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SUMMARY OF TDRI ANNUAL PUBLIC CONFERENCE 2018 ON
REORIENTING THE THAI ECONOMY TO PREPARE FOR THE AGE OF TECHNOLOGICAL DISRUPTIONS

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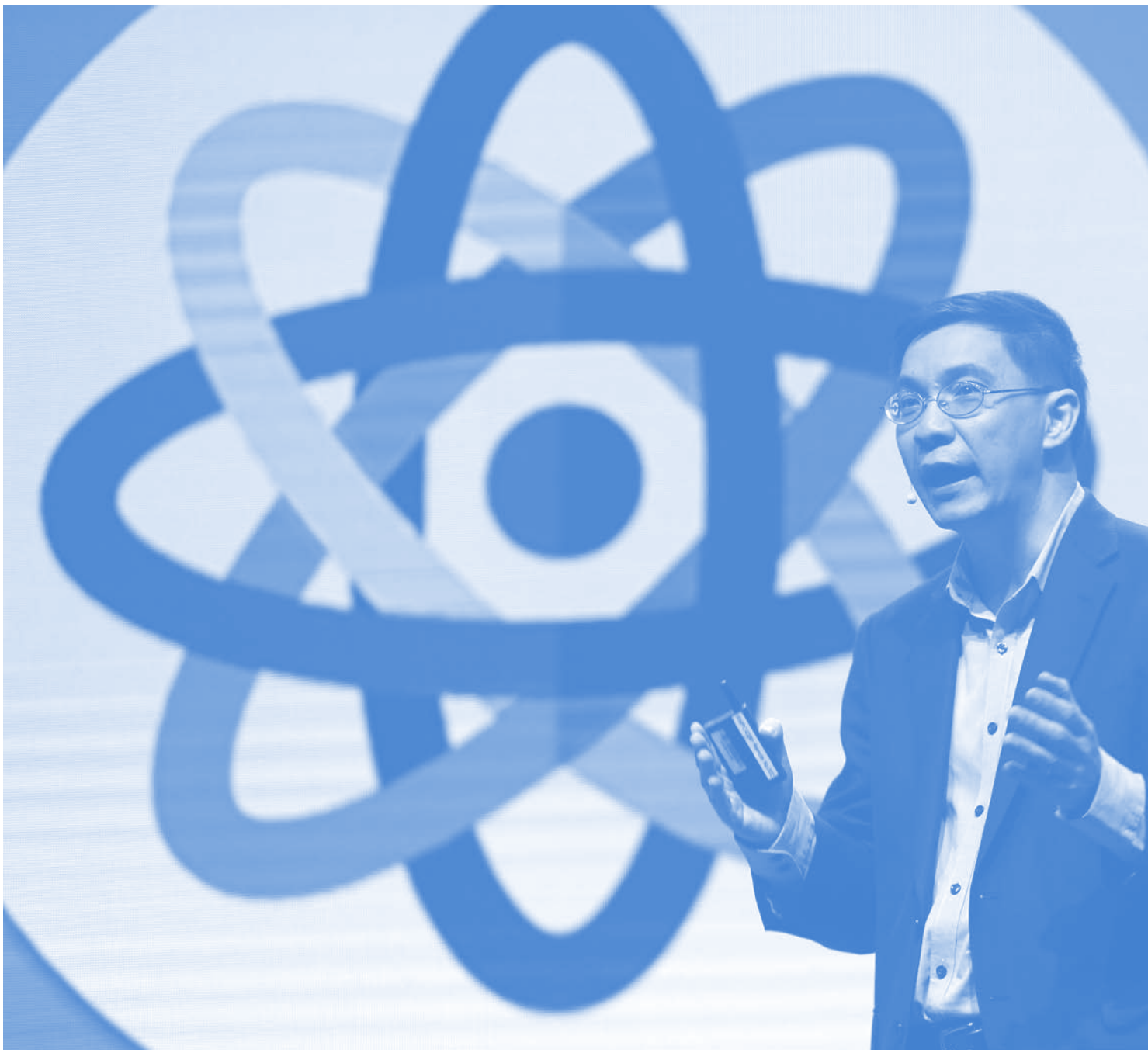


OPENING SESSION: THE FUTURE OF THAILAND IN THE AGE OF TECHNOLOGY DISRUPTION*

Presented by

Somkiat Tangkitvanich

Mankind is living in a rapid technology-transforming world—not only in the physical but also in the biological and virtual worlds. They are all connected; for example, utilizing computing technology in the physical world makes the Internet of Things happen, or in the biological world constitutes bioinformatics. Computing technology consists of four essential technologies—sensor technology, big data, artificial intelligence (AI) and deep learning, and cloud computing.

AI has significantly improved over the past year; for example, AlphaGo Zero won a competition against AlphaGo, which had previously defeated the human Go world champion. The program "Libratus" won poker games against human players, and the robot "Xiaoyi" passed a medical licensing exam. Furthermore, the robot "Sophia" displayed human-like capabilities and even received Saudi Arabian citizenship.

AI advancement has enabled robots to perform tasks similar to humans. The robots possess

* *Summarized from the original presentation by Kittiphat Buaubol, Chawana Huangsuntornchai, and Gunn Jiravuttipong.*

AI HAS BECOME A PART OF MANKIND'S DAILY LIFE. FACEBOOK'S AI CAN RECOGNIZE COMPANIONS BASED ON UPLOADED PICTURES, AND AI USES FACE-RECOGNITION TECHNOLOGY TO DETECT PEOPLE FOR IMMIGRATION CONTROL. MOREOVER, SUCH TECHNOLOGY CAN EVEN IDENTIFY A PERSON'S SEXUAL ORIENTATION.

higher capacity, that is, "brains" to solve problems, and sharper "eyes" to identify and distinguish objects better than humans. In many cases, they have extraordinary "ears" for distinguishing words from sounds, "mouths" to realistically communicate, and "hands" to assemble objects in an unstructured environment.

AI has become a part of mankind's daily life. Facebook's AI can recognize companions based on uploaded pictures, and AI uses face-recognition technology to detect people for immigration control. Moreover, such technology can even identify a person's sexual orientation. Currently, technology can also predict physical traits of a criminal suspect based on DNA (genetic data) left at the scene of a crime.

The capability to memorize and identify human faces will cause disruption with regard to the use of identification cards (IDs), credit cards, and ATM cards, such as when face scanners or selfies are utilized to complete a transaction, or when Chinese officials use face-recognition glasses to collect data and identify citizens on the street, and when such technology is used to analyze the behavior of consumers and staff in "7-Eleven" convenience stores in Thailand.

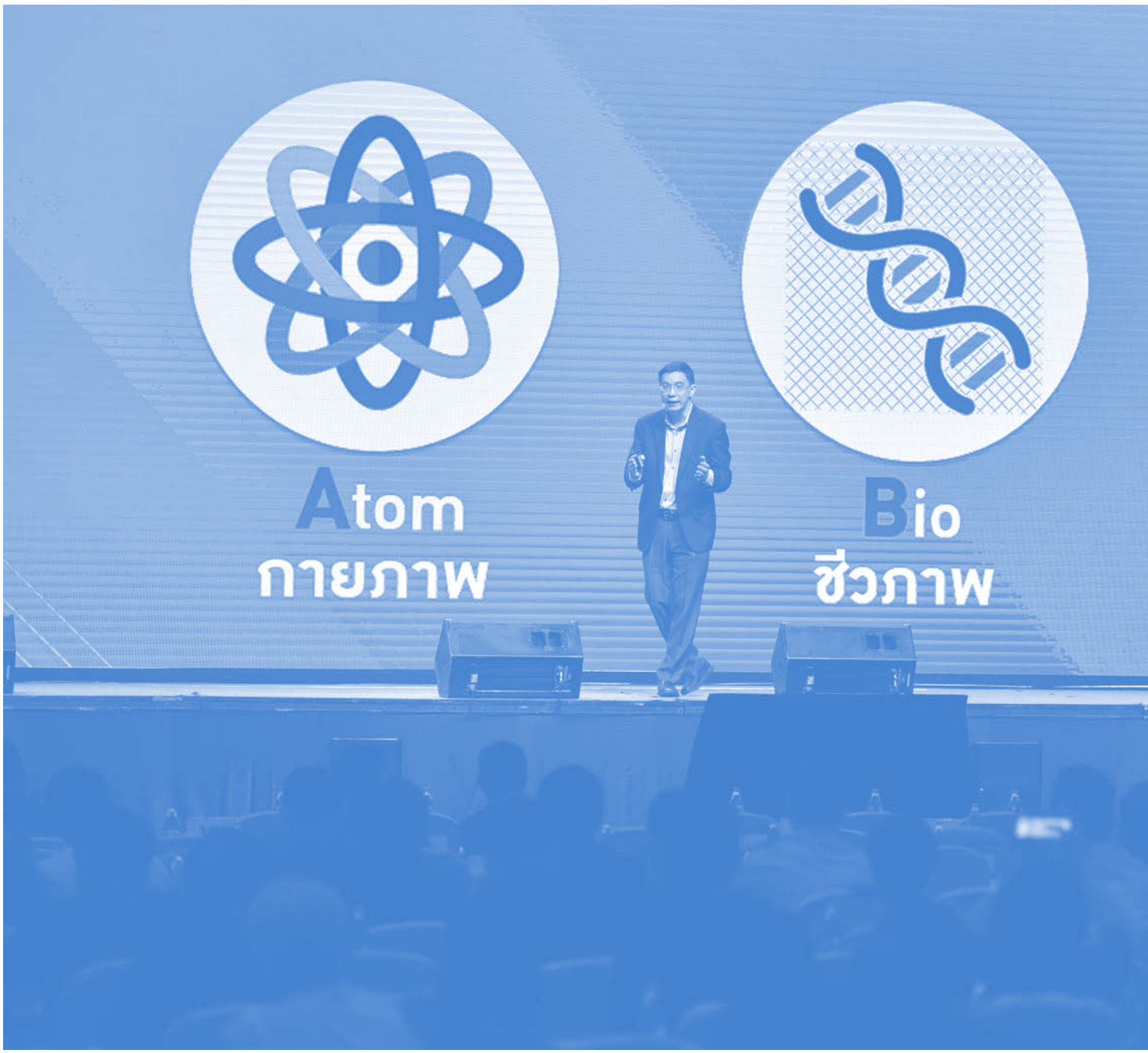
Highly-skilled professions (such as physician) have also been disrupted by AI, which possesses better abilities than a human to diagnose symptoms. For instance, modern technology can diagnose irregular heartbeats (arrhythmia) from electrocardiogram (ECG) signals, predict patients' disease from their medical records, and diagnose lung disease from x-ray scans.

AI can be deployed in various business sectors. In respect of marketing and sales, AI could help in providing customer service and conducting analysis of previous sales figures. In manufacturing and supply chain management, AI could facilitate preventive maintenance by equipping expensive machinery, such as an electricity generator, with sensors so that it can detect deviations in order to prevent potential machine failure and significant loss. Futhermore, AI can help the business sector by detecting and preventing fraudulent trasactions.

Canadian Prime Minister, Justin Trudeau, stated: "The pace of change has never been this fast, yet it will never be this slow again," while Russian President, Vladimir Putin, claimed, "Whoever becomes the leader in this sphere (AI) will become the ruler of the world." Thus, several nations are competing for supremacy in AI development, including the United States, the United Kingdom, and Germany. Another interesting point is that many Asian economies have also entered into competition, such as China, Japan, Singapore, South Korea, and Taiwan, and have announced that they are providing a significant amount of funding to support AI research. China especially has published a larger number of research papers on AI than the United States; it has registered more AI patents than the United Kingdom, and has invested more capital in AI startups than many other countries in the world. By contrast, Thailand has yet to prepare a clear AI development strategy.

For this year's conference, TDRI will examine and exhibit what the future holds for Thailand in the age of technology disruption. Several questions must be addressed. How should Thailand's economic structure and employment sector be reformed in the world of superior robots and AI? How should social welfare systems be transformed when robot automation starts to replace human capacities? How should policies and regulations be adapted to today's challenge of rapid and constant changes?

Thailand must make major transformations. This task can be achieved by improving the country's development model for national growth in the current age of disruption, reforming the education system to equip youth with new skills, ensuring a better quality of life for population through social welfare system, to face the era of disruptive technology, and improving attitudes in the government sector to prepare civil servants for implementing new regulations to facilitate the forthcoming transformations.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RETHINKING THE DEVELOPMENT MODEL IN THE ERA OF DISRUPTIVE TECHNOLOGIES*

Presented by
Somkiat Tangkitvanich & Nonarit Bisonyabut

DISRUPTIVE TECHNOLOGIES IN ECONOMIC SECTORS

Currently new technologies are affecting many markets. The emergence of e-hailing transport services, such as Uber, is one of the many good examples to illustrate this claim. To obtain a traditional taxi driver's license in London, the candidate must remember how to navigate every route in the city—the more than 60,000 of them. On the contrary, Uber enables individuals to become public transport drivers without fulfilling such a demanding requirement, thus defying the existing system while adversely affecting the income of traditional taxi drivers, and as may be expected causing an enormous protest from the affected parties. Such new technologies not only cause disruptions in London, but also in New York, by dramatically decreasing the cost of obtaining a New York taxi driver medallion, among its many other consequences.

* *Summarized from the original presentation by Chakorn Loetnithat, Gunn Jiravuttipong, and Chawana Huangsuntorncha.*

IN THE INDUSTRIAL SECTOR, ROBOT AND AUTOMATION TECHNOLOGY ALSO IS USED FOR MANY PURPOSES. THAI COMPANIES, SUCH AS SIAM GLOBAL HOUSE AND KHON KAEN FISHING NET, HAVE ALREADY INTEGRATED SUCH TECHNOLOGY INTO THEIR OPERATIONS, CAUSING DRAMATIC REDUCTIONS IN THE NEED FOR HUMAN LABOR.

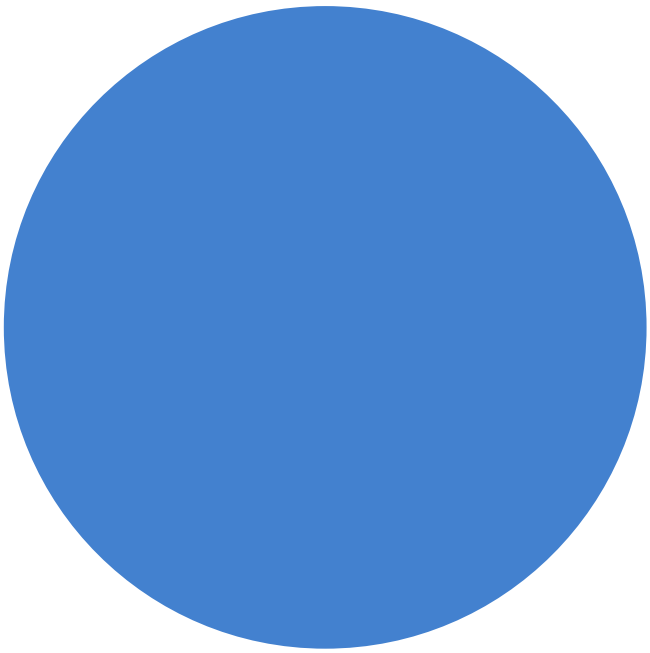
Similarly, such new technologies and related innovations are creating a new economic system—the sharing economy, which enables people to utilize the potential of their assets to the maximum degree possible. Consequently, owning certain assets becomes unnecessary, i.e., people do not need to own a car because they can use Uber for their transport needs. As a result, such a phenomenon will alter citizens' way of life, as well as urban city plans.

EFFECTS ON THE PRODUCTION SECTOR

Every production sector will be affected by disruptive technology. In the agricultural sector, the case of John Deere Company offers an example. The company invented a smart tractor with functions that can be controlled remotely. Japan makes use of a light sensor to determine the quality of Japanese purple sweet potatoes (*murasaki imo*), or even a movement sensor to enhance the production of wagyu beef. In Thailand, the Mitr Phol Sugar corporation uses data from the geographic information system (GIS) and drone technology to improve the productivity of its sugarcane plantations.

In the industrial sector, robot and automation technology also is used for many purposes. Thai companies, such as Siam Global House and Khon Kaen Fishing Net (one of the world's largest fishing net manufacturers, with more than 100,000 items listed in the company's catalog), have already integrated such technology into their operations, causing dramatic reductions in the need for human labor.

Furthermore, Denso Company, Thailand, applies lean automation principles in its automobile parts manufacturing operations. The principle is aimed at reducing existing systems before utilizing automation. As a result, the company was able not only to reduce the human labor component in its system, but also to enjoy such benefits as accelerating the cost of implementation pay off within only one year.

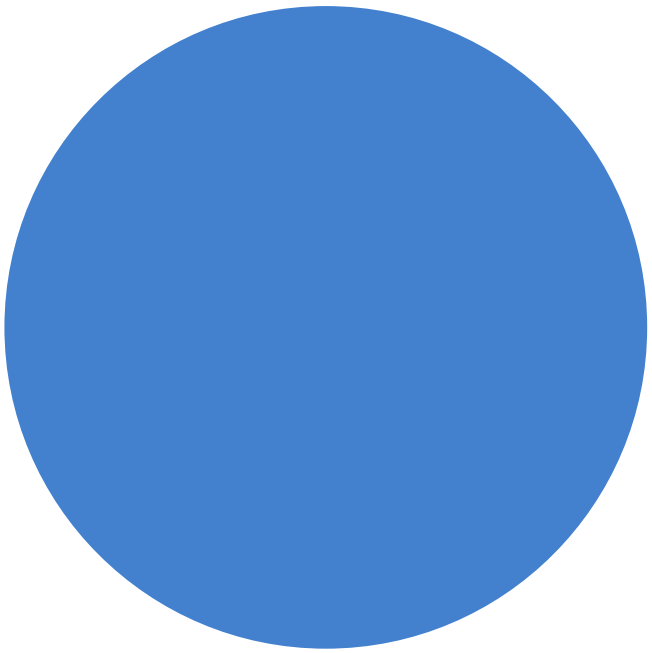


Moreover, service sectors, such as printed publications, radio and television businesses, are also affected by the growth in online media and social media, such as Facebook, and Google. Similarly, e-commerce businesses, such as Alibaba, or even transportation network services, such as Uber and Grab, are causing significant disruptions to businesses in commercial sectors.

EFFECTS ON THE LABOR MARKET

Technology is having a severe impact on the labor market. Many positions, such as those which require repetition of work, will be replaced by disruptive technology in the near future. According to Frey and Osborne,[1] 50 percent of workers in many countries, including Thailand, will be replaced by technology. However, some types of work will not be affected: those known

[1] *Frey, Carl Benedikt and Michael A. Osborn. 2017. "The future of employment: How susceptible are jobs to computerization?" Technological Forecasting and Social Change, vol. 114, issue C: 254-280.*



as "3H work," which consists of work requiring highly skilled craftmanship in an unstructured environment (Hand), creative work (Head), and social intelligence (Heart). Accordingly, creating an adequate number of 3H jobs would be an effective solution for coping with disruptive technologies in Thailand.

THREE POSSIBLE SCENARIOS FOR THAILAND

The goal of Thailand's 20-year National Strategy (2017-2036) is to generate economic growth at an average of 5 percent annually so that the country could escape the "middle-income trap." However, achieving such a rate of growth would not be an easy task due to many factors, including the demographic situation known as population aging or becoming an "aging society." Consequently, there are three possible scenarios which Thailand could face as a result of the impacts of disruptive technology.

Under the first scenario, the Thai economy would experience disruption from overseas. In cases where technology has not been utilized in the production process, the country would fail to respond adequately to technological changes, shifting overseas the existing value added in the Thai economy and causing the loss of approximately 3.1 million jobs. Under this scenario, Thailand's GDP growth rate would average an increase of 2.1 percent annually over the next 20 years, and per capita income would be the equivalent of approximately $8,600 in 2036, an outcome which could be considered as the country's failure to escape the middle-income trap.

In the second scenario, Thailand would disrupt itself by implementing the "Thailand 4.0" policy. That new policy includes the promotion of investments under the Eastern Economic Corridor (EEC) program. However, that strategy could not be an effective response to the challenge because such a strategic plan currently fails to cover the workforce development scheme, especially in the development of AI technology and highly skilled labor. In this scenario, Thailand's GDP growth would reach an average of 3.1 percent annually over the next 20 years, and the per capita income would be approximately $10,300 in 2036. However, despite the fact that some new jobs would be created, they would not make up for the approximately 1.5 million jobs lost. Consequently, this would also mean that Thailand would not be able to escape the middle-income trap over the next 20 years.

Under the third scenario, Thailand would create a "future economy," building on the Thailand 4.0 policy from the second scenario together with the implementation of a strategic plan on AI, and promoting 3H work to create new opportunities in the labor market—the "3C economy"—the following would be one of the outcomes:

(a) Craft economy: An economy focused on the production of goods and services that are exacting and of high value instead of mass produced. An example would be custom-made furniture;

(b) Creative economy: An economy focused on a highly creative skill set, such as fashion design,

film and media production;

(c) Care economy: An economy focused on service skills in meeting physical, emotional and customer needs, such as elder and patient care-taking, and career counseling.

Under this third scenario, Thailand's GDP growth rate would reach an average of 4.3 percent annually, raising per capita income to approximately $12,500 in 2036, and enabling Thailand successfully to escape the middle-income trap.

CREATING 3C ECONOMIES: COMBINING LOGIC AND CREATIVITY

The creation of 3C economies requires high-quality education which combines STEM (science, technology, engineering and mathematics) subjects, and the liberal arts. Accordingly, the Thai education system does not have to be focused solely on STEM because several successful startup companies have been founded by arts graduates, such as Reid Hoffman, the founder of LinkedIn, who holds a degree in philosophy; or even Jack Ma, the founder of Alibaba, who developed his career from the time he had been an English teacher.

Ultimately, where the development model changes, many dimensions—innovations, labor management, as well as welfare systems and government attitudes, to name but a few—also need to be reformed in order to ensure their competency in coping with disruptive technologies.

ADAPTATION OF THAILAND

Comments by Thana Thienachariya (Senior Executive Vice President, Chief Marketing Officer of Siam Commercial Bank)

Technology causes changes in consumer behavior, and thus affects many businesses. The banking sector is one example which would suffer from altered consumer behavior caused by technology. Thus, the business sector should prepare for the changes that will occur in the future.

Developing "3C economies" would seem to offer a potential solution. However, development capacity in Thailand is still limited. For instance, the number of startups in Thailand is relatively few in comparison with those in China where the number of startups is as high as 12,000 units daily.

However, creativity is a valuable asset for Thais. One example is online novel applications. This type of business has generated a substantial amount of profit due to its competitiveness compared with printed publications, and is now expanding its services to neighboring countries.

In conclusion, investing in human development is crucial. Educating the public by combining logic and creativity together with understanding the means of being a global citizen is a necessary step that has to be taken.


ขยายผลทั่วประเทศ
ด้วยภาคี
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Programming Tiger
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สอดแทรกการเขียนโปรแกรม-
สร้างหุ่นยนต์ในวิชาต่างๆ
• สนับสนุนงบประมาณ
มูลนิธิเทคโนโล
เพื่อการ
• อบรมครู-จัดห
ให้โรงเรียนที่ข
• สนับสนุนกิจกร

AN ANSWER TO THE ERA OF AUTOMATION: BETTER LEARNING TO ENCOURAGE THE DEVELOPMENT OF NEW SKILLS*

Presented by
Nuthasid Rukkiatwong & Supanutt Sasiwuttiwat

HUMAN STRUGGLE IN THE ERA OF ARTIFICIAL INTELLIGENCE

Automation is now gaining more ground at an unbelievable pace, and is about to replace a vast number of jobs in the near future. Given the pressing concern about the human role in the current AI-dominated economic scene, questions about the superiority of human labor over smarter robots are increasingly being asked. According to Frey and Osborne,[2] Oxford University researchers, there are three domains of human competence with which AI can barely compete in the foreseeable future: delicacy (power of the hands), creativity (power of the head), and social intelligence (power of the heart). The researchers argued that occupations requiring high proficiency in three competency domains, such as surgeon, will be at lower risk of being replaced. In

** Summarized from the original presentation by Nattanan Ammarananthasak.*

[2] *Frey and Osborn, 2017, The future of employment.*

SMACC, A GERMAN STARTUP, IS ALSO DISRUPTING ACCOUNTING DEPARTMENTS AROUND THE WORLD THROUGH ITS DEVELOPMENT OF MACHINE-LEARNING SOFTWARE FOR TAKING CARE OF SUCH FINANCIAL TASKS AS INVOICE DATA EXTRACTION AND PROCESSING, OPTIMIZED PAYMENTS, AND EVEN LIQUIDITY ANALYSIS.

contrast, those occupations less dependent on those three skills are more likely to become automated. For example, it has been estimated that for data-entry jobs there is a more than 99 percent of chance that they will disappear.

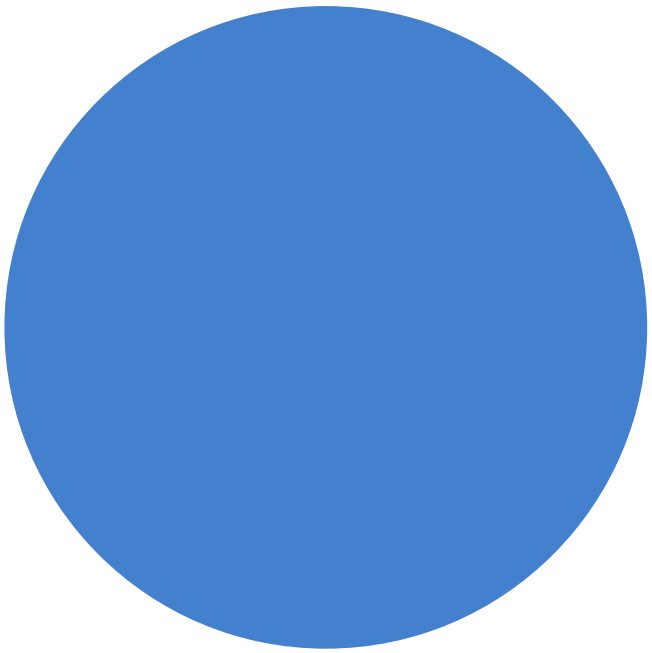
In Thailand, about 8.3 million people are currently working in jobs with a greater than 70 percent chance of being replaced. Almost half of such employees hold a middle school diploma or lower educational attainment. This situation may create the impression that a higher level of education and some technical skills could guarantee a secure job. However, a number of tech companies and startups around the world are proving this notion wrong. SoftWear Automation, a tech startup in the United States, for instance, succeeded in developing automation called "Sewbots" that is capable of carrying out the whole process of T-shirt manufacturing. SMACC, a German startup, is also disrupting accounting departments around the world through its development of machine-learning software for taking care of such financial tasks as invoice data extraction and processing, optimized payments, and even liquidity analysis. Also, several legal tasks can now be accomplished by AI. Robo-Lawyer, for example, is an AI-powered automated system that provides clients with legal consultation. Other innovations include automated contract due diligence, a class of systems which gathers and screens for data relevant to what is called eDiscovery; another is legal analytics, which utilize big data to provide insights for lawsuit strategies. In conclusion, all levels of jobs will soon be affected to different extents by automation.

WHEN CHANGE IS INEVITABLE, ADAPTATION IS THE SOLUTION

Davenport and Kirby[3] proposed five ways that humans could pursue in order to survive in the era of AI: (a) shift to high-level managerial roles; (b) deploy professional expertise in AI development; (c) collaborate with automation efforts to uplift human capability; (d) develop talents or skills in niche fields of expertise; and (e) put more emphasis on the "human touch" in professions. In the case of the legal profession, lawyers may start transferring to the role of project manager, provide legal inputs to the AI development team, distinguish themselves with a particular area of expertise, or become a certain type of lawyers heavily dependent on human skills, such as trial lawyers.

According to Mr. Thientun Neesanant, founder and managing director of SkillSolved Recruitment Co., Ltd., the workforce, and advancements in AI and automated systems are disrupting business processes in almost every imaginable industry. For firms, attracting and retaining digital talent is key to making successful transitions and being competitive. For firms to be preferred destinations for highly sought-after digital talent, employers must offer employees a clear value proposition. LinkedIn's annual survey of Thai digital talent revealed the five most important attributes of job opportunity: (a) excellent compensation and

[3] *Davenport, Thomas H., and Julia Kirby. 2016. Only Humans Need Apply: Winners and Losers in the Age of Smart Machines. HarperCollins.*



benefits (66%); (b) good work-life balance (63%); (c) challenging work (50%); (d) strong career path (40%); and (e) culture that fits one's personality (38%). The survey also showed that the essential skills of the future would be digital skills. The top three requiring digital expertise are AI, big data and cloud computing because they are in high demand but low in supply. To overcome the invasion of AI, both the current and the next generation of the labor force are very much expected to keep reinventing and empowering themselves with digital skills. That is to say, individuals should adapt by setting as their goals self-reinvention and developing skills required to accomplish that goal.

In Singapore, the government plays a big part in this process by encouraging people to reinvent themselves by running an online platform, called My Skills Future, to help Singaporeans find jobs relevant to their profile or existing skills, as well as identify any missing skills. Approximately 24,000 courses, long and short, either run by government agencies or the private sector, are certified by the government. The government also subsidizes up to 95 percent of the fees for such courses; offers each Singaporean a training coupon worth S$ 500; and compensates employers for working hours employees spend on self-reinvention. In some other parts of the world, it is the private sector that is leading the movement. Andela, a startup in Kenya, offers an intensive six-month course in which participants learn about software engineering and earn a livable wage at the same time. After passing the course, selected candidate are subcontracted to join the development team in global enterprises, and they get paid at much higher rates than they otherwise would. The same model can also be applied to address the needs for workforce reskilling and workforce displacement caused by technological innovations and changing economic conditions. A notable example is a United States startup in Pikeville, Kentucky, called BitSource. In order to tackle local unemployment resulting from secular decline in the coal mining industry, this startup retrains former coal miners as computer programmers. This model has been also adopted in other mining regions affected by the diminishing demand for coal. Unfortunately, in Thailand, the government provides little support and subsidy for the training industry, making high-quality training courses too expensive for the general public. In the meantime, Thailand's Department of Skill Development often offers limited choices of low-cost courses, which are mostly focused on basic employability skills and serve only the low-skilled workforce. For all Thais to successfully overcome the great AI transformation, the government needs to pay serious action to and take major steps in promoting the self-reinvention of the Thai labor force. An effective information system should be established to identify market demand, which could lead to an effective career counseling system that would enable match making between market demand and the supply of skilled professionals. As with its Singaporean counterpart, the Thai government should also encourage competition in the training industry and provide cost subsidies so that the Thai labor force will be guaranteed access to various high-quality training courses.

TRANSFORM BASIC EDUCATION TO PREPARE NEW GENERATIONS FOR THE FUTURE

To prepare youth for the future, it is necessary for basic education to equip the new generation with the attitudes, skills and knowledge needed by 21st century learners. Such learners should have the opportunity to develop their curiosity and creativity, and their communication, collaboration, and problem-solving skills through active learning approaches.

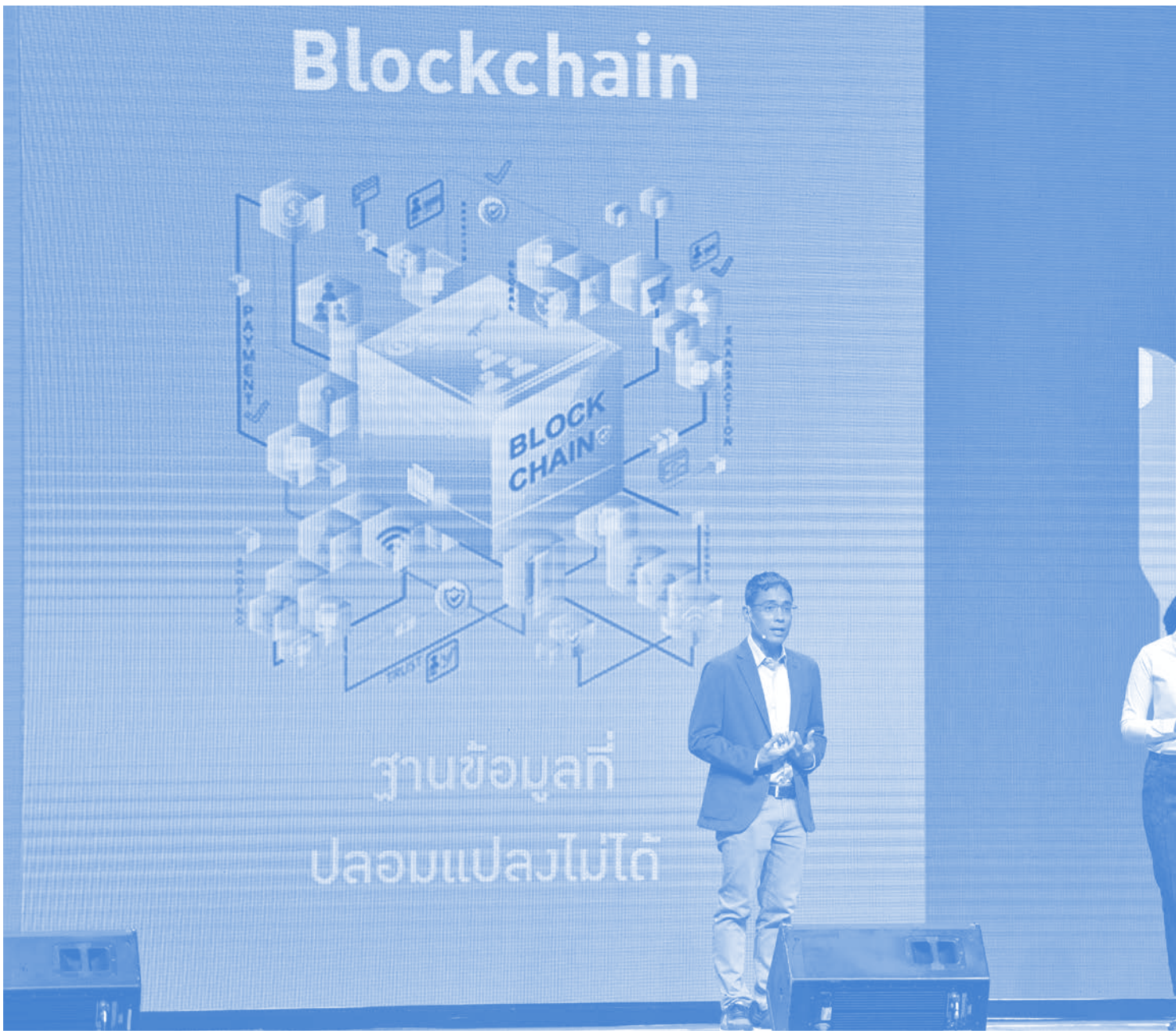
An interesting case study of such an active learning approach can be found in Estonia, a Northern European country where 99 percent of public services are online. Thanks to the vision of the country's leader, computer programming has gained importance in the national curriculum. Estonian students are learning coding through various experiences, ranging from employing visual programming language and building robots to using technology to help the elderly. Such effective learning strategies in classrooms stemmed from the Programming Tiger Project, a collaborative effort involving the government, the private sector and educators. The initiative was originally launched in 20 schools in 2012; currently, it covers 440 of the country's 550 schools nationwide.

AFFILIATION OF REFORMERS: WAY OUT FOR THE THAI EDUCATION SYSTEM

The declining quality of education in Thailand has been a major public concern for several years. The result of the Programme for International Student Assessment (PISA) in 2015 showed that 50 percent of Thai 15-year-olds did not reach even the basic level in reading; for mathematical literacy the result was 53 percent, and for science literacy, 47 percent. A little more than a third (36%) failed in these three subjects, while 54 percent were incapable of collaborative problem solving.

However, there is a spark of hope. Despite the low average PISA scores nationally in 2015, a few underprivileged schools in Thailand were found to have achieved above-average national scores, close to the average score of member countries of the Organisation for Economic Co-operation and Development (OECD), which oversees the PISA exams. In addition, different parties are making attempts to reform the Thai education system. Most remarkable are problem-based learning efforts implemented in alternative schools, personalized-learning software developed by Learn Education Co., Ltd.; Bootcamp, a coding camp, provided by CDG Co., Ltd.; and the Education Disruption Conference and Hackathon 2018, which attracted more than 300 participants.

As Singapore and Estonia have proven, strong partnerships across different sectors and organizations could be the key to successful reform initiatives in Thailand. For the partnerships to work, each player should adjust its role and become more open to different reforming approaches. The educators may endorse the use of technology in learning tools and support the learning of all age groups. Employers could increase their support in terms of reskilling, and the government must be committed to fostering a policy of lifelong learning, with strong emphasis on career change and social mobility among the disadvantaged.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SUBSTANTIAL CHANGES IN SOCIAL WELFARE SYSTEMS AS A RESULT OF THE ERA OF DISRUPTIVE TECHNOLOGY*

Presented by
Worawan Chandoevwit, Wichsinee Wibulpolprasert, Boonwara Sumano & Sittipong Kanakorn

Generally, various types of social welfare systems are available to ensure a better quality of life for the population of eligible people and to diminish burdens on the unemployed, those in poor health, and those having insufficient income, in particular unprivileged persons and their families. Three major aspects were discussed separately by different speakers as follows.

SOCIAL WELFARE SYSTEMS FOR UNEMPLOYED WORKERS

Presented by Worawan Chandoevwit

Currently, formal workers covered under Thailand's Social Security Schemes (SSS) are eligible for two unemployment benefit programs depending on the characteristics of their unemployment status. People laid off from work

** Summarized from the original presentation by Phasith Phatchana.*

receive financial benefits paid by their former employer. People voluntarily unemployed receive compensation benefits from tripartite contributions.[4] Overall, the total value of unemployment benefit expenditure across two decades is about 5.2 billion baht. Of this amount, about 60 percent has been for voluntary unemployment benefits, and 37 percent for those persons being laid off; the remainder has been for those unemployed as a result of the expiry of their contract.

Disruptive technology increases the possibility of unemployment. In the near future, Thailand will face dramatic changes in its employment profile, with an increasingly higher number of people becoming unemployed, leading to a huge expenditure on unemployment benefits. However, the Fund has been only slightly affected, and will remain sustainable for some time. For instance, without financial inputs into the tripartite contribution system and a constant rate of payments for voluntary unemployment benefits, the Fund could still be sustainable for up to seven years. Even if there is an increase in the number of unemployed people and a doubling of unemployment benefit expenditure, the Fund could remain fluid for 3-5 years.

Normally, the unemployment insurance system and the benefits it provides are revised to handle fluctuations in societal structure and the labor market. For example, in Denmark, where the unemployment rate is high and labor unions are strong, a system called "Flexicurity" is implemented. That system has two substantial components: flexibility of employment, and stability of financial supports. Flexibility of employment refers to the ability of employers to flexibly hire or not hire new employees depending on the business situation. At the same time, unemployment benefits must be adequate to cover daily living needs until the unemployed person finds a new job. Moreover, a proactive policy plays a crucial role, such as providing essential skill trainings as required in the labor market; however, implementation of proactive policy costs a huge amount of money. For example, Denmark's proactive policy costs about 1.7 percent of the country's national GDP. However, this is possible in Denmark because the government earns high tax revenues owing to an income tax rate of 55-60 percent of employees' earnings and a 25 percent VAT.

Currently, Thailand's unemployment insurance system is relatively flexible, and employees receive relatively attractive benefits. The country's policy, however, is not as proactive as that of Denmark because the unemployed in Denmark can receive benefits even without proving that they are currently looking for a job. Furthermore, the unemployed do not need to improve their skills while receiving unemployment benefits; they may even just go on holiday. Some unemployed persons could also carry out freelance work. Therefore, consideration should be given to proactive policies. A number of proactive policies for Thailand and their characteristics in the current era of disruptive technology are recommended below.

1. Wage subsidies should be provided for laid-off people to encourage them to return to the labor market. For example, employers are expected to hire new employees when new technologies are being used. Unemployed employees could enhance their essential working skills so that they would be capable of using the new technologies, thereby obviating the need to hire new employees as they would be able to carry out such functions themselves. Financially, unemployed employees could receive both the salary paid by their former employer and the unemployment benefits paid by the government. Unemployed persons could possibly work temporarily for up to six

[4] *The tripartite contribution system in Thailand refers to the employer and employee equally contributing 0.5 percent of the employee's income or a total of 1 percent of income, and the government contributing 0.25 percent of that income to finance the compensation benefit of those who become voluntarily unemployed.*

months. Later, they should be assessed by the employer to decide whether to continue their employment or not. In doing this, the annual expenditure would double, from 1.8 billion baht in the previous year to 3.6 billion baht currently.

2. The unemployment insurance program should be used as needed as a financial source for skill trainings. This approach would prevent employees from being laid off. Various methods can be utilized, such as providing employees with skill training coupons. Such skill training should continue for 2-4 weeks, and weekends or leave days should not be counted as part of the training time. Employees would be expected to use such a coupon only once in three years; moreover, the coupon could not be used by other employees. The cost per head should not exceed 20,000 baht in the course of three years, which is much cheaper than the cost of providing unemployment benefits for laid-off workers. Such unemployment benefits may be about 45,000 baht per person per year.

BENEFITS FOR INFORMAL WORKERS

Presented by Wichsinee Wibulpolprasert

In Thai society, both formal and informal work are key factors driving the economy. More than half the workers are in the informal sector. Informal workers are as those who are not covered by the SSS. In the very near future, the number of informal workers is expected to increase significantly as a result of disruptive technology. Owing to enhanced technology, however, some unemployed people may be able to work as freelancers utilizing online platforms to do so. This type of job definitely meets with job characteristics; the new generation of workers needs more flexibility to participate in such a job market. Business ownership and fewer resources are also issues.

The 2016 Cloud Survey conducted by the McKinsey Global Institute revealed that about 30 percent of all workers in the United States and in the EU15[5] work as freelancers to earn extra money. This phenomenon is quite similar to that in Thailand. For example, a survey conducted by the research department of the Electronic Intelligence Center of Siam Commercial Bank found that many full-time workers in Thailand wanted to have freelance jobs; this trend is expected to increase over time.

In Thailand, during the past few years informal workers have been encouraged to voluntarily join the SSS. Unfortunately, many of them do not want to join the SSS because they are unconcerned about the future, a situation known as "present bias," meaning that these people tend to live day by day, and that they have no, or only a short, future expectation in terms of achievement, in particular those at younger ages. Another reason is that the benefits provided in the program are not sufficiently interesting and attractive. For example, if a person had ever been employed, but then left his or her job, that person would be entitled to two options for receiving unemployment benefits. The first one is that the unemployed person could actually join the Basic Pension Fund (Section 39), although the pension benefits would be reduced to a maximum of three times lower than that allowed in Section 33.[6] Another option is for the person not to join and therefore not receive Basic Pension Fund benefits; instead he or she could receive a full pension benefit, equivalent to the pension benefit of regular employees. However, both options would provide lower benefits than those for formal workers. In another case, if one had never been employed, that person could voluntarily join the Voluntary Social Insurance Fund (Section 40). However, the benefits provided would still be lower than those under

[5] *The member countries of the European Union prior to May 1, 2004 when 10 additional countries became members.*

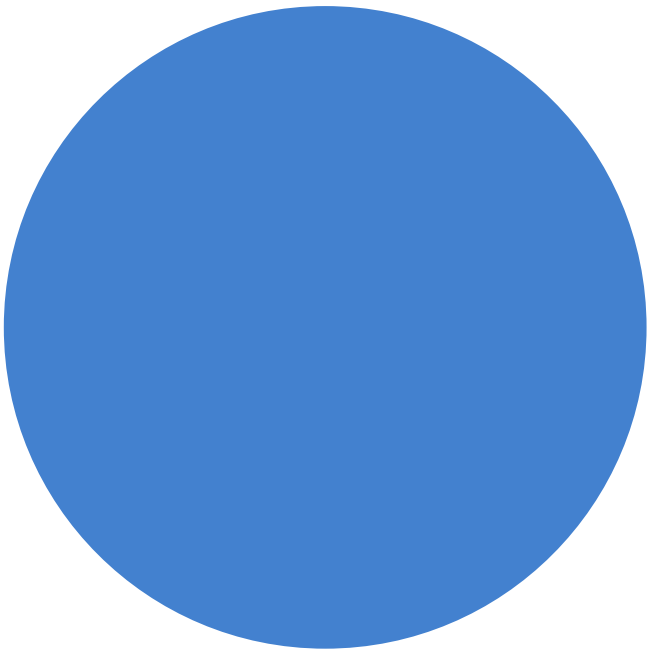
[6] *Insured person under the Section is the employee who has been over 15 years of age and not more than 60 years of age.*

IN THE LONG TERM, THE GOVERNMENT SHOULD FOCUS ON THE USE OF TECHNOLOGY TO ENHANCE IDENTIFICATION TECHNIQUES AND TOOLS TO TRACE FREELANCERS AND IMPORTANTLY IMPLEMENT PROPER DATA COLLECTION DEVICES AND SYSTEMS, PARTICULARLY DATA ABOUT THEIR WORKING HOURS AND EARNINGS, WHICH WOULD BE USED FOR CALCULATING THE CONTRIBUTION RATES AND BENEFITS.

Section 33 because there would be no contribution from the employer. Overall, the benefits provided to informal workers are lower than those afforded to formal workers.

An increase in the number of informal workers who are not covered by any unemployment insurance program could mean that they would become the responsibility of the government. With an increase in the number of informal workers, there would therefore be fewer other workers in the program. In order to stabilize and make the Fund sustainable, its coverage should be expanded. Theoretically, the government should recruit all workers into the Social Security System to ensure that they would all contribute to the Fund as is the case in the United Kingdom. To do so would be very challenging because of the limitation of data to detect freelancers or other informal workers in Thailand. Moreover, data about income and working hours are not collected well; most such data are self-reported, which is not sufficiently reliable to be used for computing proper contribution rates.

Practically, in the short term, Uber and Grab taxi drivers are informal workers; focus on them could be through digital platforms because data about their working hours and earnings are properly collected and also could be used to calculate their contribution rates. However, the benefits provision should be calculated on the basis of their performance, portability, and fairness. In ensuring fairness, the contributions and benefits should reflect the proportion of the work value of each employer from each platform or company. Section 33 of the SSS should cover people in these groups; some details must be adjusted or revised to ensure the portability of benefits. In the medium term, the government should develop recruitment mechanisms by setting up a ceiling for the contribution rate and increasing social security benefits. In the long term, the government should focus on the use of technology to enhance identification techniques and tools to trace freelancers and importantly implement proper data collection devices and systems, particularly

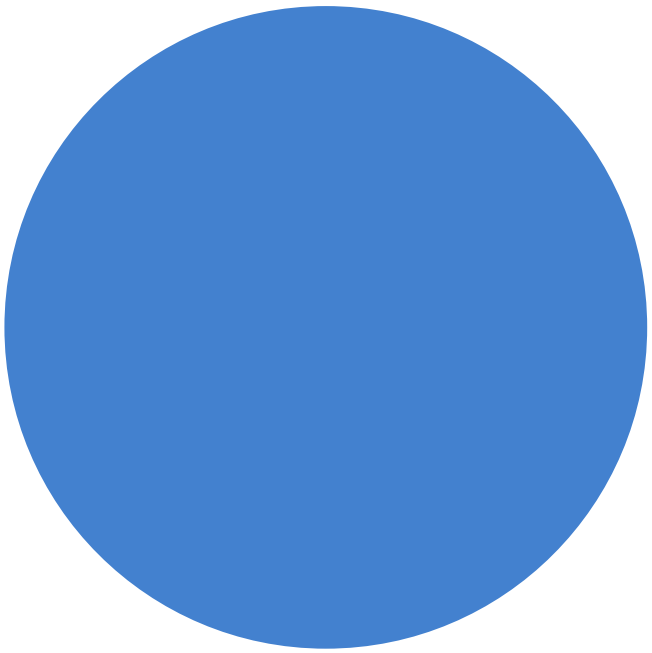


data about their working hours and earnings, which would be used for calculating the contribution rates and benefits.

WELFARE SERVICES FOR THE UNDERPRIVILEGED IN THAILAND, AND THE UTILIZATION OF NEW TECHNOLOGIES TO PROVIDE BETTER ALTERNATIVE STATE WELFARE SERVICES

Presented by Boonwara Sumano and Sittipong Kanakorn

Despite the negative impact of technology on the size of the work force and the sustainability of the SSS, new technology can be utilized literally for better provision of welfare services to unprivileged people. Two aspects will be discussed separately. First, Dr. Boonwara discusses important problems in relation to the provision of social welfare services to underprivileged groups, such as the poor, homeless people, and those who have problems with their legal status and rights. Second, Mr. Sittipong discusses how new technology can be used to better provide unprivileged groups with social welfare services.



Welfare services for the underprivileged in Thailand

Dr. Boonwara mentioned that providing social welfare in Thailand is problematic. For example, there is corruption in the personal identification process of the program called "Support for the poor," or โครงการเงินสงเคราะห์คนยากไร้, which is under the responsibility of the Ministry of Social Development and Human Security. That program is aimed at providing the poor with financial assistance. Eligible persons are supposed to receive a total benefit of 3,000 baht annually in no more than three installments a year. Corruption can take place at two points: the first of these relates to a direct cash payment to eligible persons. Officials and agents who actually pay money to the eligible people may secretly keep for themselves part or all of the payment rather than give it to the needy. The second point is related to usage of the ID cards of non-eligible people to claim for support. To overcome these problems, the Ministry of Social Development and Human Security would like to use bank account transfers instead of direct cash payments to the needy. However, such bank account transfers cannot be applied to all eligible people, as is the case with the Sema Life Development Fund. The Fund is aimed at helping underprivileged girls who are at risk of becoming involved in prostitution. Through the Fund, scholarships are offered to vulnerable girls so that they can study, from secondary school level to the university level, specifically in nursing programs. Over the past 10 years, up to 88 million baht, or half of the total budget withdrawn from the Fund, has been embezzled. This situation occurs because the payment can be made by showing only bank account numbers. For example, the Assistant Secretary of the Board of Directors replaced 22 bank account numbers with numbers not belonging to the needy. Furthermore, there is no mechanism for monitoring and evaluating the process.

Apart from the corruption in the personal identification process, the social welfare system still lacks a proper approach to providing services. Recently, two approaches have been made available. The first of these involves individuals getting paid directly by an agent or officer. Once the individual is called to receive the support payment, he or she must take a journal to the officers for verification. Therefore, the needy must bear some travel costs and loss of time, a situation that is even worse among those with a disability, such as the paraplegic and bedridden who need help to perform activities of daily living. Therefore, this mechanism itself may not be as effective as it should be. The second approach involves a direct payment via the recipient's bank account. While this approach may seem to be convenient and appropriate for preventing fraud, unfortunately the World Bank has found that nearly 20 percent of Thai people do not have a bank account. Also, this approach would be inconvenient for some people, such as those with a disability and those living in remote areas. Further, people without an ID card cannot access the support system because opening a bank account requires possession of an ID card.

Purchasing goods through the "welfare smart card" or "card for the poor" can be done at

only blue flag stores that are equipped for electronic data capture (EDC). Currently, there are only about 20,000 shops that have EDC in Thailand, although the number is expected to increase up to 40,000 shops nationwide—still definitely not enough.

The utilization of new technologies to provide better alternative state welfare services

Although disruptive technology affects employment opportunities, it can also be used to increase access to welfare services among the needy. Approaches for deploying new technologies were discussed by Mr. Sittipong, a member of the National Digital ID Technical Working Group and a co-founder of WS3; he specializes in blockchain and FinTech.

Mr. Sittipong discussed three important types of new technologies: blockchain, digital ID and e-money. Blockchain is a system that stores big data to later perform monitoring and evaluation functions. The digital ID system is used for generating a personal identity. E-money is a payment system for which a bank account is not necessary.

In order to deploy these three new technologies, several steps must be taken. For example, when a case is reported to an officer or agent, all important personal information must be reported and collected in different forms, such as photographs and videos. Later, that information would be used to generate a digital ID. Finally, the person could access support services using this digital ID and e-money system. Once the e-money payment has been made, EDC is not important anymore because a person could choose to use such technologies as the QR code in his or her personal cell phone to purchase goods. Most importantly, all transactions would be automatically stored in the blockchain, and later used for monitoring and evaluation purposes.

To make this approach clearer, using such new technology as digital IDs will surely be better than using current ID cards, because once a digital ID is used, the relevant notifications will show up automatically. This system can prevent the corruption involved with the use of fake ID cards because all transactions will be electronically stored. The information will automatically be updated and used for monitoring and evaluation purposes. By the end of 2018, this digital ID system will be implemented throughout Thailand.

The e-money system is better than a direct cash payment or bank account because it does not require cash payments, bank accounts and intermediate actors. The system requires only a mobile phone. For non-mobile phone users, such biometrics as fingerprints are required. Using an e-money system can widen coverage and reach the majority of people who need support; moreover, it could help minimize the fraud that occurs with direct cash transfers.

However, the role of government in providing welfare services, along with the deployment of new technologies, is substantial. To better provide welfare services, unprivileged people should be categorized into three different groups. The first group comprises those who have both a government-issued ID card and bank account. This is the easiest one. The prompt-pay system can definitely be applicable for this group. The second group is composed of those who have a national ID card but no bank account. The ID number of a person in this group can be digitized so that financial transactions can be made through the e-money system. The third group is made up of those lacking both a national ID card and bank account. To enable such people to access welfare services, officers such as those from the Ministry of Social Development and Human Security can issue a digital ID to these people; in this way, they can use the e-money system to obtain financial support. For all three groups, blockchain technology is also utilized.

REGULATION OF DISRUPTIVE TECHNOLOGY*

Presented by
Deunden Nikomborirak & Tiensawang Thamwanich

1. INTRODUCTION

The world is entering into the great era of the digital economy where digital technology will drastically alter the ways of living and doing business. During the current transition period, three disruptive technologies have emerged, and are showing how such technologies will change the world. The three are: ridesharing applications; drone technology; and initial coin (or currency) offerings (ICOs).

While these technologies will create more business opportunities, without proper regulation they could also generate turbulence for incumbent businesses and the public at large. Ridesharing applications directly compete with licensed taxis, which have felt unfairly treated as their activities are subject to much stricter regulation than this new form of competition. Flying drones can cause public concern over the potential for violation of people's and corporations' privacy and the increased risk of

* *Summarized from the original presentation and updated by Tippatrai Saelawong.*

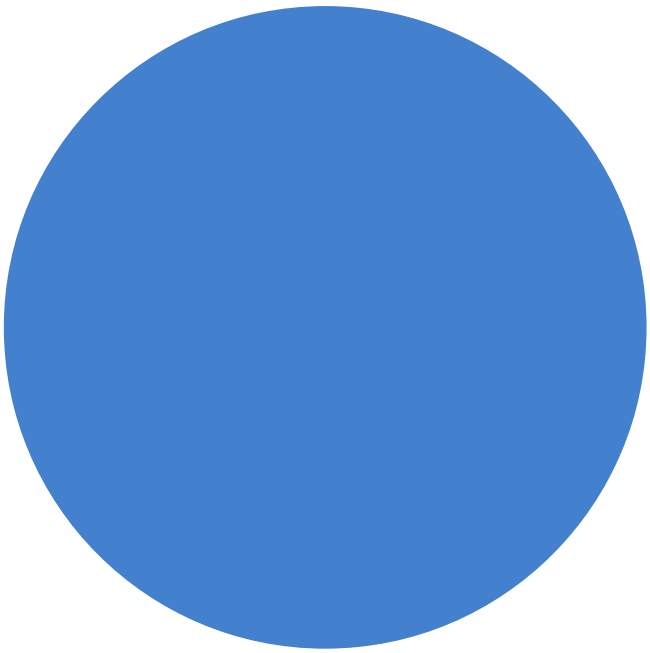
LESSONS LEARNED FROM OTHER SOUTHEAST ASIAN COUNTRIES WOULD SUGGEST THAT THAILAND MUST REGULATE RIDESHARING SERVICES RATHER THAN BANNING THEM FROM THE MARKET. FOR EXAMPLE, INDONESIA PASSED A LAW IN 2015 TO REGULATE SUCH SERVICES, WHILE MALAYSIA, SINGAPORE AND VIETNAM DID SO IN 2017.

collision with airplanes. Unregulated ICOs are of concern to financial regulators because they provide a loophole for investment fraud, or enable abuse through "pump-and-dump" schemes.

The following section provides an elaboration on these issues and end with recommendations on how the government should regulate these three disruptive technologies.

2. REGULATION OF DISRUPTIVE TECHNOLOGY

Ride hailing applications

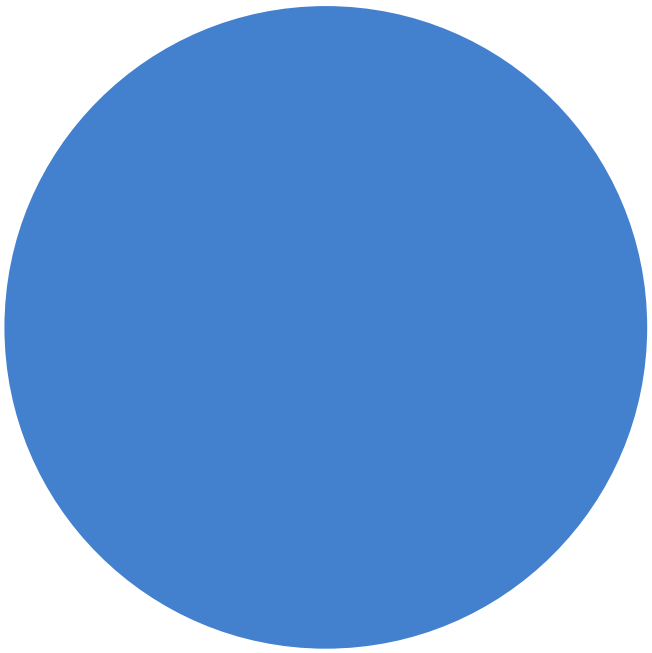


Many passengers have long complained about the bad service offered by drivers of traditional Thai taxis. A NIDA (National Institute of Development Administration) poll in 2014 found that 34 percent of the respondents had been refused a ride by a metered taxi driver. With more than a third of the traveling public having experienced refusal of service by traditional taxis, the emergence of ridesharing applications, such as Grab and Uber, creates an alternative for passengers.

Ridesharing applications have become increasingly popular among passengers for three reasons. The first is convenience. Passengers can call for service via a smartphone and quickly be informed of the estimated pick-up and drop-off times. Second, the driver of alternative means of transport has a greater incentive to pick up passengers during peak periods of traffic as these applications increase the fare, based on dynamic pricing when traffic is moving slowly. Third, many ridesharing platform operators have introduced systems which ensure the safety of passengers and the quality of service. The operators usually accept only drivers with a clean (non-criminal) record and cars in excellent working condition. The passengers can also rate the drivers and give feedback on the service through smartphone applications.

Ridesharing applications started operation in Thailand in 2013. However, as of June 2018, the Department of Land Transport had not yet issued any measure to regulate them. Without proper regulation, ridesharing services are technically illegal. The fact that ridesharing services remain unregulated has made regular taxi operators feel unfairly treated as they are subject to stricter regulations. Regular taxi drivers must pass tests to obtain a taxi driver's license; the taxis themselves must be registered as public transport vehicles and purchase taxi insurance covering the passengers. When it comes to fares, taxis can charge passengers fares fixed by the Department of Land Transport rather than fares based on dynamic pricing. The fixed fares have only rarely been changed to reflect the economic rule of demand and supply. These regulatory discrepancies have thus become the motive behind regular taxi drivers' protest against the entry of competing ridesharing services into their service area.

Lessons learned from other Southeast Asian countries would suggest that Thailand must regulate ridesharing services rather than banning them from the market. For example, Indonesia passed a law in 2015 to regulate such services, while Malaysia, Singapore and Vietnam did so in 2017.



TDRI's 2018 research report, commissioned by the Department of Land Transport, proposed the following preliminary recommendations on the regulation of this issue:

(a) **Rideshare drivers** — ridesharing operators must check the records of rideshare drivers to ensure that there has been no criminal activity. The ride-sharing drivers must possess a public vehicle driver's license and file personal income taxes;

(b) **Vehicles** — the ridesharing vehicles must display a ridesharing decal, sign or placard. They must also be covered by an accident insurance policy which covers the passengers. Inspections of working conditions must be conducted, and the vehicles must pass safety tests at the same standard as regular taxis;

(c) **Fares** — the Department of Land Transport must impose a cap on fares of ridesharing services at three times the fare of regular taxis.

Drone technology

Drone technology was first developed by the United States military in the early 1970s for the purposes of obtaining military intelligence and making airstrikes. Subsequently, this technology was applied to scientific research, in particular weather research. Over time, drone parts, such as motors, batteries and cameras, have been miniaturized and have also become cheaper and lighter. These improvements are now enabling the manufacture of more affordable consumer drones and commercial drones, as well as military ones.

While commercial drones are commonly used for photographing construction sites or farmland, their business applications are advancing. A great example is provided by retail business giants, such as Amazon Inc., which since 2013 has been testing the use of parcel delivery drones called Amazon Prime Air.

The advanced use of drones in urban areas, however, is a source of worry for regulatory authorities. Invasion of people's — and coporations' — privacy is the first concern caused by drone usage because drones are commonly equipped with cameras. Public safety and the risk of crashes with other types of aircraft are other issues.

In 2015, the Thai government introduced the first drone regulation under the Air Navigation Act (1954). According to that regulation, drones are limited to operating within the visual line of sight. The regulation prohibits night flying, privacy invasion (for instance, flying a drone over a house without permission) and flight higher than 90 meters above the ground.

In 2018, the government issued an additional regulation requiring drone registration. Drone users are required by law to request permission to possess a drone, and they must register the drone with the National Broadcasting and Telecommunications Commission (NBTC). Drones equipped with or without a camera but weighing more than two kilograms are subject to registration. Drone users must also file a request with the Civil Aviation

Authority of Thailand (CAAT) for permission to pilot a drone. Failure to register drones subjects violators to a 100,000 baht fine, or up to five years in prison.

Overall, these drone regulations comply with international practices. However, two provisions still need to be reformed. First, there are two regulators of drone use and their pilots in Thailand, namely NBTC and CAAT, while many countries have only one regulator. For instance, in the United States the Federal Aviation Administration is solely in charge of the registration and regulation of drone use.

The second provision is that permission to use drones for commercial or academic purposes is granted under the authority of the Ministry of Public Transportation. This provision creates a legal loophole for political interference in businesses based on drone use. Internationally, the authority to give permission to use drones lies solely with the regulator.

Initial coin offerings

ICO is a new fundraising mechanism. ICO issuers sell digital tokens to investors in exchange for money. Digital tokens are regarded as cryptocurrencies, such as Bitcoin and Ethereum. They are still unregulated by central banks but are managed by distributed networks of users backed by blockchain technology. A digital token can be in the form of a tradable securities token, or a utility token, providing ICO investors with access to future products or services that may be offered by the ICO issuer.

Financing through ICOs is preferred by startup businesses as it is less strict, less costly and quicker than raising money via initial public offerings (IPOs). An ICO does not require any company track record or legal document as IPOs do, but requires only a simple "white paper" describing the abstract idea or purpose of the ICO. An ICO is launched online, meaning that it can reach investors globally within minutes.

The capital value of launched ICOs has grown gradually since 2014. The popularity of ICOs reached a peak in June 2017 when capital funds raised through that mechanism was estimated at US$ 600 million. That marked the first time that ICOs raised capital funds worth twice that of online venture capital investments, which are another fundraising mechanism also liked by startups.

Despite the benefits of ICOs for both businesses and investors, capital market regulators are concerned that they pose serious risks of investment scamming for investors, in particular retail investors. The case of the Useless Ethereum Token, which was launched in 2017, obviously demonstrates that retail investors are not well informed, or they ignore the need to search for information before investing in ICOs.

Useless Ethereum Token

In July 2017, an anonymous person launched an ICO selling a digital token called the Useless Ethereum Token (UET). This ICO issuer explicitly stated on the website (uetoken.com) that the UET had no tradable value, and that this fundraising mechanism did not have any investment purpose. In addition, investors were not provided with a traditional "white paper." Despite this explicit statement of the ICO having no value, this ICO managed to raise more than US$ 237,701.

Source: uetoken.com (2018).

To prevent excessive risk posed by ICO investment scamming, regulators in many countries have taken different measures to regulate them. Models of ICO regulation can be summarized as follows.

(a) **Liberalizing ICOs:** Japan and Switzerland allow investing in all ICOs; it is up to investors to inform themselves in order to prevent risk;

IN 2015, THE THAI GOVERNMENT LAUNCHED ITS "DIGITAL ECONOMY STRATEGY," AND ANNOUNCED ITS AMBITION FOR THAILAND TO BECOME A DIGITAL INFRASTRUCTURE HUB IN THE SOUTHEAST ASIAN REGION. PROGRESS IN IMPLEMENTING THIS POLICY CAN BE MEASURED PARTLY BY THE NUMBER OF STARTUPS OPERATING IN THAILAND, IN PARTICULAR UNICORN STARTUPS. UNICORNS ARE THE MOST VALUABLE TYPE OF STARTUP AS THEY CAN RAISE FUNDS IN EXCESS OF US$ 1 BILLION.

Table 1: Comparison of tax rates for ICOs and IPOs in Thailand and Singapore

Taxes	Thailand		Singapore
	ICOs	IPOs	ICOs
Corporate income tax	20%	Exempt	17% (but exempt if approved by the Economic Development Board)
Withholding tax	7%	Exempt	7% (for utility tokens)
Capital gains tax rate	15%	Exempt	Exempt

Source: SEC (2018); Ressos Legal Pte. Ltd. (May 2018); Withersworldwide (February 2018); and PwC Hong Kong (2017).

(b) **Reserving ICOs only for accredited investors:** the United States allows investment in all ICOs, but only *accredited investors* are allowed to invest. Accredited investors include financial institutions and persons with an annual income of at least US$ 200,000;

(c) **Case-by-case permission:** Canada allows investing in ICOs on a case-by-case basis; however, it requires that a risk test be conducted under limited terms and in an environment known as a "regulatory sandbox;"

(d) **Banning investment in ICOs:** China and South Korea in September 2017 banned investment in any ICO, but are considering the introduction of proper ICO regulation.

Thailand also began to regulate ICOs after the Securities and Exchange Commission (SEC) in March 2018 introduced the Royal Decree on the Digital Asset Business. This regulation is aimed at ensuring fair and transparent investments and transactions related to digital assets, including cryptocurrencies and digital tokens. It stipulates that only businesses authorized by the SEC can undertake an ICO, and they must conduct activities via an electronic portal also approved by the SEC.

The SEC regulation on ICOs was followed by the Royal Decree Amendment of the Revenue Code (No. 19) 2018, which imposed taxation on certain digital assets. Profits generated from digital token investments are considered as personal income and therefore are taxed at the rate of 15 percent.

However, there are discrepancies between the newly introduced tax on income from digital assets and Thailand's capital gains tax. Capital gains on IPOs in Thailand are tax exempt. Thailand's taxation on ICOs also differs from that of Singapore. Capital gains from ICOs in Singapore are tax exempt, while corporate income from ICOs is taxable at 17 percent, although it may be tax exempt if approved by the Economic Development Board.

3. THAILAND'S DIGITAL ECONOMY POLICY

In 2015, the Thai government launched its "Digital Economy Strategy," and announced its ambition for Thailand to become a digital infrastructure hub in the Southeast Asian region. Progress in implementing this policy can be measured partly by the number of startups operating in Thailand, in particular unicorn startups. Unicorns are the most valuable type of startup as they can raise funds in excess of US$ 1 billion.

The technology consulting firm, CB Insights, estimated that, as of 2017, there were 237 unicorns in the world. The most valuable unicorns (the top 10) are headquartered in the United States and China combined. The two highest-value unicorns are the ridesharing startups, the American company

Table 2: Unicorn startups in Southeast Asia

Country of headquarters	Name of unicorn	Valuation (Billions of US dollars)	Industry
Malaysia	Grab	6	Ridesharing
Singapore	Sea Ltd. (formerly Garena)	4.5	Games and e-commerce
Vietnam	VNG Corporation	4.5	Games
Indonesia	Go-Jek	3	Ridesharing
	Traveloka	2	Travel technology
	Tokopedia	1.2	e-commerce
	Bukalapak	1	e-commerce
Philippines	Revolution Pre-crafted	1	Prefabricated houses

Source: CB Insights (2017).

Uber Technologies Inc. (US$ 68 billion) and the Chinese Company Didi Chuxing (US$ 56 billion).

In the Southeast Asian region, five countries (not including Thailand) host the headquarters of some unicorns (see Table 2). However, Thailand has not yet managed to attract any unicorn headquarters, even though it is one the largest economies in the region, and some unicorns, such as Grab and Garena, were co-founded by Thais. Moreover, unicorn startups operating in the Thai market have employed very few highly skilled Thais. Grab has hired only one data scientist, while Garena employs only 10 game developers. These issues bring into question the favorability of Thailand's ecosystem in respect of the digital economy. How beneficial is it for local startups to grow, and how attractive is Thailand for foreign startups to invest?

According to the World Digital Competitiveness Index 2017 of the International Institute for Management Development, Thailand still lags behind its ASEAN neighbours, Singapore and Malaysia, with regard to prospects for the development of digital technologies (see Figure 1). It is urgent therefore that the Thai government improve the quality of its basic education, in particular the teaching of mathematics, and invest more in scientific research and development. On the other hand, certain government regulations, in particular intellectual property protection and the regulations regarding the starting of businesses, remain major obstacles to the development of new technology businesses in Thailand.

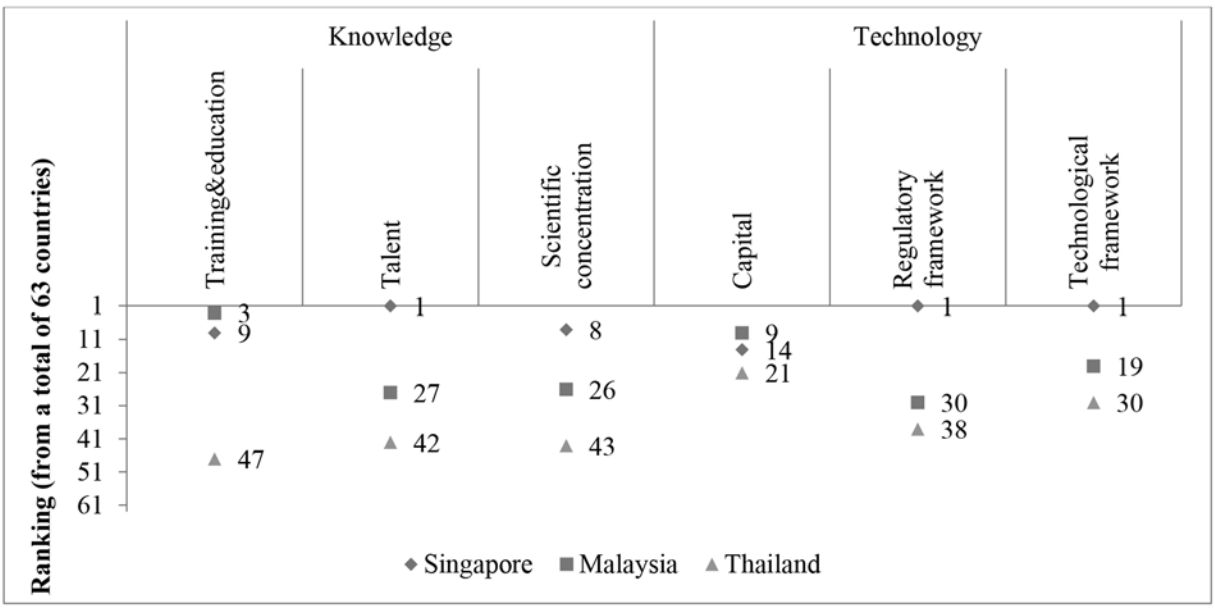
4. RECOMMENDATIONS

Because the emergence of new disruptive technologies is unavoidable, the government must adopt a new framework for the implementation of policies and regulations in order to be able to address the concomitant challenges.

First, it should attempt to better understand the nature and impacts of these new technologies. It should also promote technology development in view of the net benefits for the Thai economy, even if some incumbent business groups may lose out, such as regular taxis in the case of ridesharing applications.

Second, the regulators should abandon "nanny-state" regulations and adopt evidence-based regulations through which the government would assess the regulatory impacts of technology before formulating relevant policies. Regulatory impact

Figure 1: World Digital Competitiveness Index 2017



Note: 1 represents the highest ranking.
Source: IMD (2017).

assessment of disruptive technologies should not be based on case studies occurring in the past (backward-looking regulation) but on forward-looking scenarios.

Regulators should also move from taking a precautionary approach, in which proof of technology impacts is required, to taking a risk-based approach, in which they allow the use of technology but take appropriate regulatory measures depending on the level of risk. For instance, financial regulators may allow the selling of ICOs to retail investors but they also educate them about the risks of the investments and the vulnerability of investors to scamming rather than simply banning ICOs.

To conclude, the appropriate regulation of disruptive technology should be formulated according to the following process:

(a) **Evidence-based** — regulators should establish a regulatory sandbox to test the benefits and risks of the technology. This process would enable the regulator to obtain evidence useful for designing regulatory mechanisms;

(b) **Participative** — all the stakeholders should be open to participating in the regulation design process. They should comprise the incumbents, new entrepreneurs, and potential consumers;

(c) **Well balanced but decisive** — regulators should respond quickly to the risk of and the changes in market conditions. However, the regulatory measures should be sufficiently clear and decisive for businesses to be confident in the direction of government policy;

(d) **Implemented by a stand-alone and single-level regulator** — the regulations should be enforced by a single authorized body in order to reduce the risk of redundancy and unnecessary procedures.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SUMMARY OF THE DISCUSSION ON THAILAND'S DIRECTIONS IN THE AGE OF TECHNOLOGY DISRUPTION*

Panelists:
Kobsak Pootrakool, Decharut Sukkumnoed, Ruangroj Poonpol & Sarinee Achavanuntakul

Moderator: Nattha Komolvadhin

Recent technological advances worldwide have raised concern about how to prepare for consequent changes in the future. The four panelists shared their views on appropriate strategies to prepare for the envisioned changes. The following is a summary of the questions considered and the discussion of each of the panelists.

** Summarized from the original discussions by Supachai Sompol, Pattharapon Yutthasaknukun, Sarunchana Titisawan, Chawana Huangsuntornchai, and Gunn Jiravuttipong.*

DR. KOBSAK POOTRAKOOL, VICE MINISTER FOR THE OFFICE OF THE PRIME MINISTER

The lack of high-value startups (unicorns), the problems posed by Thailand's policies and regulations, and the government's preparation strategies for addressing expected changes in the future:

For people in the past, the existence of today's technologies and how they benefit society would be unimaginable. Nowadays, various technologies have become essential parts of daily life. Therefore, it is logical that the government would prepare itself for changes resulting from technology advancement. Such preparations can be categorized into three main areas, as follows:

1. Improvement of laws and regulations. The government must adjust its approach to regulatory governance because existing laws and regulations are not compatible with the current situation. The government has prioritized this issue and responded to it by establishing a drafting committee to formulate/create new laws and regulations and amend existing ones in order to address the demands and concerns of society, including:

(a) Amending the Civil and Commercial Code to enhance the ease of doing business for startups;
(b) Issuing a regulatory sandbox act to ensure the possibility of working on new inventions while being covered by a legal framework;
(c) Issuing an e-government act as a fundamental part of taking the use of data to the next level—from inventing new technologies to exchanging information among government agencies.

2. Improvement of the capabilities of government agencies. Owing to the fact that regulating bodies lack a perspective on imminent trends, they are unable to perform their roles properly. Therefore, capacity-building becomes crucial for regulating agencies. Furthermore, without proper understanding on the part of regulators, the development of reliable laws alone may not yield any positive results.

3. Determination and willingness to improve Thailand's competencies in order to keep up with international advancements. Overprotection delays development. Despite the fact that there is growing interest in creating startups in Thailand, especially in regions outside Bangkok, such fervor unfortunately has not gained support from the government sector. Having to use a tourist visa to run a startup in Thailand is a good example of the lack of appropriate support. That being said, issuing a special type of visa for launching a startup business could be favorable for such developments.

Government efficiency in enhancing its working capacity to address the current situation:

Other than rethinking and reworking laws and regulations to cope with technology disruption, the government sector also needs to shift its roles—from main driver to facilitator. Further, the government needs not only to foster a more active role by the private sector but it also needs to take into account other stakeholders in society, such as those who reside in rural areas or who may not have access to the same information, or ability to exercise their rights, because, if such people are not nurtured, they may be soon be left behind.

MR. RUANGROJ POONPOL, FOUNDER OF DISRUPT UNIVERSITY AND THE 500 TUKTUKS FUND

The issue of creating a startup in Thailand compared with other ASEAN countries:

Startups in Thailand face three significant challenges that restrict their potential to grow into a unicorn startup, including the following:

1. Delayed formation of startups. Currently, the development of startups in Thailand is in its initial stage compared with other ASEAN countries. Current startups are considered as the first wave and are of moderate size (not too big and not too small). The startups are focused on survivability, thus are less attractive for foreign investment compared with foreign startups.

2. Lack of financial support. Startups in Thailand experience a bottleneck issue with regard to financial support and fundraising. By comparison, startups in Singapore are able to raise more funding compared with a startup facing similar conditions but which are located in Thailand. Therefore, startups in Thailand tend to be undervalued by investors.

3. Lack of skilled professionals. Despite the rapid expansion of startups in Thailand, there is still an unsolved problem with regard to the high demand for skilled workers. Ultimately, foreign workers are solicited in order to compensate for that scarcity.

However, Thailand should not focus on establishing unicorn startups in the initial stage. Instead, it should aim at creating waves of smaller startups (ponies), which would form the base to support the next wave of startups that will become unicorn startups in the future.

Moreover, there are three main agenda items that the government needs to consider in adjusting the ecosystem for the benefit of advancement:

(a) Current laws and regulations need to be adjusted in line with the current situation. Some legislation is currently not enforceable and needs to be amended;

(b) Government enforcement is not effectively implementing the three agendas. Performance indicators may be responsible for that ineffectiveness because the government is focused on results without considering the necessary intervening learning process. The result of such factors, however, might not reflect reality. Therefore, the government should not be focused on such quantitative performance indicators;

(c) Let the private sector be the main driving force for improving the quality of labor through innovation, while the government should act as a supporter. The government could also decentralize its administrative (decision-making) power or functions, devolving them to local or provincial authorities.

DR. DECHARUT SUKKUMNOED, HEAD OF THE DEPARTMENT OF AGRICULTURAL AND RESOURCE ECONOMICS, KASETSART UNIVERSITY

Confidence in the government's ability to cope with disruptive technology: the technologies that will soon disrupt the current workforce, and the government's response to such disruptions:

Automation and artificial intelligence will soon replace some of the current workforce. Labor will then have to adapt to the current technological developments. However, such an adaptation process involving the factors of production, capital, and labor may not be at the same pace and may require a lengthy period, especially in unskilled labor sectors. Moreover, the shortening of the technological development and production life cycles will also pose a challenge for Thailand's labor market. Ultimately, the lack of proper preparation will cause a loss of bargaining power for Thai laborers, and this will widely affect the livelihoods of people in Thailand.

There are three mandates that the government could work on to respond to technology disruption:

(a) **Proactively decentralizing labor training.** The government should focus on the demand side to help labor to develop skills according to the needs of labor;

(b) **Creating specific skills for labor.** For this aspect, the government could create

area-based responses, such as specific development plans for special economic zones that serve local needs;

(c) **Enhancing labor welfare.** The government should provide adequate welfare in response to technology disruption. However, determining what is an appropriate amount of such aid is still being debated, because excessive welfare could adversely affect the incentives for labor to work.

The increased inequality that may arise from technology replacing labor:

Inequality in the labor market is measured by the concentration of labor productivity. The emerging AI and related platforms may increase the density of labor productivity in some industries, such as the ridesharing or social media applications, which are dominated by a small number of firms. In the opinion of Dr. Decharut, the digital age, however, does not guarantee a reduction in inequality, but it provides an opportunity to reduce inequality because technologies lower capital requirements and support the ease of starting a business.

MS. SARINEE ACHAVANUNTAKUL, MANAGING DIRECTOR, KNOWLEDGE DEVELOPMENT OF SAL FOREST CO., LTD.

Technology disruption and the exercise of political rights in Thailand:

Technology disruption does not help provide political space for the people to exercise their civil and political rights. Details of citizens' Internet access can be inspected by the government. Therefore, authoritarians can still control political movements online.

The development of the digital economy is measured by the Digital Revolution Index. In 2017, Thailand received a lower score than in the previous year. The index uses four keys indicators, which include:

(a) **Supply:** infrastructure and access to the Internet;

(b) **Demand:** with regard to consumer demand for digital technologies and services, there is high usage of such technologies and social media in Thailand;

(c) **Institutional environment:** when measured from a legal framework to bolster investment and government transparency etc., Thailand falls behind other countries in the region as there are concerns about electronic transactions;

(d) **Empowerment with regard to innovations and changes:** creation of an entrepreneurial spirit, the courage to take risk, is crucial. However, such changes can be achieved only by creating a proper ecosystem to support citizens to perform without fear of interference by the authorities.

Considering all of the four indicators that help a country develop its digital economy, the main factors which are limiting the growth of Thailand's digital economy are its institutional environment and innovation aspects. Moreover, there is concern about the growth in AI replacing human labor. In this regard, inequality could increase if AI disrupts work, which requires accumulation of experience—building up from basic to advanced skills—to develop one's professional career. An example is paralegal work: humans will face difficulties in developing specific skills to become lawyers in the future.