研究論文

Thailand 4.0 as a Long-Term Economic Policy: Realization of a Self-Sustaining Innovation Ecosystem as a Condition for Becoming a Developed Country

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Abstract: The purpose of this study was to clarify the possibilities for realizing Thailand 4.0 and the challenges surrounding this endeavor based on local information sourced through interviews and related conferences, as well as a review of existing literature on the topic. The direct interview was with Amata Corporation manager and staff, who were in charge of the project in the industrial park. I also had the opportunity to hear from many stakeholders involved in Thailand 4.0, including a lecture by Kromadit. V, CEO, Amata Corporation. In addition to highlighting the background issues that led to the implementation of this policy, we classified the specific trends of various firms toward the realization of Thailand 4.0 according to the efforts of industrial estates. In conclusion, this paper points out that the creation of a self-contained ecosystem-like network for bringing innovation with economic value will lead to the success of this policy. The foreign capital-dependent economic growth model currently being promoted in Thailand was effective in realizing a middle-income country status; however, its effectiveness in transitioning it to a high-income country is limited. This implies that conversion is required.

Keywords: Thailand 4.0, Innovation with economic value ecosystem, Middle-income trap, Endogenous development, High-income country

1 . Introduction

In an effort to break away from the current economic situation in which middle-income countries, such as Thailand, find themselves, and evolve into a high-income country, the Thai government formulated a new policy, referred to as “Thailand 4.0” as part of the country’s long-term economic and social vision[1)]. This policy aims to achieve economic and social transformation that can create sustainable added value[2)]. However, growth due to labor force growth and capital accumulation such as infrastructure is approaching its limit. Hence, the Thai economy is entering what is called a “middle income trap.” A “middle-income trap” refers to a situation in which the economy is stagnant at the middle-income level and cannot enter the developed world. In the future, it will be important to promote industrial sophistication through efforts such as stimulating innovation power. Therefore, the purpose of this study

is to clarify the possibilities and challenges of implementing this policy. This article first describes the background issues that led to the development of this policy. Then, it clarifies the specific trends and efforts of individual management entities toward the realization of Thailand 4.0 based on the efforts of Amata City Chonburi industrial estates. Lastly, the paper specifies the issues that make Thailand 4.0 policy difficult to realize, and the author proposes to study the feasibility of the innovation ecosystem. The author, however, believes that the creation of an innovation ecosystem (a self-contained ecosystem-like flow line for realizing innovation with economic value) will lead to the success of Thailand 4.0.

2 . Literature review

Izumi (2017a, 2017b) and Suehiro (2018), among others, are representative of prior studies in this field. They contributed to showing the current state and challenges of Thailand 4.0 as a policy, where their findings are not always clear. Oizumi (2017a, 2017b) considers the direction and content of Thailand's long-term development policy using the Thai government's recently announced concept of "Thailand 4.0" as a keyword. He says that it is important for Japan as a developed country to contribute to the economic development of Thailand, since both have strong economic ties. This study also examined how Japanese companies should conduct business in Thailand such that it contributes to Thailand 4.0. In his paper, Suehiro (2018) pointed out the effects of Thailand 4.0. He indicates that this strategy can overcome the "middle income trap." The paper also pointed out that Thailand "should aim for a balanced society" rather than a high-income country. The basic knowledge, that is the premise of this paper, was obtained from these previous researchers; based on the information obtained therefrom, we conducted field interviews.

3 . Methodology

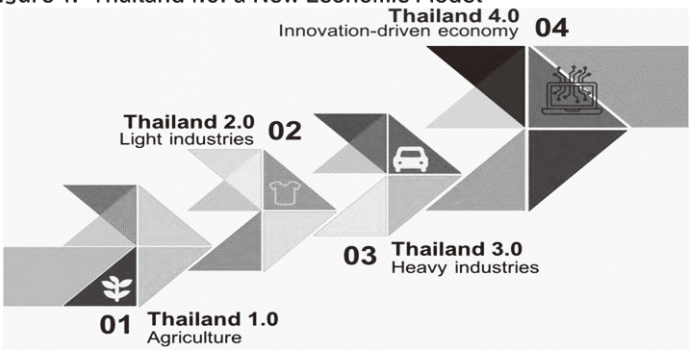
For this study, we used previous research information, as well as current information sourced through interviews with Amata Corporation manager and the staff, who were in charge of the project in the industrial park. I also had the opportunity to hear from many stakeholders involved in Thailand 4.0, including a lecture by Kromadit. V, CEO, Amata Corporation, and other conference lectures. Many companies in Japan are directly investing in Southeast Asia, especially Thailand. Such investments promote this kind of research, ones that help understand the economy of Thailand. In the corporate world, it is desirable to carry out decisions based on the external environment or the macroeconomic situation. As can be seen from the above situation, many suggestions could be obtained from the previous researchers. The initial information was research based, which led to further information collection from a beneficial interview, and a synergy was born.

4 . Results

The development of the Thailand 4.0 policy

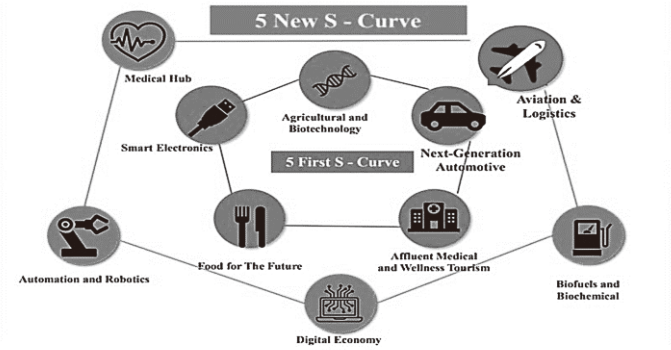
Thailand 4.0 is targeted at transforming Thailand into a value-added society by accelerating the digitization[3] of the economy. This strategy is a long-term development policy aimed at propelling the nation into a developed country in about 20 years (Oizumi, 2017a). The country's agriculture, light industry, and heavy chemical eras, which represent Thailand 1.0, 2.0, and 3.0, respectively, show the progress of its economic and social development thus far (Figure 1). The country is currently in the third stage, and through a national-level strategy formulated to achieve the fourth stage, it is looking to advance past this level. That is, the Thai government is in pursuit of revolutionizing the country into an economy that can sustain added-value creation or an "innovation-driven economy." All four stages are shown in Figure 1. In this strategy, as shown in Figure 2, the key industries of focus to help achieve

Figure 1. Thailand4.0: a New Economic Model



(Source) THAILAND BOARD OF INVESTMENT (http://www.boi.go.th)

Figure 2. Target New Industries

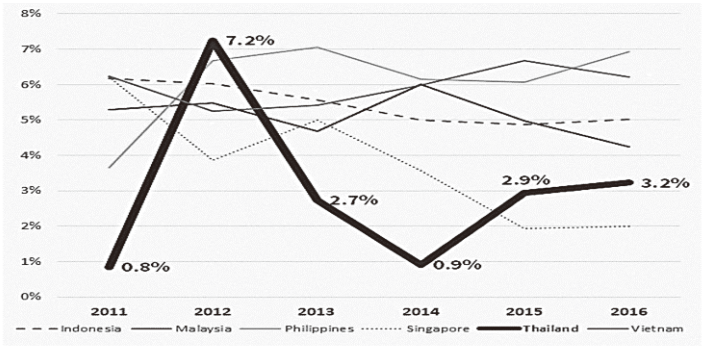


(Source) Chiangraitimes
(https://www.chiangraitimes.com/economy-business/three-strategies-for-thailands-economic-transformation/)

Thailand 4.0 are the high-tech areas and industries, depicting a significant shift from its current focus on the existing industries. Important industries to realize Thailand 4.0 are largely changing. These industries, called “Target industry,” are, for example, Next Generation Automotive, Smart Electronics, Medical & Health Tourism, Agriculture and Biotechnology, Feeding Foods, Robot Industry, Airlines, Logistics, Biofuels and Biochemicals, Digital Industry, Medical Hub Industry, and so on.

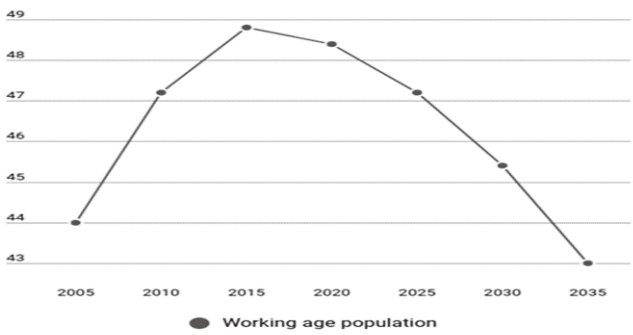
One of the reasons for introducing this development policy is to escape the “middle-income trap.”[4] Thai economy has maintained high economic growth rates over the past half century. Despite the currency crisis, economic crisis, the global economic crisis that followed the Lehman Brothers’ shock, and the disastrous fall in production base due to the flood, the economy has shown stable growth; however, in recent years, the growth rate has tended to be blunt. A middle-income trap refers to a situation where a less-developed country has achieved economic growth and a moderate income level but has subsequently fallen into a slow-growth state, which prevents it from developing further and reaching the “developed country” status. It is characterized by “a growth trajectory that has relied solely on low-wage labor and the additional input of low-cost wages has reached its limits with rising real wages and inefficient investment funds” (Suehiro, 2018). One of the indicators that Thailand is now trapped in this economic situation is depicted in Figure 3, which shows Thailand’s real GDP growth trend in comparison with those of other ASEAN countries. In recent years, the country’s average annual real GDP growth rate has not exceeded those of emerging and developing countries (2016 IMF published 4.4%, 2017 IMF published 4.8%). Figure 4 shows the recorded and projected changes in Thailand’s labor force. It can be seen that the decrease in labor force and the GDP growth rate are in proportion. In order to cope with the anticipated rapid birthrate and aging society, the government pursued a drastic improvement in productivity, and measures to achieve this were required. For this reason, the government identified “three traps” that the country has to overcome and formulated a strategic response to do so (Suehiro, 2018).

Figure 3. Thailand GDP Growth Compared to other ASEAN-6 Countries



(Source) ASEAN UP (https://aseanup.com/business-thailand/)

Figure 4. Thailand's Labor Force



(Source) International Monetary Fund (https://www.imf.org/en/News/Articles)

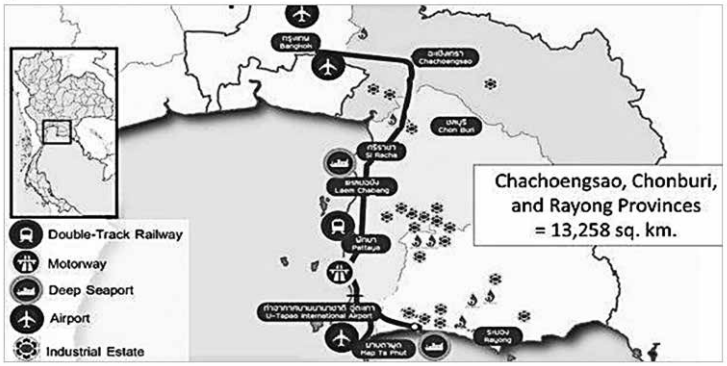
These traps include the (1) middle-income trap, (2) economic inequality trap, and (3) imbalance between economic development and environmental conservation trap. Through the formulated strategy, the country responded by promoting (1) innovation-led growth, (2) inclusive growth, and (3) green (eco-friendly) growth. Suehiro (2018) described the transition that ensued as "From goods to innovation, from industries to technology and creativity, from goods to services and services" (p. 83.). This mission can be viewed as an intention to transform the economic system itself.

Trends toward the realization of Thailand 4.0—Reinvesting in the strategic areas

One of the major impacts on the realization of Thailand 4.0 was Prime Minister Shinzo Abe's (of Japan) visit to China in October 2018. This visit triggered the transition of Japan–China economic relations toward cooperativeness, which led to collaboration between the two countries in promoting China's policy for the "One Belt, One Road" area,[5] a huge economic zone. One concrete form of such cooperation is that of a Japanese–Chinese company jointly developing a business in a third country, in this case, Thailand. The specific initiatives of this venture include the use of AI and IT technologies to improve energy efficiency, transportation network efficiency, urban convenience, etc. In fact, this set of initiatives is a political move to intentionally and indirectly indicate cooperative posture from Japan's side to China's wide area economy. The development in Thailand thinks that Japan with technical advantage is led by the lead. The targeted development areas include the Amata City Chonburi Industrial Estate in Thailand, which is located in the Eastern Economic Corridor (EEC), a strategic area that aims to become the center of industrial advancement in Thailand.

The EEC is an existing development area for three provinces in eastern Bangkok (Chonburi, Chachoengsao, and Rayong) (Oizumi, 2017b) (Figure 5). This area is different from previous privately led developments. It was positioned as a national project to realize the "20-year National Strategy"

Figure 5. EEC: Eastern Economic Corridor



(Source) Sunplay.Asia (https://www.sunplay.asia/thailand-168-projects-in-eec-get-green-light/)

stipulated by the Constitution and is dedicated to investment in infrastructure development at the national level. The area is being developed to further enhance the eastern coastal industrial zone, which was established as an industrial agglomeration zone. The intention is to increase its feasibility. As a preferential policy in special economic zones (special investment preferential areas), preferential treatment, such as corporate tax exemption, has been determined for foreign-affiliated companies investing in these areas.

Amata City Chonburi Industrial estate and the Smart Plan

The Amata City Chonburi Industrial Estate[6], located in the EEC within the Chonburi Province, was opened in 1989 by Amata Corporation (the CEO of which was Wikrom Chromadit at the time). This estate is a representative Thai industrial estate with a total development area of 4,000 ha and lies approximately 57 km east of Bangkok (in 2018, the property name was changed from “Amatanakorn Industrial Estate” to “Amata City Chonburi Industrial Estate”). More than 60% of the current 730 resident companies in this estate are Japanese-affiliated, and well-known companies such as Komatsu, Bridgestone, Denso, and Daikin are listed among them. The total number of employees in the industrial estate is approximately 180,000, of which approximately 3,000 are Japanese. The proportions of the industries operating within the area are 32.7% for “automobile-related,” 32.6% for “steel/plastic/rubber-related,” 9.2% for “service/R&D/logistics/sales-related,” and 8.6% for “electrical and electronic-related” industries (The Bank of Tokyo-Mitsubishi UFJ, Ltd. 2017).

Among the recent issues recognized by industrial estates is the aging of the entire energy management (energy saving) facilities, and the necessity to repair them is becoming more prominent. In order to motivate foreign companies considering new occupancy at Amata City Chonburi Industrial Estate, the addition of distinctive functions is required. The industrial estate hopes to attract companies

entering the market by making it smarter.

Creating a city that makes use of smart factories will differentiate it from other industrial estates. For example, the utility of industrial estates is enhanced by improving their transmission networks so that they can control and optimize the flow of electric power from both supply and demand (smart grid) and the effects of traffic congestion detection and traffic regulation (smart traffic). The Amata City Chonburi Industrial Estate assumed that these will eventually lead to the provision of an optimal environment for tenant companies.

On one hand, since a general smart plan to achieve this level of innovation has been deployed in cities and local communities, various stakeholders, for example, landowners, city designers such as government, utility companies (electricity, gas, water, traffic, and communication), equipment manufacturers, software companies, etc., will be involved. The involvement of various actors with different business types and models indicates that a consistent smart process is difficult to achieve. That is, due to vertical division, consistent smarter promotion will be difficult. On the other hand, the Amata City Chonburi Industrial Estate smart plan can be integrated and promoted. Even if the estate is not a collection of smart functions within an industrial estate, there is a possibility that a situation benefitting all tenant companies can be realized. If successful, the multifaceted development will expand. The estate has the potential to be a model initiative for achieving economic and social transformation that creates sustainable added value.

Clarification of issues that make it difficult to implement the policy

The Thailand 4.0 policy is based on strategy and planning. However, it must be pointed out that the methodology for promoting Thailand 4.0 relies on the current advanced technology and planning power of foreign companies. This means that, excluding the individual micro-level Thai workers in a particular foreign-owned enterprise, it will be difficult for other Thai workers to gain added value universally in proportion to the rising wages. Thus, it is likely that the cause of the “middle-income trap” will not be solved.

To escape from the “middle income trap” and evolve into a high-income country, it is necessary for a country to shift from an economy based on mimicking technologies imported from developed countries to an economy driven by innovation. This solution is also premised on the existence of high human capital that can support such an economy (Ueda, 2018). Unfortunately, in Thailand, the quantitative expansion of education has not kept pace with the sophistication of industry. Figures 6 and 7 include tables showing the comparison of educational levels for Thailand and Vietnam. Vietnam has a lower GDP than Thailand. Nevertheless, it can be seen that the percentage of Vietnamese students who have not reached the basic proficiency level in Scientific Literacy, Reading Comprehension, Mathematics,

Figure 6. Year of Education

	GNI per capita GNI(Gross National Income)	Average years of education for citizens aged 25 and over		Years of education a child of school age will receive	
Year		2010	2015	2010	2015
Thailand	5,690 US$	7.3	7.9	13.3	13.6
Vietnam	1,990 US$	7.5	8.0	12.0	12.6

(Source) Ueda(2018)p.99.

Figure 7. PISA: Program for International Student Assessment

Scientific literacy: Percentage of students who have not achieved basic scientific abilities

	PISA2012	PISA2015	2015−2012
Thailand	33.6%	46.7%	13.1
Vietnam	6.7%	5.9%	-0.8

Reading comprehension:
Percentage of students who have not reached basic reading comprehension

	PISA2012	PISA2015	2015−2012
Thailand	33.0%	50.0%	17
Vietnam	9.4%	13.8%	4.4

Mathematical literacy:
the percentage of students who have not achieved basic mathematical skills

	PISA2012年	PISA2015年	2015年−2012年
Thailand	49.7%	53.8%	4.4
Vietnam	14.2%	19.1%	4.9

(Source) Ueda(2018)p.99.

and Literacy is extremely low (Figure 6, Figure 7). Therefore, it would be difficult to claim that Thailand's human capital has developed and accumulated in proportion to income.

Search for human capital development and accumulation

What measures are being planned to contribute to solving the above-mentioned issues related to the development and accumulation of human capital? An interesting fact about the Amata City Chonburi Industrial Estate is that it focuses on providing an education system that will contribute to the advancement of Thai human capital working for companies in the industrial estate. This is one entity whose policies match those of Thailand 4.0.

For a Japanese company, there is always the problem of how to reduce the number of managers, particularly Japanese managers, who require financial support to work within the country. To achieve this, in addition to making the factory itself smarter, it is essential to upgrade the Thai human capital (on the

other hand, smarter factories make it possible to execute sophisticated and complex work, and they are able to respond even to non-skilled personnel on the production line). The fact that an industrial estate can inherently support this mechanism is a very big incentive. Therefore, the industrial estate is planning to establish a Master's of Science (MS) in Engineering program at Amata University. In addition, it aims to create an academic city by actively attracting universities from overseas, such as Taiwan, Singapore, and Japan to set up campuses therein. It can be said that this initiative aims to develop human capital for employers in the industrial estate and achieve a positive cycle in which the established human capital contributes to the productivity of the affiliated companies. University education can also respond to the development and accumulation of high levels of human capital. It is anticipated that the development and accumulation of substantial human capital can be achieved in order to transform the country to an economy led by innovation.

5 . Discussion

This paper has highlighted the issues and challenges inherent in the pursuit of Thailand 4.0, such as the need to develop and accumulate human capital, and the plans for the Amata City Chonburi Industrial estate, which has the potential to contribute to solving these issues. The point of uncertainty in the efforts made at the industrial estate is whether it will be expanded into a universal innovation hub. Indeed, on the surface, the industrial estate's multifaceted development has the potential to expand and have a positive impact on the Thai economy and society. However, Thailand's industrial estates are operated by foreign companies such as Japanese corporation. Therefore, it is important to develop and accumulate the Thai human capital as employees of foreign companies. This will ultimately contribute to the productivity of foreign companies. The realization of economic development through foreign capital is a useful strategy. However, if the Thai themselves cannot create autonomous business processes that lead to the creation of derivatives or related industries utilizing foreign-owned technology, or if the development of technology does not enable the realization of a Thai company's own flow of innovation, it will be difficult to avoid the middle-income trap. In other words, endogenous industrial development in the region is needed in the future. In addition to achieving industrial transformation that can facilitate the creation of added-value products, the realization of innovation in the productivity of Thai companies is also crucial. In any case, it is necessary for the Thai people to realize innovation creation through autonomous business development while taking advantage of foreign technology. The achievement of the creation of an innovation ecosystem, defined in this paper as "a self-contained ecosystem-like flow line for realizing innovation with economic value," will lead to the success of Thailand 4.0.

Ecosystems are defined in various ways. Originally, the term ecosystem referred to circulation in natural sciences. However, it is often used in the form of regional economic collaboration, such as

collaboration on the market economy and autonomous startups found in Silicon Valley. In recent years, the trend among actors forming a business model has been termed “co-creation,” which creates new value by incorporating different skillsets and technologies that cannot be created from outside the organization. This is almost synonymous with “open innovation.” A point to be noted for organizations seeking co-creation is whether they possess the necessary core knowledge and skills. Without these, is the organization will simply have to rely on other organizations’ knowledge and technology.

In the case of Thai companies, their core knowledge and skills are often not competitive. By utilizing the connection with foreign-affiliated companies, we hope that the elements that become the core of the organization will be polished and developed with autonomy. To achieve this, a core actor is needed to connect the companies. In this case, a foreign company plays a central role in strategic management, which leads to the creation and functioning of an ecosystem. In other words, it determines the extent to which foreign-affiliated companies are responsible. Then, for Thai cooperative companies, the extent to which they will be responsible will be decided based on how to make them more sophisticated and broader. This translates to creating innovation through “co-creation.” This is different from traditional role sharing, which relies on low wages.

To that end, it is necessary to develop and accumulate human capital for Thais, who can draw and execute the autonomous flow lines underlying them. An even greater focus is on improving public education at the national level in terms of quality and quantity. In addition, at the individual management level, it is essential to develop competitive human capital based on the market. In an uncertain market economy, it is necessary to create human capital with independence and autonomy to reduce various risks and create development.

6 . Conclusion

The purpose of this study was to clarify the possibilities and challenges for realizing Thailand 4.0 based on local information. In addition to showing the background issues that led to the implementation of this policy, we clarified the specific trends of individual management entities toward the realization of Thailand 4.0, given the efforts of industrial estates. It clear that the Thailand 4.0 policy was implemented with the recognition that Thailand may be in a “middle income trap.” This policy was an initiative to introduce digital technology and other technologies into the Thai economy and society based on the national strategy to realize industrial sophistication and improve productivity. The plan was to focus on the EEC as a realization area and proceed effectively.

This paper points out that the creation of a self-contained ecosystem-like network for realizing an innovation with economic value ecosystem will lead to the success of this policy. In other words, although the foreign capital-dependent economic growth model currently being promoted in Thailand was

effective in realizing middle-income country status, its effectiveness in transitioning it to a high-income country is limited. This implies that conversion is required.

Notes

1) This paper is a complete academic revision and update of Kiyoshi (2020), which was written as an article for local companies. Access to information gathering has been facilitated by joining the Administration and Management College, King Mongkut's Institute of Technology Ladkrabang.
2) According to comments from senior officials of the Ministry of Industry obtained from various lectures, Thailand 4.0 is based on Industrial 4.0 drafted in Germany. Suehiro (2018) said that given the digital economy that Thailand 4.0 is aiming for, Professor Kotler's Marketing 4.0 also had a strong influence.
3) It is often used to create value by utilizing digital data.
4) It means an intermediate country between "developed countries" and "developing countries," and the World Bank assumes that the gross national income per capita is approximately 1,000 to 13,000 US dollars. It is a concept that is loosely shared in development economics.
5) A broad economic zone concept developed on the "Silk Road Economic Belt" on the land route called "One Belt" and on the "21st Century Maritime Silk Road" on the sea route called "One Road."
6) It is not only the creation/sales of the factory location and mediation of rental factories. In the adjacent area, there are residential facilities, banks, hospitals, convenience stores, gas stations, shopping malls, and golf courses. Town planning is conscious. The opening of Hotel Nikko Amata City Chonburi is expected in 2021.

References

Journal Article References

Ueda Y. (2018) "Human Capital Development and Thailand in a Middle-Income Trap", Doshisha Policy and Managemant Review 19 (2) pp. 93–102.

Oizumi K. (2017a) "What is Thailand 4.0", Research for International Management, RIM 2017 17 No. 66 pp. 91–103.

Oizumi K. (2017b) "What is Thailand 4.0", Research for International Management, RIM 2017 17 No. 67 pp. 99–115.

Ota T. (2018) "Trends in Science and Technology Policy in Thailand", Bangkok Research Contact Center.

Kiyoshi T. (2020) "Thailand 4.0 and Innovation Ecosystem", Hokriku Economic Research, Hokuriku Economic Research Institute.

Suehiro A. (2018) "Getting out of the Middle-Income Trap: Thailand 4.0 and the Capabilities of Big Thai

Firms", Keizai-Sirin, Hosei University, pp. 67–129.

The Bank of Tokyo-Mitsubishi UFJ, Ltd. (2017) "Thailand Investment Environment Report", Mitsubishi Tokyo UFJ Bank International Operations, Report.

Office of the National Economic and Social Development Board (2017) "The Twelfth National Economic and Social Development Plan 2017–2021", Office of the Prime Minister.

Interviews and lecture auditions (executed at various locations in Thailand)

Ishikawa T., Senior Department Manajer – Japanese Business, Amata Corporation. Meeting. 28 October, 2019.

Kromadit V., Ceo A. Corporation. "Smart City" in DIP Japan desk 10 year's celemony. 28 August, 2019.

Boonsiri S. Deputy, Director General, Department of Industrial Works, Ministry of Industry. "Government Strategy for Manufacturing" in Maintenamce & Resilience Asia 2019. 2 October, 2019.

Foo D., Chairman, Sakae Holdings Ltd. "Case Study for Smart City Constraction through Da Nang City Project in Vietnam and Opportunity for International Collaboration" in Maintenance & Resilience Asia. 3 October, 2019.

Garnjanakarn S, Chief Marketing Director, General Manager, Hitachi Asia (Thailand) Co,Ltd. "Enhance Your Smart Infra & Smart Factory" in Maintenance & Resilience Asia. 3 October, 2019.

Ng L, Chief Investment Officer, Amata Corporation. "Smart City Development in Thailand" in Maintenamce & Resilience Asia 2019. 3 October, 2019.

Takahashi S, Assistant, Director, Industrial Safety Division, Industrial and Product Safety Group, Ministry of Economy, Trade and Industry, Japan. "Government Strategy for Smart Manufacturing" in Maintenamce & Resilience Asia. 2, October 2019.