The Development of Thai and Chinese Automotive Industrial Technologies

Krongchan Chantharaphaha
Research School for Southeast Asian Studies, Xiamen University, People's Republic of China
E-mail: jeeeeeoil@yahoo.com

Article History
Received: 6 January 2020 **Revised:** 22 January 2020 **Published:** 30 June 2020

Abstract
China is increasingly progressing in the economy. Now, China becomes the second-biggest economic hub after the USA. Because of the Big Reform, it brings China to technological development. First, it was the science and technologies as the principal production base. Now, innovation is a priority in China's economic development. That makes China one of the most developed countries in terms of science and technology which influences the world. There are also many technologies and AI as a production base in the Automotive industry. The production process and the assembly of the automobile part processes were carried out by robots and AI technologies. It helps to reduce the cost of production and the need for human labor. At the same time, the Thai automotive industry is becoming an electrical automotive industry which is a global tendency. So, the development of technology and innovation is a major concern that Thailand has to follow and has to be ready for a big change in the future. That is the reason why the researcher interests in studying the development of Thai and Chinese automotive industrial technologies. That can reflect the tendencies of China's technological development to Thailand to adjust the automotive industry in accordance with the development of our country.
Keywords : Automobile Industry, Thailand, Technology

Introduction
The China's economy has increasingly progressed. Nowadays, it becomes the world's second-biggest economy after the United States of America. Looking back to the reforming and opening-country paths in 1978, the Chinese Reformation take China into technological development era. In the beginning, sciences and technologies were the main production power of the country. Then, the "innovation" becomes the most important force for economic development. From the scientific and technological execution, the strategic study on capacities of the people in the country and the resort of using innovation to develop the country, it found that the addition of capacity of innovation creation and the technological and scientific reform become a good and important strategy to open China to the world. That represents the cutting-edge advance of the country. For the last 40 years, China has increasingly progressed its technological and scientific advances. The technological and scientific strength is increasingly proceeded in order to fulfill and support the whole economic cycle. That makes China one of the most developed countries in terms of science and technology which influences the world. This situation could be called the "Super Smart Society" which technology plays a crucial role in human life. It helps us to live easier in every aspect. It was maybe called the era which merges the Cyberworld with the reality that uses Artficial Intelligence (AI) as the main driving force (Sirirat, 2019). In the same way, the automotive industry faces this situation both in the production process and in the assembly line. They apply robots and AI technologies to reduce production costs and labor works. For

years, it can be seen in the news relating to every investment including the automotive business that in the first half-year 2017, many Chinese companies became automotive and automobile part manufacturers. They invested in foreign countries for more than 5,500 million dollars. China set his objectives of development that he will develop his industries in order to become world's leader of innovation within 2030. China dedicates to fabricate industrial products which high cost, to move his position to be world's leader of innovation and increase the research and development budget rate from 2.5 percent of GDP to 2.8 percent within 2030. The automotive industry is one of the industries on which the Government focuses. From 2008 to 2017, the Chinese Government had invested in foreign countries for more than 34,000 million US dollars (USD) or more than 1.08 billion baths (Chobrod Co., Ltd., 2018). In the present, there are more automobile products and usages in Thailand because driving is more convenient than using public transportation. The present vehicles have been developed in order to provide drivers and passengers many conveniences such as eco-fuel system and beautiful decorations. Today, the Thai automotive market is going to shift to an era of Electric Vehicle or EV according to the world's propensity. Now, Europe, America, and China have already enforced the law on Carbon Dioxide emission control. In some countries, they set a day to stop fabricating a vehicle using oil as fuel. Because oil price is still at a very high level, it makes many governments start supporting EV productions including the Thai government. In 2017, the Thai government announces to reduce Excise taxes for EV. This made leap progress for Thai EV market as the sale of Hybrid Electric Vehicle (HEV) and Battery for Electric Vehicle (BEVs) progressed increasingly (Phatsawat, 2019).

Technology and Automotive Industry in China

Many people heard about "Artificial Intelligence or AI" which means the event that a computer can think like a human (or even smarter than humans). Today, the composition among the computational power, the big data, and the algorithm, AI could be adapted to use with every domain. An advantage of AI is that it can write calculating-analyzed procedures for a computer to learn or to adjust itself. It is a science of living as human and of self-correction. One of the computer sciences the most interesting nowadays is called "Machine Learning". For the "Big Data", it is a new technology of information storage which is not only big but also smart. It can precisely analyze information from the past to the present. In terms of industry, China has become a bigger EV market than the USA since 2015. Its sale was increasingly augmented from 8,159 cars in 2011 to 580,000 cars in 2017 which was 50 percent of the world. China is the country the most emits pollutions to the world and the world's largest oil import country. That is the reason why the Chinese government pays attention to renewable energies including the electricity in order to solve the environmental problems and the instability of oil prices. So, EV becomes an important factor to economic growth and it is an opportunity for the Chinese manufacturers. The Chinese government has the policy to support EV developments to be the 1st of the world. Since 2015, the use of internal combustion-engine car tends to reduce because of the environmental impacts and the instability of oil prices. So, the use of electric energy becomes an opportunity for Chinese manufacturers. In 2019, an overall EV market in China is very active because there are more than 486 EV registered manufacturers. That is three times more than the EV market 2 years ago. The Chinese government created an environment which is suitable for electricity transport by creating a public charging station, which plans to create more than 12,000 electric charging stations and 4.8 million charging power wire networks within 2020. Additionally, China dedicates to exclude many international investment obligations of this industry in order to create more marketing competition and to push the Chinese manufacturers to develop their potentials. There are also other supports such as the reduction

of Excise tax and Vehicle possession tax. These supports make a firing competition between the new manufacturers (Startup group), who earn financial supports from Alibaba, Foxconn, and China Evergrande Group, and the old brands such as Toyota, Volkswagen, BMW and especially Tesla which has already constructed its own factory in China. Because of fierce competition and stagnancy of sale ratio comparing with the ICE car sale, it makes new car brands do not succeed today. They cannot compete with the popular brands. It is obvious with the continuous deduction of car sale for the last 10 years (starting from 2018). Because of the economic deceleration and tension, it slows the new car purchase down. The development of China's electric vehicle industry represents a commitment of the government by using the "bottom down" method in order to achieve his goal according to the country's development direction. The policy on "Supporting the Fair Competition more than Public Subvention" will help the manufacturers to be ready to compete with foreign companies. According to this situation, it makes Thai automobile-part industries to prepare in advance for a major structural shift in the future. So, cooperation of research and development, relating to the Automobile part between public entities, educational institutes – private and public- and private sections, is a major concern because this will strengthen the Thai automobile demand cycle in the future. (Royal Thai Embassy, Beijing, 2019)

Technology and Automotive Industry in Thailand

The Automotive Industry in Thailand is the largest automotive industry in ASEAN. It is the principal mechanism which propels the "automatic" and "Intelligent arms" development. For the last decade, the Thai automotive industry has been changed in many aspects because there is an adaptation of new technologies into the industry. So, Thai automotive industry has its strength and continuous development under the government's policy. To create "Big Data" is very important because it will connect every production process together. For the Public Policy, it determines that the automotive industry is one of the five "S-Curve" Industries because it is a marketing-potential industry. Now, there are many people interested to be registered as EV manufacturers including EV station providers. It was planned that the production ratio of EV will reach 25 percent of all vehicle production within 2036. In the decade of changes, it is important that the automotive industry must play a crucial role in cooperating with the public sector, the entrepreneurs and the educational institutes in order to help the industry to adjust to a new change (InfoQuest, 2018). Nowadays, the automobile industry strives to develop technology to meet the needs of Smart Mobility, starting with the electric vehicle (xEV) to solve environmental problems and to use energy and technologies in an efficient way. In the same time, it will develop the Connected and Automated Vehicle (CAV) in order to add conveniences and to increases safety, while driving including reducing a problem of traffic congestion. This technology will be developed until it can be a "Fully autonomous". So, the automobile-part manufacturers must develop their potentials relating to the production capacity and to the research and development in order to be able to design and fabricate the "Module" part for the automotive manufacturers. It is still important to have flexibility, preciseness and rapidity in the production process in order to fulfill the needs of automotive manufacturing which now has a very short Model life because of various and changeable needs of the consumer (Project BUS & TRUCK, 2019). The development of Electric Vehicle (EV) is rapidly growing because of the cutting-edge research on industry development especially in terms of the reduction of the battery and automobile-part production costs. Thailand is one of the most important bases of Automotive and Automobile-part production. It is necessary to learn and adjust to the new EV technologies. It was estimated that EV will become popular all around the world in 2020 (Green Network, 2019a). In 2019, the Thai EV market is already thriving because there are many new EV brands. There are already 10 series available for sale. Therefore, the EV attires more interest

and there are more and more EV drivers. The principal factor of using EV is the battery, performance, and price which is competitive to the Internal Combustion Engine car. It also includes the public policy of carbon dioxide emission reduction and infrastructure development such as charging stations and charging period etc. (BLT Bangkok, Lifestyle Newspaper, 2019)

Tendencies of Technological Development in China

In the context of innovative technologies of the world, artificial intelligence (AI) becomes a very strong competition among organizations, such as Google, Microsoft, IBM and Facebook, who rely on the full advantage of their artificial intelligence. The company has increased its investment in the field of research and development, high-quality personnel recruitment, laboratory construction and acceleration of key technology development. At the same time, they will "absorb" AI from the medium and small enterprises by taking over them in order to enhance their overall competitiveness. In addition, each company has launched and created a platform, source of technology and its own ecosystem. Because of the lack of flexibility and new innovations, future works will also be replaced by artificial intelligence whether it is a workforce or a smart work. It is not necessary to use thought, imagination or flexibility. These kinds of the job will be replaced because AI can do it easily. The benefit of AI use is a good profit by using new business models and commercial models. In the new business model, it will apply AI in order to make a leap in development. And it will continuously apply the new business models and commercial models. In addition, the new industry which using artificial intelligence can also be a driving force for the robot industry, the virtual reality industry[1], and the Drone[2] industry. The company's leap development will be dependent on the industrial life cycle. While the world's stream of AI technology, China is not stationary. China is operating in the creation and development of artificial intelligence systems. Mr. Xi Jin Ping, President of the People's Republic of China, declared to build China a new socialist country of the 21st century by using technology and science. China set an objective to be the world's leader of technology within 2050. So, there consistently are many financial subventions to the research and development such as the establishment of scientific and technological institute, the construction of space laboratory, the hi-tech industrial reform, the exploratory submarine, the production of big aircraft, creation of technological companies such as Baidu, Alibaba, and Tencent which are equivalent to Google, eBay and Facebook of the USA. In the development of Chinese innovation, the public sector has an important part in supporting the private sector to develop innovations that can influence the economy. The Chinese government seriously plans to support artificial intelligence technology. In July 2017, the Chinese government has drafted "the development of artificial intelligence for the modern era" which is a plan to promote every research of AI technology based on the factors that change today. This plan has the main objective to make the AI industry market at 1 billion Yuan (approximately 5 billion baht) within 2030. The AI technology development plan is also one of China's major projects called "Science and Technology Innovation Project of the year 2030". The project focuses on the development of innovations from the Disruptive Tech[3] and focuses on long-term development for good results to the country's economy and society. The government also announced a partnership

[1] Virtual reality means that the surrounding vision is generated by the computer. it conveys the feeling and experience in the virtual world. Viewing virtual is required to have a device that received a signal from a computer.

[2] Small planes fly automatically with human control.

[3] Having new technologies to replace existing ones which makes the user more comfortable. It is a tool or an IT device, such as a server or a program that we do not need to invest or even free of charge. If we do not use it for business, we can use those devices through the internet.

plan with the 3 technological giants' companies. Each of them has one AI development project for specific use: Baidu will develop an AI for autonomous driving, Alibaba will develop an AI for Smart City and Tencent will develop an AI for Healthcare (Intelligent Healthcare) (Digital Ventures, 2018). Additionally, in 2025, China will make the national Road Map which is clear to Chinese manufacture for conquering the world's industry by Hi-technological products, known as " Proactive development plan for the technology industry (Made in China 2025)". The objectives are to promote innovation under the concept of pushing production with High-quality innovation, to create a reliable brand, to delete the unpleasant image of "Made in China" products, to improve personnel performance, to enhance overall quality of life, and to use energies with respect to the environment (Digital Ventures, 2018). China aims to dominate the market in 10 industrial sectors: Robot AI, chip, computer, Cloud Service, Airport Railway, intelligent car, Renewable Energy, agriculture, High-tech materials, Pharmaceutical and medical equipment, etc. (The Standard, 2019).

Tendencies of Technological Development in Thailand

At present, the global market gives more important to the electric vehicle. If the Thai electronic industry is reached its stagnancy or reduced its role in the supply chain, it is a better way adapting from auto-parts manufacturing company to an EV electronic parts manufacturing company (Ratirita, 2019). The direction of the automotive industry in the future is that the government will focus more on environmental-friendly driving. So, automobile-parts manufacturing company will be matched with this government policy including the development of sensor and software system for Electric Vehicle (EV). Although Thailand is the beginning of EV using but the government will support the automobile industry to grow by promoting EV production. Currently, the Ministry of Industry is collaborating with the Ministry of Higher Education, Science, Research and Innovation as well as the Ministry of Digital Economy and Society to push the automotive industry and to encourage people to pay attention to the environment, which will help the national economy in every dimension (Project BUS & TRUCK, 2019). Furthermore, the new trend of automotive industry begins to use more robots which are expected that within 2020, Thailand will use robots in the automotive industry, up to 70 percent, the highest in ASEAN and will have more proportion of EV production (Bangkok Entertainment Co., Ltd, 2018). In addition, it is expected that the Thai automotive industry will take 5 years (from 2020 to 2024) to change into the EV since which in accordance with Thailand Power Generation Development plan 2018-2037 in order to Supports future electricity demand (Green Network, 2019b)

Conclusion

It cannot deny the fact that nowadays the automobile industry is focused on the Electric Vehicle: EV". In this era where there are augmentations of oil prices and pollutions, the government decides to support EV production via tax measurements according to the Ministry of Finance announcement on Excise tax reduction for EV, starting from 2018 in order to enhance the sales of HEV, BEV, and PHEVs. In addition, the support of EV production will cause the exchange of advanced technologies between the local manufacturers and international manufacturers. This measurement makes an increase of EV sale in Thailand from 76 percent in 2018 to 83 percent in 2019. It is a significative change which represents that Thailand is going to strongly participate in the EV market in the near future. The government target to support the use of EV of 1.2 million cars within 2036. Thailand is ready in terms of technology and innovation. There are not many people using EV cars today because of its expensive purchase price compared with its performance and convenience. There are not many brands to choose. Normally, people are worried about this new innovation and they still do not understand about the EV car (Ratanakul, 2019) .

However, technological and innovative development is still the main concern to Thailand in order to develop our country. Even if there are already technological development, we still have to continue developing technologies and innovations because the innovation and technologies changes all the time. Now it plays a crucial role in economic development. As we can see from China, he applies technology in many aspects especially industry. So, it makes China the country with advanced and modern technologies more than others. At this point, if we apply the way china using technologies in Automotive production industry to our country in a suitable way, it will help Thailand to develop in many aspects.

References

Bangkok Entertainment Co., Ltd. (2019) . *Year 2020 Thailand Uses Most Robots in Automotive Industry in ASEAN.* Retrieved from news.ch3 thailand.com/economy/ 68778.

BLT Bangkok Lifestyle Newspaper. (2019). *EV Trend! Expected sales Year 2019 to 32,000 cars.* Retrieved from www.bltbangkok.com/CoverStory/รถยนต์ไฟฟ้าไทย-รถยนต์ไฟฟ้า-ยอดขายรถยนต์ไฟฟ้า-สถานีชาร์จรถยนต์ไฟฟ้า-แบตเตอรี่รถยนต์ไฟฟ้า-รถยนต์ไม่ใช้น้ำมัน.

Chobrod Co., Ltd. (2 019). *China heavy invasion with world automobile market.* Retrieved from chobrod.com/foreign-auto-market/จีนบุกหนักลุยตลาดรถยนต์โลก-3633.

Digital Ventures. (2018). *The Rise of AI in China when AI Ecosystem Blooming in a global scale.* Retrieved from dv.co.th/blog-th/the-rise-ai-china/.

Digital Ventures. (2019). Made in China 2025 : China with strategic plans to step to the tech world. Retrieved from dv.co.th/blog-th/Made-in-China-2025/.

Green Network. (2019a). *Drive automotive industry prepare for EV.* Retrieved from www.greennetworkthailand.com/ออโตโมทีฟ-ซัมมิท-2019ev/.

Green Network. (2019b). *Energy preparation for change in Thai auto industry into EV era within 5 years (2020-2024).* Retrieved from www.greennetworkthailand.com/ยุครถยนต์ไฟฟ้า2563-2567/.InfoQuest. (2019). *Thai prepares to establish "Modern Automobile industry Research Center" prepare for automotive industry big change.* Retrieved from www.ryt9.com/s/iq03/2890218.

Phatsawat, B. (2019) . *What happened to the Thai automotive industry?.* Retrieved from medium.com/@bewphatsawat/เกิดอะไรขึ้นกับอุตสาหกรรมรถยนต์ไทย-33e301fd35e7

Project BUS & TRUCK. (2019). *Automobile Institute foresight Thai automotive industry to Smart Mobility.* Retrieved from www.busandtruckmedia.com/16576/.

Ratanakul, T. (2 019) . *When ' electric cars ' will run throughout the Thai road.? Watch Electric Vehicle Policy of other countries.* Retrieved from thematter.co/science-tech/ev-policies/70558.

Ratirita. (2 019). *Be careful of automotive industry! Reduction of the export amount. Result from trade war and economic woes.* Retrieved from positioningmag.com/1249763.

Royal Thai Embassy, Beijing. (2 019). *China's Trends and direction of Electronic Vehicle Development.* Retrieved from globthailand.com/china-06082019/.

Sirirat, C. (2 019) . Prepare to Social Living 5.0 era. Bangkok Business. from www.bangkokbiznews.com/blog/detail/646777.

The Standard (2 018). *Watch policy Made in China 2 0 2 5 of Xi Jin Ping.* Retrieved from thestandard.co/made-in-china-2025/.