Drugs and biologics

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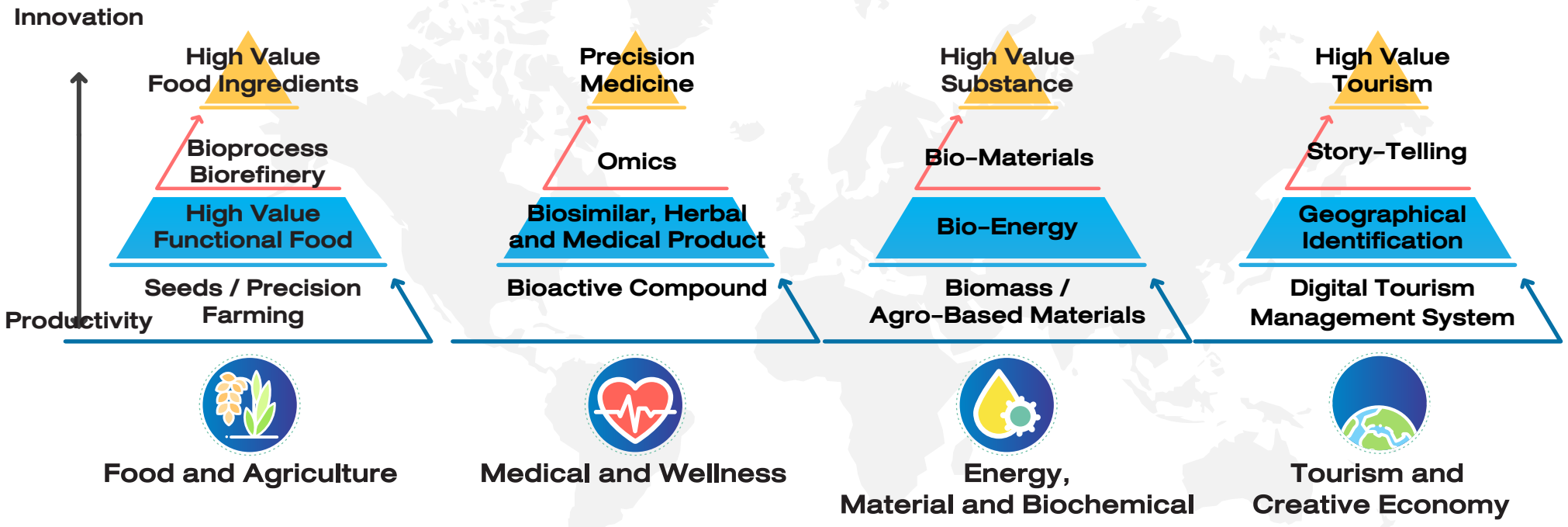
BCG Economy: Thailand's Economic Model Post-COVID-19

Principle:
Sufficiency Economy Philosophy

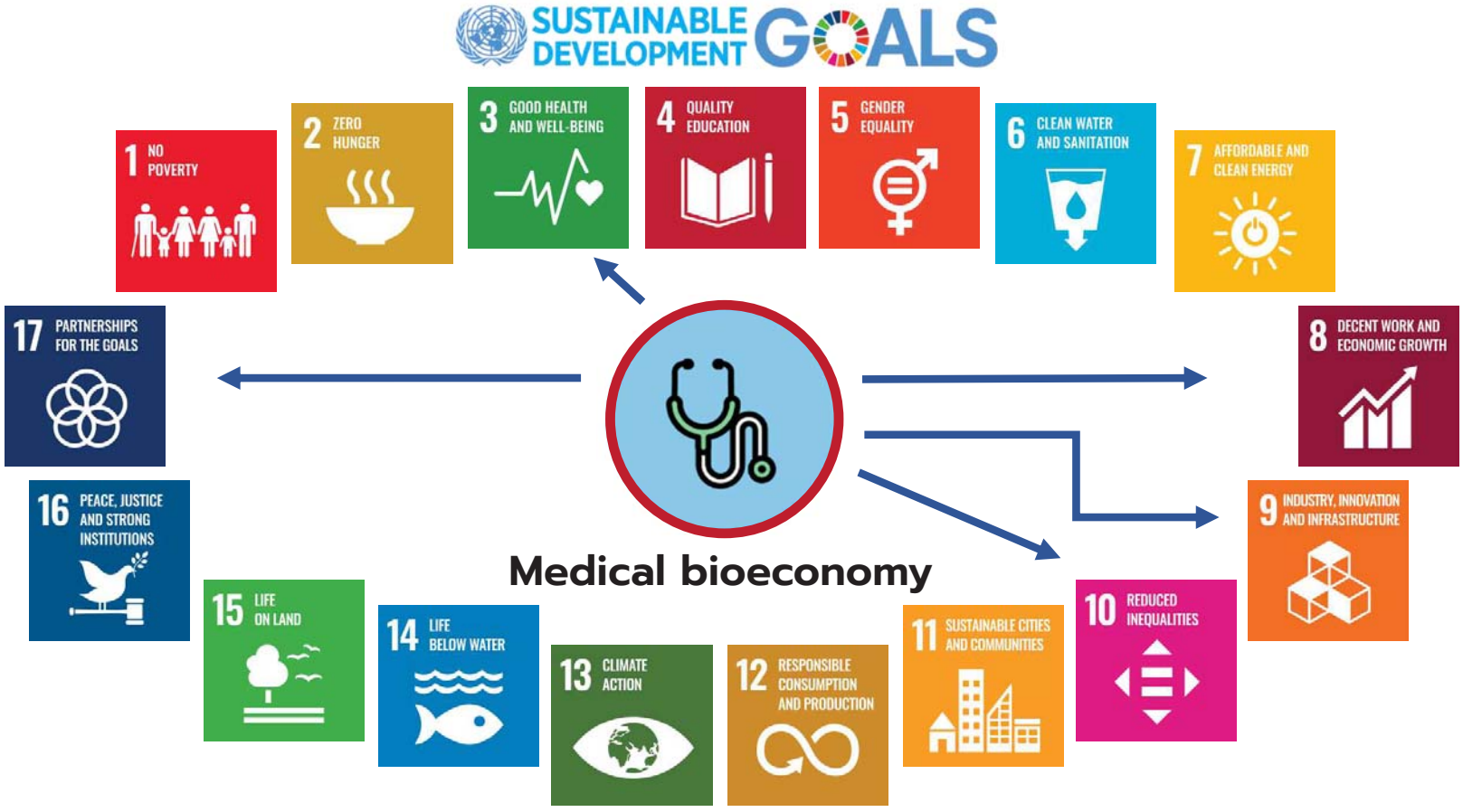
Goal:
Sustainable Development Goals (SDGs)

Value Creation in 4 BCG Sectors



BCG Digital Platform

Medical bioeconomy on



Increase Thailand's health sufficiency and reduce drugs and biologics import by research, development and production

Key success factors

- Promote local private companies' capability to compete with multinational companies
- To increase Thailand's economic growth and to strengthen country health emergency preparedness

Challenges and Opportunities in medical and Thailand Public Health

100 Billion Baht
Imported Value of Medical and Pharmaceuticals Products

Health security vs Emerging disease/re-emerging disease

1.4 Trillion Baht Estimated Healthcare Expenditure when Thailand Becomes Super-Aged Society

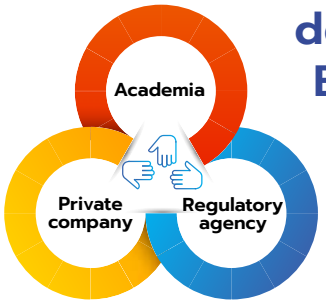
Opportunity and equity of access to healthcare services

High efficiency medical services attract medical tourism

The state of the art technology shift new patterns on medical care and medical service : Genomics, Advanced therapy

Enhance capability of Drugs and Biologics research, development and production and promote Thailand medical services and Industries

1



develop Drugs and Biologics research networking along the Value chain

2

Develop Drug's research and development workforces as well as Biologic's manufacturing Cooperate with private companies and international R&D Institutes

3

Drugs and biologics infrastructure development

- Active ingredient testing lab
- Animal testing
- Clinical research organization
- Pilot plant

4

Develop and utilize technology and innovation for supporting medical hub policy

Public Private Partnership and International Institutes

Flagship Project

Vaccine and infrastructure development for COVID-19

Background

- COVID–19 affect on economics and public health
- Vaccine is the most efficiency way to control disease
- Domestic vaccine production will increase more opportunity of vaccine accessibility and better Thailand's health security than depending on imported vaccine only

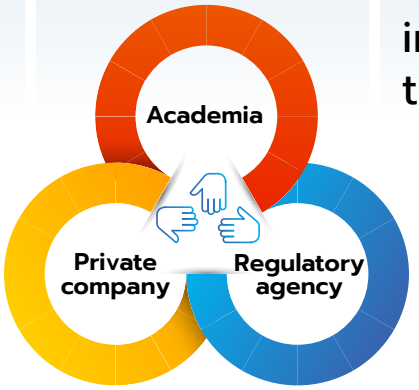
Impact

- Increase Thai people more opportunities to access COVID-19 vaccine
- reduce negative health and social impact
- Sustain health security on vaccine

Action plan

Develop local vaccine industry by transferring Technology from success vaccine development country

Plan for vaccine procurement in advance



Promote local R&D capability of vaccine development in medium-long term

COVID-19 development in Thailand

Public Private Partnership

Vaccine development

Antigen selection

Proof of Concept

mRNA

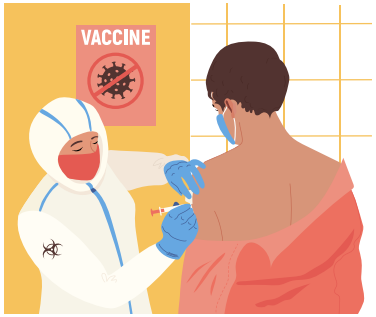
CHULA VRC Penn

DNA

CHULA VRC BioNet sharing vaccine expertise

Toxicity testing

Clinical Trial phase1-3



Registration

FDA APPROVED

Infrastructure for manufacturing

NBF

BioNet sharing vaccine expertise

Infrastructure for filling and packaging

สภากาชาดไทย The Thai Red Cross Society

Production in Late 2021

Technology Transfer from foreign country

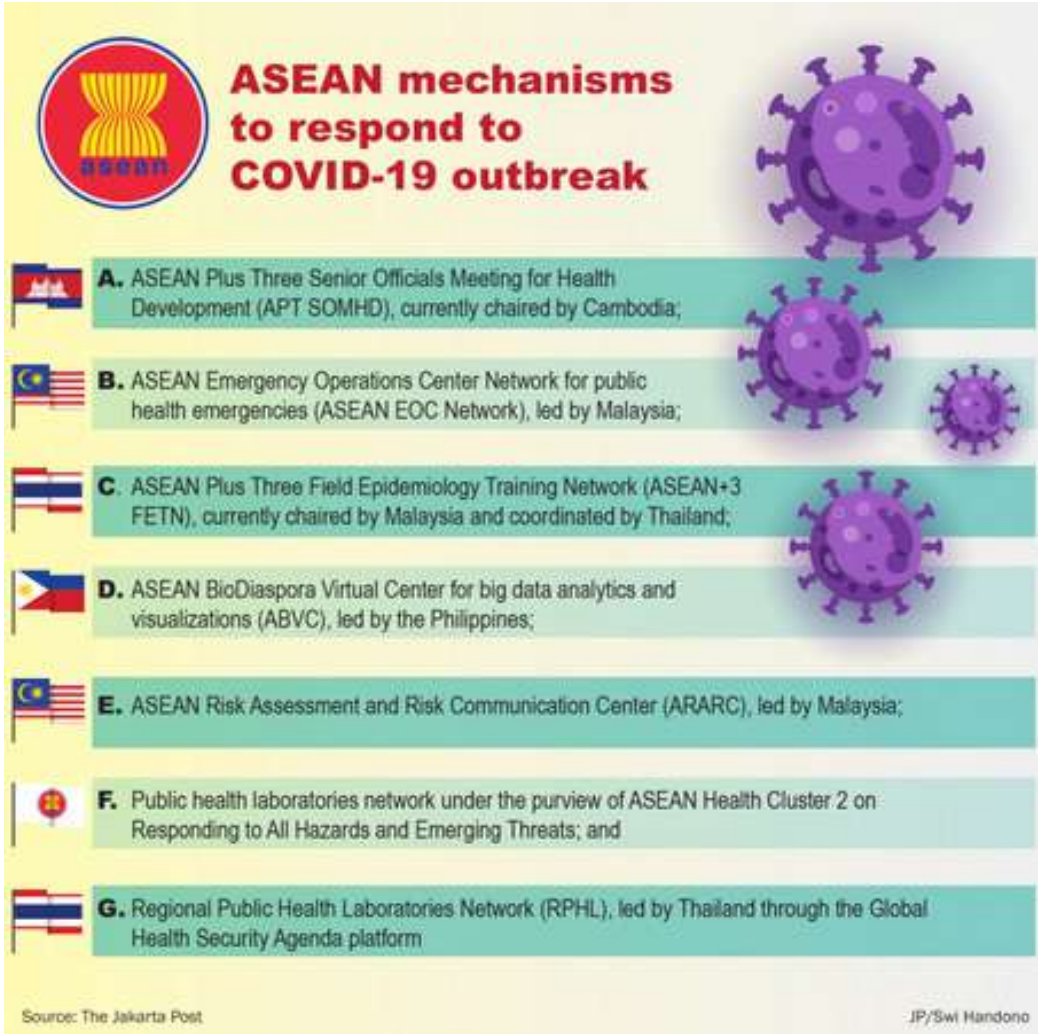
Adenovirus Based

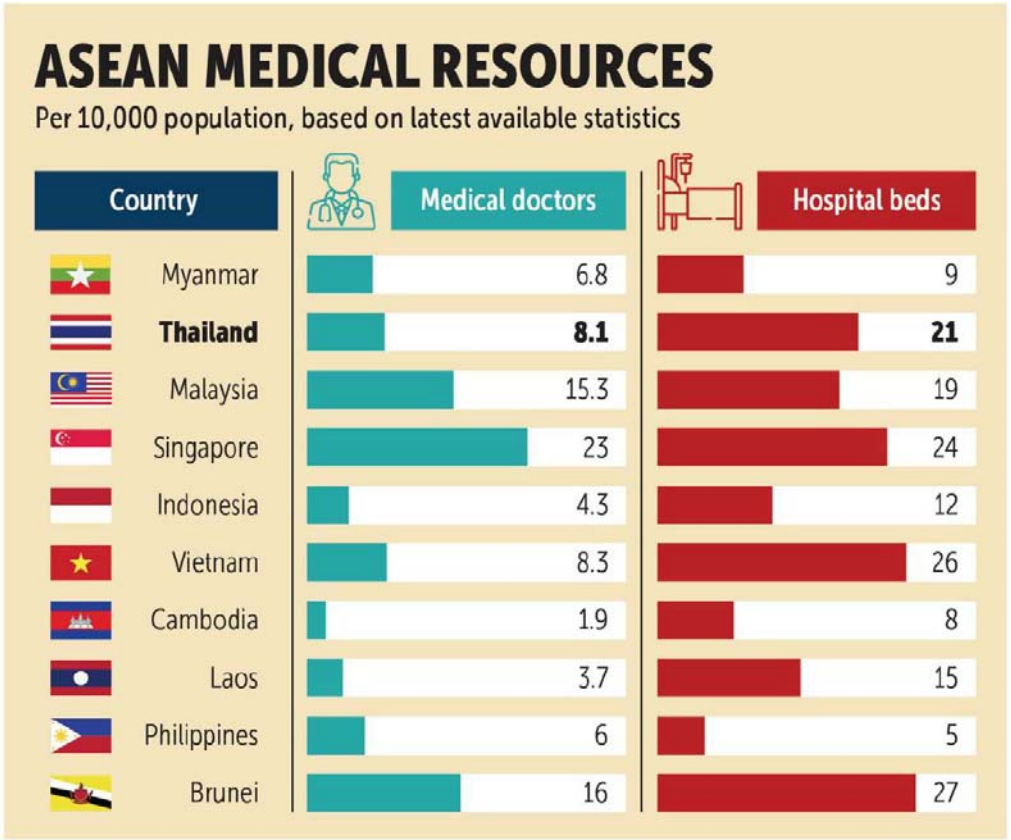
NBF

SIAM BIOSCIENCE

UNIVERSITY OF OXFORD

AstraZeneca





https://www.bangkokpost.com/world/1912228/covid-report-card

https://www.nationthailand.com/news/30384381?utm_source=homepage&utm_medium=internal_referral

PPP on COVID-19 Vaccine Manufacturing and supply for Thailand and SEASIA

The Ministry of Public Health, Siam Bioscience, SCG and British-Swedish biopharmaceutical company AstraZeneca signed a Letter of Intent on the manufacturing and supply of the University of Oxford's potential COVID-19 vaccine AZD1222.

https://scgnewschannel.com/th/scg-news/ministry-of-public-health-siam-bioscience-scg-and-astrazeneca-joining-hands-to-produce-the-covid-19-vaccine/

Flagship Project

Thailand Genomic Databank and center for policy development in genomic medicine industry and service

Background

- Genomic medicine is innovation for precision and specific medical service
- Use personal genomic data and bioinformatics for big data analysis to predict illness, treatment effectively, reduce complications and illness including prevent premature death

Impact

- **Reduce burden on medical and public health budget by 70 billion baht per year**
- **Generate income by promoting healthcare service and medical hub**

Genomic service and precision medicine platform

Thailand Genomic databank of 50,000 people/ big data analysis for diagnosis, precision treatment, disease control, and drug and biologics development

Center for policy development in Genomic medicine industry and service

National Action Plan "Genomics Thailand" (2020-2024)

Genomics Thailand Strategic Plan

Vision

Thailand will be ASEAN leader in Genomic Medicine within 5 years
All Thai people can have access to quality Genomic Medicine services

Research and Application	Clinical Service
• Infrastructure for research - Thailand Genome Database - National Bioresource Center • Development of research platform and ecosystem	• Technological Assessment • Service Improvement and Quality Assurance • Law and Regulations • Clinical Practice Guidelines

Data Analysis and Management

Ethical, Legal and Social Implications (ELSI)

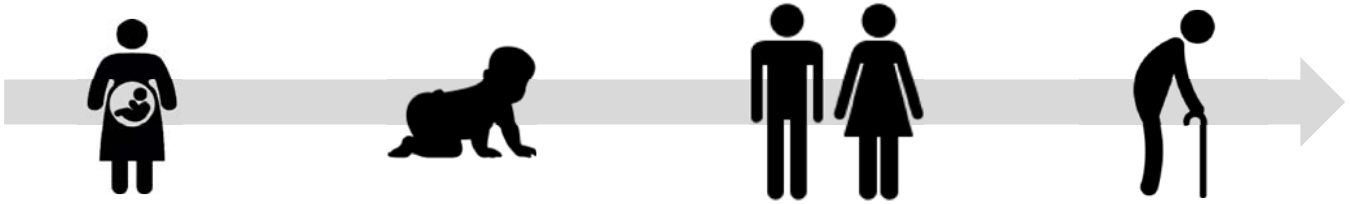
Workforce Development

Promotion of New S-curve Industry

Genomics Thailand = Future of Medicine

- Genomics Information and Technology
- Whole genome sequencing

Transform Medical/Health care and management
- Diagnosis
- Prevention
- Treatment

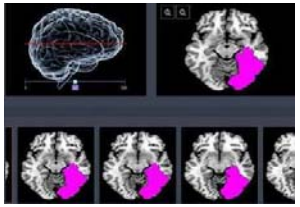


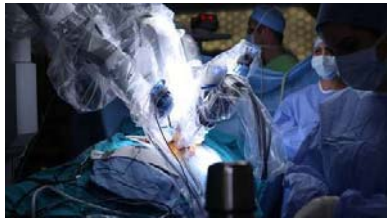
- Pre-marital Counseling
- Prenatal Diagnosis

- Newborn Screening
- Diagnosis/Treatment of Genetic Diseases

Diag.-Prevent-Treat
- Infectious Diseases
- Severe ADR

Diag.-Prevent-Treat
- Cancer
- NCDs – Diabetes, CAD
  Wellness/Fitness





RE-SEQUENCING PROJECT OF 1,500 SOUTHEAST ASIAN INDIVIDUALS USING THE 100 PHARMACOGENE-NGS PANEL & CNVs GENOTYPING + Full-Length, Long read HLA sequencing

Impact on drug and vaccine development

Economic impact

- GDP increase from 40 billion baht to 90 billion baht
- Decrease medical and public health expenditure
- Reduce import value of drug and biologics at least 7.5 billion baht annually

Health impact

- Reduce inequity of drugs and biologics accessibility for at least 0.3 million people
- Build health security in all situations