. Examples of inclusive innovation are agricultural machinery and smart farming equipment for small-scale farming, community-level agricultural processing machinery and community power plants. Adequate R&D funding will be allocated to develop inclusive innovation in various sectors including agriculture, food, health and wellness, and energy. Technology transfer and commercialization processes all the way to business models such as leasing or sharing platforms will be specially designed and promoted to ensure that inclusive innovation truly reaches and benefits the disadvantaged.

## **2 Promoting Human Values, Social Changes & Sustainability**

Human capital is the most essential component to drive the sustainable development agenda. This strategic direction therefore focuses on ensuring human security, promoting human development, embracing diversity, advocating social justice, engaging people in local and national politics, understanding geopolitics and having awareness of environmental and technological issues affecting society.

## **#4 Human Security & Human Development**

Human security must be strengthened in order to restore the balance in development. The shift from economic focus to human centric shall follow the sustainable development agenda and the Sufficiency Economy Philosophy. The human security and development plan must recognize multi-stage life and tailor to the aging society, while its goal must address social equality and people's well-being. Transformative platforms will be established as an avenue to engage people in the pursuit of social change for equal opportunity and social equality. Social enterprise will be the main mechanism to drive social innovation.

Human health is also an essential element in the society. Research and innovation in healthcare reinvention will be promoted to bolster security in drug, vaccine, medical devices and supplies and to strengthen health information systems and health service systems. Improvement in health literacy will be made so that people have better understanding in both mental and physical health. Programs such as village health volunteers, community sports centers and community pharmacies are among effective actions to support local health systems.

## **#5 Social, Cultural and Political Movement**

Arts and culture have a wide impact on society. They feed creativity and therefore can substantially contribute to the creative economy. Arts and culture can also facilitate mutual understanding and communication in the society and help strengthen social cohesion. To maximize the benefit of arts and cultural diversity, a system will be developed to promote arts and culture curricula in schools, nurture creativity, employ arts and culture to create value to the society, establish knowledge management systems for arts and implement mechanisms to encourage transdisciplinarity.

Science, research and innovation can help create and maintain livable and sustainable cities through the development of knowledge, innovation and technology that support sustainable urban development and social space. Technologies such as virtual reality and big data analytics can facilitate the city development and planning process in order to create a compact city and avoid urban sprawl. Critical infrastructure and innovation will be developed to support sustainable urban development and low-carbon cities, embrace universal design in public spaces and services and prepare the city to cope with disasters.

Social reform is a challenging issue for Thailand. It encompasses politics as well as justice and bureaucratic systems. In-depth studies will be actively supported so that proper policy, laws and regulations and institutional mechanisms can be designed to drive democracy and advocate for social cohesion. Open society approach will be taken to engage people, especially future generations, in important issues such as public policy, bureaucratic reform, decentralization and human rights. A knowledge exchange platform can facilitate discussion on political innovations and best practices.

Thailand as a country is a member of the global community. It is important to have a strategy to effectively respond to geopolitical shifts and handle border disputes and issues. Studies will be supported to set foreign policy enabling the country to fit in the new contexts of global politics and world economy, including new geopolitical balance, international trade, post-COVID globalization and regionalization, violent extremism and terrorism, transnational crime and transboundary environmental issues like PM2.5 and climate change. Education, science and innovation diplomacy will form an integral part of Thailand's foreign policy, whereas higher education system will focus on producing people with global mindsets.

## **#6 Sustainable Management of Environment and Natural Resources**

Environmental and natural resource security is essential to social and economic development. To ensure water security, big data analytics will be applied to water resources management and support decision-making processes concerning water management policy. Innovative solutions to water storage systems, water conservation, water recirculation and water treatment will be created. Social innovation and incentives will be widely implemented to encourage behavioral

change in water consumption and improve water use efficiency in communities and enterprises. To strike a balance between conservation and utilization of bioresources, HESRI will play a critical role in an evidence-based policy design, regulation and management mechanisms related to the conservation, sustainable utilization and rehabilitation of bioresources. HESRI is also a key driver to develop new knowledge on Thailand's biodiversity such as new species discovery and unlock its utilization potential to underpin the Bio-Circular-Green Economy.

Through education, research and development, HESRI can provide solutions to prevent and mitigate environmental pollution such as waste, PM2.5 and smog and natural disasters such as floods, earthquakes and tsunamis. Examples of such innovations are earthquake warning systems and air pollution monitoring systems using satellite data. By ramping up the effort in R&D, study results will provide more evidences used in the design of policies, measures and regulations addressing pollution problems, whereas formal and informal education and training programs will help raise awareness and inspire behavioral change regarding pollution prevention and mitigation.

Climate change is a pressing issue at present because its impacts are enormous and global. A transition to a low-carbon economy is necessary to reduce greenhouse gas emissions, thus limiting the impacts of climate change. HESRI will be actively involved in developing management systems to regulate greenhouse gas emission, creating innovative low-carbon technologies and technologies supporting climate change adaptation for vulnerable sectors such as agriculture. Financial instruments such as Green Climate Fund will be tapped to enhance Thailand's ability to respond to climate change.

## **#7 Resilience to Disruptive Technology**

New technologies continue to emerge and some of these have potential to disrupt society to various degrees. HESRI can generate immense bodies of knowledge on social sciences, humanities, arts and physical sciences and contribute to policy formulation concerning disruptive technology. The interventions include supporting research studies that will contribute to the establishment of ethical guidelines and regulations and a preparedness action plan for technological and social disruptions. A platform will be created to promote cross-disciplinary studies between hard and soft sciences.

## **3** Implementing Bio-Circular-Green Economy

The Bio-Circular-Green Economy or BCG has been introduced and promoted by the government as a new economic model for inclusive and sustainable growth. HESRI is employed to turn Thailand's comparative advantage in biological and cultural diversity to competitive advantage, thus enabling the country to thrive in the global market.

### **#8 BCG in Four Target Sectors**

The BCG model will be applied to promote four major industries– namely agriculture and food; medical and wellness; bioenergy, biomaterial and biochemical; and tourism and creative economy – as follows.

- **Agriculture and Food.** The focus will be placed on upgrading agricultural sector by strengthening smart farming businesses, promoting smart farmers and developing innovative agricultural technologies such as precision farming, decision supporting systems (DSS), plant breeding and farm machinery. Attempts will also be made to boost the food industry through product innovation aiming at premium markets such as specialty foods, functional ingredients and nutraceuticals; food safety and low environmental impact in food manufacturing; and food logistic systems such as cold chain and traceability.
- **Bioenergy, Biomaterial and Biochemical.** The goals are to improve energy security and develop biomaterial and biochemical industries. Biorefinery research will be supported to develop novel high-value materials and chemicals from local feedstocks. Intensive research will also be promoted in the areas of energy storage systems and ethanol/hydrogen fuel cells. Platforms and infrastructure such as biomass management database, energy trading platform and smart grid will be established to support both research and commercialization.
- **Medical and Wellness.** To position Thailand as the medical hub, priorities will be given to the following areas: personalized medicine, vaccines and new medicines, medical devices, telemedicine, clinical research infrastructure, herbal and traditional medicine, nutraceuticals and medical tourism. The strategy includes intensive capacity building in technology, human capital and infrastructure to support R&D and manufacturing of vaccines, biopharmaceuticals and medical devices, as well as clinical research and product registration of pharmaceuticals and medical devices.
- **Tourism and Creative Economy.** HESRI will be applied to rebrand Thailand as a high-quality tourist destination for wellness and recreation. Innovative technologies and measures – travel bubble, quarantine guidelines, regulation of online travel agencies, technologies supporting screening, tracking and social distancing, etc. - will be employed to support tourism under pandemic conditions. To distribute income and wealth, secondary cities will be promoted as new tourist destinations based on their unique culture with the support of modern tools such as destination management systems (DMS), virtual reality (VR), augmented reality (AR) interactive screen and audio guide. Science and technology will be applied to define national guidelines for tourism, e.g., carrying capacity, as well as to support sustainable tourism standard system and conserve and rehabilitate the environment.

## #9 Circular Economy Transformation

The circular concept offers solutions to the scarcity of non-renewable resources and waste problems, presents new business opportunities and supports sustainable economic growth. Two approaches will be employed: 1) shifting paradigm on resource use and 2) promoting circular economy (CE) businesses. Policies and measures will be introduced to raise awareness on resource use and drive changes in production and consumption behavior. Supporting mechanisms and infrastructure such as recycle/upcycle programs and recycle facilities will be established, whereas innovative technologies will be employed to drive resource-use efficiency improvement and waste minimization in industry. A healthy CE ecosystem will be built. Actions include adding new businesses such as upcycling, recycling and circular design to close the gap in the CE value chain, introducing a solution platform for waste-to-resource matching among businesses and establishing a capacity building program to educate enterprises on international CE standards.

## #10 BCG Infrastructure

The BCG economy can be energized by a well-developed ecosystem. Among key infrastructures and facilities to underpin the BCG economy are National Biobank of Thailand supporting the conservation and sustainable utilization studies to harness the potential of bioresources to develop high-value products and National Quality Infrastructure (NQI) that can promote competitiveness by helping industry produce goods and services that meet the quality specifications of the global market.

Some regulations need to be redefined to pave the way for BCG businesses. These regulations include, for example, the ethanol production licensing to industry outside the energy sector, import tax exemption on raw materials for medical device manufacturing, government procurement criteria on novel products, waste management, plant protection act and the use of recycled plastics in food packaging. In addition, new measures concerning carbon pricing, green tax, extended producer responsibility (EPR) and financial incentives to promote the use of recycled plastics should be introduced. Facilities such as regulatory sandboxes, product registration processes, Thai biodiversity act should be established or streamlined to improve ease of doing business.



## **4** Transforming Industry & Building Foundation for the Future

For years, Thailand's economic growth has slowed as the country is losing its competitiveness in the global market. To invigorate the economy, Thailand needs to bolster technological capacity of its industry by embracing Industry 4.0, increasing the number of tech-based enterprises, strengthening frontier research to build groundwork for the future development and empowering the society with social sciences, arts and humanities.

### **#11 Innovation Driven Enterprise Development**

SMEs, startups and spin-offs are the engine that drives economic growth and jobs. However, to ensure that these businesses can deliver high value products or services and support high paying jobs, they need an upgrade to innovation driven enterprises (IDEs). Innovation capability will be enhanced through capacity building programs tailored to target groups and covering a whole range of skills from marketing and finance, to technology and business management. An IDE ecosystem will be created with initiatives ranging from entrepreneurship mobilizing programs (e.g., bootcamps, hackathons and startup contests) and infrastructures (e.g., incubator, pilot plant, living lab and maker space), to venture capital, regulatory reform, incentive measures, local and international networks and digital infrastructure to support market access.

### **#12 Next-Generation Manufacturing and Service Industry**

Advanced technologies have the potential to transform the manufacturing and service industry. They promise greater speed and precision of production as well as improved business transaction and better customer experience. The adoption and diffusion of these new technologies in the Thai industries are the means to survive and thrive in the global market, and HESRI can play an integral role to facilitate this endeavor.

Digital trade represents an important component of global flows of goods, services, money, and people. Policy and mechanisms will be designed to accelerate the development and implementation of digital trade platforms to facilitate trade and investment. E-commerce platforms and Thailand Tourism Exchange Platform (TTX) are among initiatives that will support B2C businesses, whereas digital tools for Enterprise Resource Planning (ERP), supply chain management and banking and payment systems will greatly enhance enterprise capability. B2G platform will connect businesses to government systems, providing convenient access to services offered by government agencies such as the Customs Department, the Revenue Department and the Department of Business Development.

Digital technology and artificial intelligence (AI) are the main driver of Industry 4.0 and possess great potential to improve people's quality of life. HESRI will facilitate the digital transformation and Industry 4.0 adoption in Thai industry, especially SMEs with special emphasis given to the

fields of digital technology and AI in the manpower development plan. Infrastructures such as supercomputing facility and big data infrastructure will be supported, whereas ethical and legal frameworks will be prepared to facilitate innovation development.

Autonomous, Connected, Electric, and Shared (ACES) are the four mega-trends for the future of mobility, enabling the industry to achieve clean, safe and sustainable transport systems. ACES will be adopted in the R&D and business strategies across railway, aviation and logistics industries. Manpower development programs encompassing reskilling, upskilling and new-skill courses, will be implemented to develop a workforce with necessary skills, including mechanics, mechatronics, IT, electricity, software engineering, system integration, big data, data analytics and AI. Infrastructures for R&D and demonstration will be developed to support innovation development, whereas standards and regulations will be established to ensure quality and safety.

Quality infrastructure systems are a catalyst for improving the quality of products and services and a tool to increase the competitiveness of the industry to participate in global trade. Thailand's national quality infrastructure (NQI) system will be strengthened, with priority given to BCG, next-generation mobility, robotics and smart electronics.

Facilities to support translational research will be supported. These include pilot plant facilities for translating laboratory processes into viable industrial processes, maker spaces, fabrication labs, data infrastructure for social science and humanities research, supercomputing and cloud infrastructure. A management system will be established to maximize the use of these facilities and ensure that they adequately serve the research communities of both the public and private sectors.

Smart government utilizes digital technology to facilitate and support better planning and decision making by improving democratic processes and transforming the ways that public services are delivered. HESRI will be employed to: 1) make government services accessible anytime anywhere on digital platforms, engage with people through design thinking approach, and transparent via open-data concept; 2) improve government's process and efficiency by integrating databases from various governmental sources; and 3) support national issues such as energy management and water management through big data analytics powered by integrated databases and collaboration among various authorities on digital platform.

## **#13 Big Science & Frontier Research**

Frontier research and big science are the foundation for the future as they enable new discoveries for future industries. Big science infrastructure will be built in order to establish scientific excellence, enhance competitiveness, attract national and international talent and collaborations, draw S&T investment and enrich the innovation ecosystem. The focus on big science infrastructure will be in the areas of biosciences, physics and engineering, energy and environment, digital technology and computing, and social sciences, humanities and arts.

Frontier research will largely be supported not only in physical sciences, but also in social sciences, humanities and arts to create new knowledge and develop new understanding on game changing technologies and innovations. In addition to basic and applied research, frontier research program will advocate for transdisciplinary, multidisciplinary and interdisciplinary studies. Ten areas have been identified for frontier research, namely 1) food, 2) medicine, 3) quantum technology, 4) earth space system, 5) high energy physics, 6) integration of humanities, arts and technology, 7) sustainability transition, 8) health, value and balanced development, 9) democracy and social connection and 10) cultural diversity and ethical challenges.

For an innovation-based economy to fully develop, people in the society need to understand and appreciate the power of science for social and economic development. A platform will be constructed at the community and national levels to cultivate science, technology and innovation culture, so that science can fully contribute to the wellness, safety and happiness of people. Popular and ubiquitous communication methods and media such as social media, VDO clips and contests will be used, whereas the content will be easy to understand and entertaining. Official media outlets are important for providing factual information on current issues of public interest. Educational facilities such as science museums will be upgraded. Enterprises will be incentivized to engage in science awareness creation through their CSR projects.

## **5 Reinventing Higher Education & Human Capital**

Higher education is a focal point of knowledge and application and is defined as one of key drivers of growth performance, prosperity and competitiveness. Higher education institutes make enormous contribution to economic and social development through fostering innovation and increasing higher skill levels. This strategic direction is therefore dedicated to the high education system reform and talent development and management.

### **#14 Higher Education System Reform**

The higher education system needs reform to make universities more internationalized and, at the same time, glocalized. A quadruple helix model will be introduced, involving interactions of industry, government, academia, and users/civil society to enable universities to value both excellence and relevance, build society's resilience and cultivate entrepreneurial mindset, while maintaining autonomy, diversity and accountability.

New management and funding systems will all be designed to allow each university to develop strength, expertise and identity in frontier science, technology and innovation and area-based development according to its objectives. Academic standards and quality assurance systems will be redesigned to meet international recognition and accommodate diversity in the university system, university's missions to respond to the country's needs and educational innovation sandbox. Budget allocation and management systems will be more flexible and more efficient, whereas new initiatives such as student loan programs will be introduced to facilitate demand

side financing to improve access to education and to encourage the training that will fulfil demands in the job market.

Mechanisms such as checks and balances and the merit system will be employed to promote good governance in higher education. Guidelines such as the code of conduct and code of ethics will assist universities in establishing commitment to high standards such as honesty, integrity and safety.

## **#15 Lifelong Learning**

One of the main roles of higher education is to create a quality workforce. Measures and facilities will be designed to enable higher education to prepare the workforce with knowledge and skills in demand for social and economic development. Cooperative education model - whereby a university offers classroom-based education in combination with practical work experience in the industry or community - will be promoted. Innovative financial instruments such as income share agreements will be introduced as a way to engage the industry in the workforce development process.

With an increase in life expectancy, the three-stage-life structure – education, work and then retirement – is no longer applicable. Multi-stage life becomes the new way of living. The multi-stage life requires continuous learning so that people can navigate through changes and disruptions in the job market landscape. To support lifelong learning, new mechanisms and systems are proposed. These include a one-stop service platform for education, skill development and career development offering skill gap analysis, career guidance and job recruitment, non-degree programs for reskilling and upskilling the workforce available in both classroom and online formats and a credit bank system encouraging people to earn experiences both inside and outside of formal education.

More innovative education platforms, education management systems and learning media will be developed and introduced to improve education quality and support new normal learning. Teachers will be trained on new skills enabling them to deliver education in today's world where new knowledge and technology emerge rapidly. Education will take focus on STEM (science, technology, engineering, and mathematics) and STEAM (science, technology, engineering, arts and mathematics) education in which various disciplines are integrated into a cohesive learning paradigm based on real-world applications, thus allowing hard and soft skills to be developed. Digital infrastructure, digital collections and digital library will be developed and upgraded to improve access to education.

A number of target industries have been identified by the government to serve as a new growth engine. To ensure that the higher education system creates workers with skill sets meeting the demand of these sectors, universities are encouraged to engage industry in the curriculum design and development. Furthermore, non-degree programs can be tailored to the requirements of employers and served as a tool for industry to map out their employees' career paths.

## #16 Brainpower Planning and Management

Ecosystems will be developed to foster brainpower development, employing mechanisms to build up a quality workforce as well as attracting foreign talent to fulfil the demand of current and future development. A National Talent Management Unit is proposed to manage demand-and-supply of talent for industry and area-based development as well as to support long-term monitoring and evaluation systems. New funding programs such as agenda-based programs, frontier research, big science projects, public-private-partnership scholarships will be introduced to drive brainpower development. Mechanisms such as virtual networks and brain circulation will be employed to forge talent development cooperation between academia and industry and between Thai institutes and their international partners.

## **Reforming Higher Education, Science, Research and Innovation System**

With the merge of ministries of higher education and science in 2019, the government envisions that the synergy will help drive the national development agenda that heavily relies on quality manpower and an ability to innovate. To create this synergy, the higher education, science, research and innovation system needs to be redesigned. The new system will outline the division of labor and mechanisms to foster cooperation among institutes, as well as create a dynamic HESRI ecosystem.

## #17 System Reorganization

The restructuring of the HESRI organization system will bring about agility and accountability, supporting an overall performance improvement. The new HESRI organization system will clearly define the roles of each organization within the system, especially the funding and implementing organizations, contain mechanisms to support cooperation between organizations and identify key performance indicators (KPIs) for each role.

An overhaul of the administrative system is expected to improve efficiency and facilitate performance management of the whole HESRI system. Budgeting systems will be designed to effectively drive the HESRI implementation strategy and plan, whereas monitoring and evaluation systems will employ digital tools to promote result-based accountability and trust in governance and to provide feedback to support double loop learning. Lastly, a system for data integration will be established to support HESRI operations.

A dynamic innovation ecosystem will be promoted to drive the social and economic development with HESRI. Interventions include regulatory reforms, increased access to finance, technology and market and enhanced IP/innovation management. Topics that call for regulatory reform are those related to the establishment of holding companies, spinoff and startups, government procurement, Thai Bayh-Dole Act and innovation sandbox. Innovation funds, mega projects and

government procurement programs are among measures to increase access to funds, technology and markets and encourage public-private partnership in innovation.

## **#18 Organization Development**

Along with the system restructuring, organizational development (OD) will also be employed to improve efficiency and productivity of organizations in the HESRI system. The process will enable organizations to better respond and adapt to new business models which employ research and innovation to enhance competitiveness.

Resources drawn from the Science, Research and Innovation Fund will be utilized towards two components, namely institutional competency development and capacity development. Institutional competency development involves strengthening personnel's capability in the areas of administration, policy deployment, and management of national agenda and initiatives, as well as applying OD principles to unlock potential of organizations and their personnel. The capacity development component will be in the form of a basic research fund allocated to higher education institutes.