

# **CROSS-BORDER INDUSTRIAL EXCHANGES AND COOPERATION: EVIDENCE FROM JAPAN AND TAIWAN**

Kuan-Ju Lin, Aletheia University  
Yahn-Shir Chen, National Yunlin University of Science and Technology

## **ABSTRACT**

*Taiwan and Japan have successively initiated industrial collaboration policy and incentive measures since 2011. Japanese local governments place Taiwan as a key globalization area. They wish to enhance their exchanges and cooperation with Taiwan, leading to significant effects on trade and investment between two countries. Specifically, Tokai region (Tōkai-chihō) and Taiwan have had a close relationship in trade, investment and tourism. After the 2011 Northeastern Great Earthquake in Japan, Tokai region actively promoted industry collaboration and exchanges with Taiwan. This study completes an in-depth interview and questionnaire survey of six companies in Tokai region to investigate the current status and viewpoints of development and topics of bilateral industrial collaboration after 2011. This study finds that collaboration plays a complementary role of industrial advantages for Japanese companies and matches the visions and goals of bilateral collaboration plans. Taiwan and Japan intensively interact to solve the topics faced and identify countermeasures to adapt to the variable situations during the collaboration.*

**JEL:** M38

**KEYWORDS:** Tokai Region, Japan, Taiwan, Taiwan-Japan Industrial Collaboration

## **INTRODUCTION**

To promote bilateral collaboration, Taiwan and Japan signed the Taiwan-Japan Investment Security Agreement in September 2011 and the Taiwan-Japan Industrial Collaboration Bridging Plan (hereafter 2011 Bridging Plan) in December 2011. Further, the Taiwan-Japan Tax Treaty was signed and effective since 2017. The gross industrial output of Tokai region exceeds that of other Japanese areas. According to the Chubu Bureau of Economy, Trade and Industry, five prefectures in the Tokai region (Tōkai-chihō), including Aichi, Mie, Gifu, Shizuoka, and Nagano, actively exchange and cooperate with Taiwan to market their local products and tourism.

The main industrial structure of Japan is similar to Taiwan and focuses on small and medium-sized enterprises (SMEs) which are also the key companies intending to expand overseas investment. The Japanese 2012 Taiwan-Japan industrial collaboration policy places SMEs as a priority target for counselling. Successfulness of bilateral industrial collaboration constitutes an important implication for the governments and SMEs. Hence, this study takes Tokai region as an example to investigate the effects of industrial collaboration on Japan. We first investigate the background, status quo, and direction of the 2011 Bridging Plan to check the results of industrial collaboration. Then, we examine operating strategies, topics faced, and future development direction from the perspectives of Japan. Six companies in Tokai region are investigated, including Haneda & Co. Ltd., Chubu Medical Co. Ltd., Gifu Sanken Kogyo Co., Ltd., Bankyo Pharmaceutical Co. Ltd., CloudMaster Co., Ltd., and Nomura Unison Co., Ltd. Few prior studies examine the effects of industrial collaboration on Japan by interview and survey. To fill the gap of literature, this

study took an in-depth interview and questionnaire survey over four companies and questionnaire survey over two companies between 2013 and 2017.

Our findings indicate that industrial collaboration plays a complementary role of industrial advantages for Japan. Industrial collaboration matches the visions and goals of 2011 Bridging Plan, including cooperative pattern, industrial competitiveness, and expansion of oversea market. Partners of Taiwan and Japan intensively interact to solve topics faced during the collaboration. They identify countermeasures and dynamically modify them to adapt to the variable situations. Further, we find that human resources, particularly the CEO in Taiwan, plays a critical role in the success of bilateral industrial collaboration. With the results of qualitative information, this study fills the research gap and contributes knowledge to the literature of Taiwan-Japan industrial collaboration. The remaining structure of this study is organized as follows. First, we describe current state of Taiwan-Japan industrial cooperation in detail. Next, a literature review and hypothesis development are established. Then, we present the in-depth interview and survey results. In a path forward section, this study addresses how the firms, and the respective governments might move forward in a positive way. We conclude in the final section.

### Current State of Taiwan-Japan Industrial Collaboration

Taiwan signed ECFA with mainland China in June 2010. Liberation of cross-strait trade and investment enhances the advantages of Taiwan to be a fortified point for export to and investment in mainland China. This advantage creates the best opportunity for Taiwan to attract foreign investors. Further, Japan is the most important trade and investment partner of Taiwan and the fourth largest export and import country in 2019. Japan ranked the number four and number one of foreign investment dollars and items in Taiwan during the 1952 to 2019 period. Japan is the largest trade deficit country of Taiwan. Taiwan expects to balance the deficit from Japan. Heavy dependence on Japanese advanced technology, precision parts and equipment produces a large long-term trade deficit. To reduce the deficit, Taiwan successively establishes incentive measures to introduce Japanese capital and technology (Ministry of Economic Affairs, 2017). After ECFA, Taiwan imports from mainland China, which impacts some local industries. To reduce/mitigate the impacts and promote the transformation/upgrade of industry, Taiwanese companies cooperate with foreign companies to enhance their competitive advantages. Mainland China participated WTO in 2001. Cooperating with Taiwan, Japan has more successful cases and is more likely to expand the Chinese market, compared to collaborations with European or American countries. As a result, Taiwanese industrial collaboration policy will develop a new tendency for bilateral collaboration.

Japan encounters the operating topics of “six-fold hardship” after the 2011 Northeastern Great Earthquake. Increasing companies adjusted their business strategies in production, supply-chain and overseas investment (Lin, 2015). Japanese companies incurred the third upsurge of overseas investment in 2010. Mainland China is the first targeted area, but many failed cases appear. Japan gradually exited mainland China after anti-Japanese sentiment soared in 2012. Because of the similarity in language and living habits between Taiwan and mainland China, Japan is more likely to succeed in expanding the market of mainland China if it cooperates with Taiwan. The growth of domestic market demand slowed down due to fewer children and aging society in Japan. More companies transform their market from long-term dependence on domestic markets to Asian overseas markets. Small and medium-sized enterprises (SMEs) are on the mainstream of this wave but have less experience in overseas investment and insufficient resources. To cooperate with Taiwan is one of the shortcuts for SMEs to expand overseas markets because of the long-accumulated business resources in internationalization and globalization by Taiwan (Lin and Chen, 2020).

Japan confidently cooperates with Taiwan because it owns advantages of a complete investing environment, such as high reliability and many Japanese talents. After the global financial crisis, Japan actively pushed policies on foreign investment promotion and overseas investment assistance to revitalize its local industry. Japan aggressively held seminars and exchange conferences to promote investment, tourism, trade, and

culture in Japan. After the 2011 Northeastern Great Earthquake, local governments exchanged and cooperated with other countries to sell products, expand air route and flight bases, and promote the tourism industry (Lin and Chen, 2020). For example, five prefectures in the Tokai region take the lead in exchange and cooperate with Taiwan.

Based on the above background of industrial collaboration, Taiwan took some actions to promote the bilateral relationship and aimed at the expansion of global markets. First, Taiwan and Japan signed the Taiwan-Japan Investment Security Agreement in September 2011 and the Taiwan-Japan Industrial Collaboration Bridging Plan in December 2011 (hereafter 2011 Bridging Plan). Further, a Taiwan-Japan Tax Treaty was signed and effective in the beginning of 2017. Responding to the promotion of industrial collaboration by Taiwan, Japan signed the MOU of Enhancement of Taiwan-Japan Industrial Collaboration Bridging Plan in 2012. The MOU, not limited to manufacturing or service industry, selects 11 industries as the target to jointly strengthen economic exchange in SMEs and local governments (TJPO, 2020). The policy and specific measures of 2011 Bridging Plan are as follows.

Taiwan sets the Negotiation Task Force of Taiwan-Japan Industrial Collaboration in the Executive Yuan and the Taiwan-Japan Industrial Collaboration Promotion Office (TJPO) in the Industrial Development Bureau, Ministry of Economic Affairs. TJPO is the single service counter and platform with Service Team, Project Team, and Japan Window. In addition, Taiwan sets a Japan Window in Japan for service provisions and to promote the progress of industrial collaboration. Pushing procedures include division of labor from vertical to horizontal, and from large-scaled enterprises to SMEs. Patterns of industrial collaboration are composed of business administration, R&D design, production and manufacturing, and marketing. In inception, the rewarded targets include six strategic industries, such as aero-space, semi-conductor machinery, green energy, biotechnology, digital content, and hand tool machine (International Strategic Comprehensive Special Zone New Plan, 2020). To match with the 5+2 industries promoted by Taiwan, the target industries rewarded change to digital content, green energy, information and communication technology, biotechnology, and precision machinery.

Taiwan-Japan Industrial Innovation Park (TJ Park), Tainan Technology Industrial Park, and Pin-Tung Agricultural Biotechnology Park offer the assistance of plant sites for Japan. For capital assistance, Taiwan-Japan SMEs Venture Capital Foundation was established. To cooperate in skill, production, marketing, brand name, and joint venture, SMEs were encouraged to finance from the Execution Plan for Enhancing Investment in SMEs (NT\$ ten billion) and the International Cooperative Investment Project-SMEs Development Foundation (NT\$ 900 million). In addition, each SMEs of Taiwan and Japan are offered an upper limit of financing guarantees of NT\$ 200 million. Japanese companies establishing R&D centers and innovation research in advanced skills and products are financially supported to encourage their R&D in Taiwan. For marketing, Taiwan and Japan have common demand for developing a third market to match with Taiwanese 2016 New Southbound Policy. Bureau of Foreign Trade, Ministry of Economic Affairs, entrusts Taiwan External Trade Development Council (TAITRA) to initiate a cooperative plan to do it. TAITRA invites JETRO to jointly push the plan with a hope to match enterprises in both countries for developing a third market (Shinya 2012).

The 2011 Bridging Plan sets two visions in 2020. One is exerting the complementary industrial advantages to upgrade industrial dominant position and added value. Another is pushing resource integration and exchange in the Asia-Pacific area to create a paradigm of global innovation integration and application. Next, in terms of pushing objectives set in 2016, the 2011 Bridging Plan establishes a task force to push industrial collaboration to fully integrate all resources and to construct a perfect environment. In addition, Taiwan takes advantage of the benefits from ECFA to promote the bilateral industrial collaboration and to develop a global new market (Lin, 2018). Since 2011, Taiwan has hosted a series of seminars or workshop for local and Japanese-affiliated companies to promote the exchanges and collaboration. It includes

Promotion of the 2011 Bridging Plan, Technology Collaboration between SMEs of Taiwan and Japan, or Introduction of Investing Environment in Taiwan.

Based on the background above, Taiwan drafted the 2011 Bridging Plan in November and the Executive Yuan approved it one month later. The 2011 Bridging Plan promotes the exchanges and collaboration between Taiwan and Japan for expanding the market in mainland China with a hope to form a “golden triangle collaboration model” between Taiwan, Japan, and China. Under the 2011 Bridging Plan, Taiwan establishes an organizational pushing system to assist in capital raising, R&D, and acquisition of plant sites (Lin, 2018). To strengthen the exchanges and propaganda with Japan, TJPO signed MOU with eight Japanese local governments between 2011 and 2019, including Mie, Kagawa, Ehime, Kochi, Akita, Kagoshima, Wakayama, and Osaka. Furthermore, TJPO establishes communication channels with more than forty local units in Japan. Through conference, matchmaking, and seminars, TJPO establishes organizational connections with Taiwanese companies by use of complementary industrial advantages to closely accumulate bilateral industrial collaboration relationships. In addition, TJPO facilitates Japanese Ministry of Economy, Trade and Industry (METI) to prepare budgets to support exchanges and collaboration for local enterprises between 2013 and 2019. METI supported 32 exchanges between Japan and Taiwan, creating 2,084 business talks for 580 Taiwanese companies.

## LITERATURE REVIEW, METHODOLOGY AND HYPOTHESIS DEVELOPMENT

Taiwan signed ECFA with mainland China in 2010, enhancing its competitiveness in exports to China. Since 2011, Taiwan and Japan initiated an industrial collaboration policy. As a result, research on Taiwan-Japan industrial collaboration mushroomed after ECFA and can be classified into four types. Type one investigates the industrial collaboration incentives to companies, their experience in mainland China, and the new trend of development in Taiwan. Researchers include Overseas Research Department of Japan External Trade Organization (2010), Nomura Research Institute (2011), Maie (2012), and Li (2012). They find Taiwanese companies have flexible decision-making processes in investment and administration, and quick market responding capabilities. Japanese companies own superior technology skill and strong brand name image. As a result, both countries benefit each other. Type two examines the industrial collaboration model and case study. Lin and Chen (2011) investigate both successful and failed cases in Taiwan. Wen and Chen (2013) illustrates three models of industrial collaboration and related cases. After Taiwanese New Southbound Policy, Li (2018) investigates the development, opportunities, and cases of Taiwan-Japan service industrial collaboration. Main findings show that 2010 ECFA lowers trade barriers between Taiwan and mainland China and enhances the competitiveness of Taiwan to expand market in China. Japan took advantage of the situation through the 2011 Bridging Plan and facilitated more successful market expanding cases in mainland China. Type three focuses on the background, status quo, topics, and performance of industrial collaboration in Taiwan. This stream of research includes Sato and Morinaga (2013), Lin (2013), Lin (2014a), Lin (2015a), Lin (2015b), Lin (2016), and Weng (2017). Their findings indicate that industrial collaboration cases grew quickly after the 2011 Bridging Plan. The main reasons behind for this growth are incentives with mutual benefits and complements for both countries.

Taiwan possesses some unique merits, such as international marketing, business administration and skill, and more Japanese talent. This fills the gap of Japanese insufficient experience in overseas investment. Japan takes Taiwan as an overseas touchstone and base for expanding to the third market. Accordingly, industrial collaboration becomes extremely active after 2011. The three types of research above focus on Taiwan to investigate the industrial collaboration. All of them examine the incentives, background, current status, topics faced, and future development from the perspectives of Taiwan. Instead, type four investigates the effects, countermeasures, and viewpoints of the industrial collaboration from the perspectives of Japan. This line of research focuses on either a region or an area to investigate the effects of industrial collaboration on Japanese central, local governments, and industries. Japanese Tokai region is a good example of areas examined by prior research. Gross industrial output in the Tokai region exceeds other areas. Five prefectures

in the region, including Aichi, Mie, Gifu, Shizuoka, and Nagano, actively exchange and cooperate with Taiwan after Japan's Northeastern Great Earthquake on 11 March 2011. More and more prior researchers investigate the five prefectures after 2011. For example, Sawada and Lin (2012) investigates the investment incentive policy and the trend of foreign companies in Tokai region.

Lin (2015a) and Lin (2016) compared the viewpoints of industrial collaboration in Mie and Achi, while Lin (2014b) and Lin(2015b) and Lin, Li and Nishinmura (2016) examine industrial collaboration between Mie and Taiwan after ECFA. Comparisons of viewpoints from Gifu and Shizuoka appear in Lin (2017a) and the countermeasures of Shizuoka to promote industrial collaboration are examines by Lin (2017b). The effects and countermeasures of collaboration policy on Gifu and Tokai region are investigated by Lin (2018a) and Lin (2018b), respectively. Focusing on the five prefectures in Tokai region, Lin and Chen (2020) compare the effects of the collaboration policy on them, their willingness to cooperate with Taiwan, and the topics they face. The above researchers find that Japanese SMEs lack overseas investment experience. In contrast, Taiwan meets their demand due to pro-Japanese attitudes, more talent in Japanese, rich experience in overseas investment, international marketing and business administration. As a result, Taiwan is the best overseas partner of Japanese SMEs. However, only six strategic industries are promoted by the 2011 Bridging Plan. Inclusion of more industries is suggested to match the industrial development policy and industrial competitiveness. This study examines six companies in Tokai region between 2013 and 2017. They are Haneda & Co. Ltd., Chubu Medical Co. Ltd., Gifu Sanken Kogyo Co., Ltd., Bankyo Pharmaceutical Co. Ltd., CloudMaster Co., Ltd., and Nomura Unison Co., Ltd. We conduct an in-depth interview and questionnaire survey of the companies. Basic information of the case companies is displayed in the Table 1.

Table 1: Fundamental Data of Six Case Companies

Companies	Haneda	Chubu	Gifu	Bankyo	Cloud Master	Unison
Industry	Merchandising	Medical equipment manufacturing	Caster manufacturing	Pharmaceutical	Information	Machine manufacturing
Partner in Taiwan	tmsuk Formosa	NanoRay	Hong-Yi	Chung Mei	TOKAI	NCT
Size (number of employees)	89	60	36	130	16	400
Year founded	1951	1950	1973	1960	2013	1954
Place founded	Nagoya	Mie	Gifu	Kobe	Shizuoka	Nagoya
Survey Time (day/month/year)	05/07/2013, 04/08/2013, 29/08/2014, 06/07/2015.	09/2015	24/07/2015, 23/08/2015.	02/2017	05/04/2017	29/08/2017
Methodology	In-person interview	Emails	In-person interview	Questionnaire survey	In-person interview	In-person interview

*Note: Table 1 summarizes the information of six case companies, including the industry, partner in Taiwan, size, year founded, place founded, survey time, and methodology used.*

In-depth interview is a repeated and flexible design that interviewers can modify their issues continuously during the process (Babbie 1991; Marshall and Rossman 1995). As a purposive and interactive dialogue, in-depth interview is a means and an end as well. Both the interviewers and interviewees can construct new or innovative implications in the interview (Fontana and Frey 1994; Babbie 1991). Through the in-depth interview, the interviewers acquire deep, detailed, and comprehensive information (Rubin and Rubin 1995). Entering the mindset of interviewees to comprehend their mental activities and thinking, the interviewers deeply understand the background of behavior and determinants affecting the behavior (Wimmer, Landerl, Linortner and Hummer 1991; Wimmer and Hartl 1991). Hence, the interviewers have more opportunities to capture the interviewees' viewpoints, belief, experience, and lexicons on issues (Fontana and Frey 1994). Based on the previous literature and official statistics, this study expects that industrial collaboration agrees with the pattern, competitive advantage, and Japanese aim of overseas market expansion. Further, it

complements the industrial advantages for Japan. Accordingly, this study establishes the following hypotheses.

*H1: Industrial collaboration matches the cooperative pattern, competitiveness, and expansion of Japanese oversea market.*

*H2: Industrial collaboration plays a complementary role of industrial advantages for Japan.*

## IN-DEPTH INTERVIEW AND QUESTIONNAIRE SURVEY RESULTS

### Haneda & Co., Ltd.

Haneda & Co., Ltd (hereafter Haneda) was set up at Nagoya in 1951 with overseas branches in Thailand, China, Indonesia, Singapore, and Taiwan (Haneda & Co., Ltd., 2020). It imports and sells domestic and foreign machinery equipment (machine and tools). Its customers include industries such as automobile, work machinery, aero-space, construction machinery, robot, and semi-conductor. Automobile manufacturing industry, in particular, is one of its major customers. Its sales amount follows the production trend of Toyota. For example, the number of cars produced by Toyota reached its peak of 422 million in 2007. Because of the 2008 global financial crisis and the 2011 Northeast Great Earthquake, the car production number in Toyota dropped to 276 million in 2011. The sales amount of Haneda was JP\$ nine billion in 2008 and was substantially reduced to JP\$ six billion in 2012. Haneda thus predicted that growth of domestic car production in Toyota will slow down.

We visited Haneda three times, 5 July 2013, 4 July 2015, and 6 August 2017. We also visited an affiliate of Haneda in Taiwan, tmsuk Formosa, on 29 August 2013. All of the visiting was conducted by an in-person interview with executives of the company. Due to the slower growth of Japanese domestic car production, Haneda adjusted its operating strategy to maintain its continuous growth in businesses and revenues. It expanded business fields into automobile parts, semi-conductor manufacturing equipment, medical and nursing machine production. Accordingly, to expand business fields into medical and nursing machines, Haneda engaged in industrial collaboration with tmsuk Formosa, a company with technology in producing robots (tmsuk Formosa Company Limited, 2020). The tmsuk Formosa was established in October 2011 and its parent company has accumulated over twenty years of experience in the R&D of OEM and ODM of service robots. It invested in Indonesia in 2013 to manufacture the same robots as that of tmsuk Formosa. Eighty percent of the Indonesian robots are delivered to Japanese electric car companies.

Haneda is interested in investing Taiwan due to the following niches. Taiwan owns more talent in Japanese and production skill, higher technology in production and manufacturing, lower production cost, conducive to the development of the China market. This occurs because of the similar lifestyle between Taiwan and China and higher sense of trust in Japan. Also, Taiwan has more complete infrastructure than Southeast Asia countries. Further, the law and regulations change frequently in Southeast Asia countries which produces a secret worry for Japanese companies investing there.

When conducting joint ventures, Haneda and tmsuk Formosa have a division of their operating strategies. Haneda is responsible for capital raising and utilizes its capital from Singapore branch to invest the tmsuk Formosa. The tmsuk Formosa takes charge of the production skill, and R&D. Its authorized capital was JP\$ 240 million on May 2017 and its president is Yuji Kawakubo. The tmsuk Formosa hires 12 Taiwanese employees and one Japanese employee, the president. The tmsuk Formosa takes an ODM model on the production of machinery products and the manufacturer is Taiwan Machinery Corporation. The main medical and nursing products of tmsuk Formosa include pre-hospital care robots, universal vehicle ROOEM, and dental robots DENTAROID. In 2017, it expanded business into a new product line, including ceiling-construction robots and new idea electric vehicles.

In terms of market target, the main target markets of tmsuk Formosa are Europe and USA. For example, the selling price of a universal vehicle ROOEM is JP\$ five hundred thousand and a dental robot DENTAROID is JP\$ twenty million. Currently, they are exported to USA, Saudi Arabia, and Thailand. From the perspectives of investing pattern and target market, H1 receives support. The industrial collaboration between Haneda and tmsuk Formosa matches the cooperative pattern, competitiveness, and expansion of overseas markets for Haneda. Haneda is good at the export and sale of machine and machinery tools. It invested in the business field of medical and nursing machines in 2011. However, Haneda does not acquaint itself with the production skill of these machines. Haneda transferred its equity holding in tmsuk Formosa to tmsuk Co., Ltd. in Japan in 2015 and held 5-10% equity of the tmsuk Co., Ltd (Tmsuk Company Limited, 2020). Haneda has no further investment in Taiwan because of the higher production cost compared to Southeast Asia. After the successful investment in Indonesia, Haneda currently engages in investment in Thailand. Because of its expertise in the sale of machinery equipment, Haneda assists tmsuk Formosa in marketing its products. The merit of Haneda is marketing and tmsuk Formosa is production. Through the industrial collaboration, both companies assist and benefit each other. Hence, H2 is supported, that is, industrial collaboration plays a complementary role of industrial advantages for Haneda.

#### Chubu Medical Co., Ltd.

Chubu Medical Co., Ltd (hereafter Chubu) was originally established as a medical electrical company in Yokkaichi-shi, Mie, Japan, in 1950 (Chubu Medical Co. Ltd., 2020). It was renamed as Chubu Medical Co. Ltd. in 1969. After acquiring the medical production license from Ministry of Welfare in 1994, Chubu increased its capital from original JP\$ two hundred and fifty thousand to JP\$ thirty million in 1995 with 36 employees. Its main businesses began from sale and maintenance of X-ray equipment and later expand to produce advanced medical machine, general diagnostic medical machine and long-term care medical machines. The Taiwanese partner of Chubu is NanoRay Biotech Co., Ltd (hereafter NanoRay) (NanoRay Biotech Co. Ltd., 2020). Established in 2007, NanoRay had authorized capital of NT\$ four hundred and fifty million and 45 employees (22 in R&D department). NanoRay is a large-scaled company in terms of its authorized capital. Its production technology comes from Nanodynamics-88, Inc. Laboratory in USA. Former president of United States National Academy of Sciences, Dr. Frederick Seitz, and the physicist, Dr. C.G. Wang established the Laboratory in 1988. NanoRay jointly develops technology with research institutions and medical or engineering colleges in Taiwan, successfully producing the first made-in-Taiwan X-ray machine. As a young company, NanoRay actively engages in R&D and won the 23rd Taiwan SMEs Innovation Award.

We interviewed Chubu by emailing the executives on September 2015 and summarize the following results. Chubu actively looks for domestic companies with the technology to apply X-ray skills to non-destructive inspections, such as quality control, foreign material detection and structure analysis. However, the searches were in vain. After 2002, both the college of biological resources and college of technology, Mie University, helped Chubu with technology.

To respond to the Taiwan-Japan industry collaboration policy promoted by Mie government and Mie University, Chubu takes part in an interchange goodwill visit hosted by Mie government. The visit is a match-making seminar, Chubu has an opportunity to cooperate with NanoRay. In contrast, NanoRay is eager for expanding overseas markets and consulted with Taiwanese Health Care and Life Science Team of Industrial Development Bureau, Ministry of Economic Affairs. Accepting suggestions from the Team, NanoRay participated in a meeting and contacted with Chubu. Since then, Chubu communicated through mail with NanoRay on 11 September and 14 December 2015. Further, Chubu visited NanoRay in October and signed an industrial MOU in December 2015. Chubu and NanoRay serve as agents for each other and sell products of counterparts in respective home countries. In terms of R&D, Chubu adopts the N-series X-ray source module of NanoRay. The module possesses some characteristics, such as: (1) a core component of non-destructive testing equipment or a customized inspection system; (2) high light-emitting efficiency,

wide light-emitting angle and low power consumption. Japanese companies are unable to produce it. As a result, their collaboration pattern is NanoRay provides technology and Chubu assembles.

The Desktop X-ray Inspection System was successfully produced by Chubu in November 2014. It has six attributes: (1) wide light-emitting angle to shorten the distance of irradiation and the largest effective sensing area (145.4 x 114.9 mm); (2) small, light and easy to move; (3) savings of over 75% power of the traditional reflection-type X-ray inspection equipment; (4) low power consumption and operational by the household AC 110V power supply; (5) high perspective and high resolution; and (6) unique transmission lighting equipment. Chubu sold the Desktop X-ray Inspection System for the first time in Japan in March 2015. Its costs about JP\$11 million and its major customers are post office and official product inspection agencies. Regarding the target market of the X-ray Inspection System, Japan was the first market to be expanded, followed by Taiwan, Mainland China and Southeast Asia. NanoRay takes charge of the market expansion in areas other than Japan. The Chubu case indicates that they established a division of technology and marketing. This provides support to H1, industrial collaboration matches the cooperative pattern, competitiveness, and expansion of overseas markets between NanoRay and Chubu.

Recently, some differences and conflicts arose between Chubu and NanoRay, including language, organization culture, product specification accreditation, and mutual trust. Both companies actively took countermeasures to overcome tissues faced and establish a fiduciary relationship. For example, during the beginning of industrial collaboration, NanoRay communicated with Chubu in English by its Japanese technicians in the USA. Because of impaired verbal communication, Chubu communicates with NanoRay in Chinese by its Chinese technicians in Japan. Chinese communication goes better than English and makes the industry collaboration progress easier. In addition, both companies successfully complement advantages and disadvantages with each other, resulting in the development of a new product, Desktop X-ray Inspection System. For future development, cost to produce the Desktop X-ray Inspection System will be 30% lower if it is manufactured in Taiwan with the same quality. Hence, it is more likely to produce in Taiwan in the future. Both companies jointly develop and manufacture industrial inspection equipment. Production of medical inspection equipment and joint marketing are in their future plans. To maintain good industrial collaboration development, both companies must foster talents with Chinese, Japanese, and English capabilities. Further, to increase the competitive advantage for both companies, talents with business administration, international trade, and R&D capabilities are also required to overcome and respond to the topics faced. In conclusion, the industrial collaboration between NanoRay and Chubu plays a complementary role of industrial advantages and supports H2.

#### Gifu Sanken Kogyo Co., Ltd.

Gifu Sanken Kogyo Co., Ltd (hereafter Gifu) was established in Gifu with authorized capital of JP\$ two million in 1973 (Gifu Sanken Kogyo Co., Ltd., 2020). Authorized capital was substantially increased to JP\$ sixty million and the number of employees was 60 in February 2019. Major businesses of Gifu include the production and sales of casters, plastic moldings, and gifts, accounting for 30%, 20% and 50% of total revenues, respectively. Gifu focused on the domestic market. Casters are extensively applied to a variety of industries and products. To maintain sustainability, Gifu and Taiwanese Hong-Yi Trading Company (hereafter Hong-Yi) established Shanghai Ukai Industrial Vehicle Co., Ltd. (hereafter Shanghai Ukai) to diversify its businesses in 2000 (Honyi Trading Co., Ltd., 2020). The parent company established a caster division to manufacture casters in 2002. Casters supported revenues of other products. The authors had an in-person interview with executives of Gifu Sanken in Japan on 24 July 2015. Following the interview, we personally visited the CEO of Hong-Yi in Taiwan on 23 August 2015. Responding to the fierce market competition, Gifu actively conducts R&D to upgrade product quality, leading to a high profitability ratio and stable sale revenues. Gifu cooperates with its long-term partner, Hong-Yi. Because of the established fiduciary relationship, both companies jointly established Shanghai Ukai in 2000. The accumulated



investment in production facilities of Shanghai Ukai was over US\$ three million, an indicator of smooth and successful industrial collaboration.

In terms of the division of businesses in Shanghai Ukai, Gifu provides technical support by assigning a technician to stay in Shanghai for 2-3 years. Because Hong-Yi is familiar with the China market and application of Chinese language, Gifu does not intervene the administrative affairs. Hong-Yi takes charge of the administration and marketing businesses. Currently, Shanghai Ukai has 60 employees, 50 field operators and 10 administrative staff. The person in charge of Shanghai Ukai is the president of Hong-Yi. To manage Shanghai Ukai, he actively takes measures in marketing, technology and quality, and facilities update. As a result, profitability has risen year by year with annual sales over US \$6.7 million. Annual earnings are distributed to Gifu and Hong-Yi. Both companies have recovered their contributed capital. Hong-Yi is fully responsible for marketing and development of overseas markets and hires Chinese to do the business. Gifu requires the quality of casters manufactured by the subsidiary company be equal to that of the Japanese parent company. Casters parts are from parent company. About 30% of products manufactured by Shanghai Ukai are sold back to Japan. In addition, 70% of products are sold in China and Southeast Asia. Specifically, the major customers are Japanese companies in China. Gifu provides technical supports and Hong-Yi is responsible for marketing and management which lends a support to H2: industrial collaboration plays a complementary role of industrial advantages for Gifu.

Although Shanghai Ukai turned its financial performance from deficit to positive earnings since its start-up in 2000, some operating issues remained. Weak consciousness of product quality by Chinese employees and high turnover lead to difficulties in quality control. Second, appreciation of Renminbi (CNY) and rises of labor cost and taxes in China pushed production costs up. Third, the president of Shanghai Ukai used to stay in Shanghai and Taiwan for half month. However, he reached the age of retirement and informed Gifu Sanken of his desire to appoint a new president for Shanghai Ukai. However, we expect difficulty in hiring a new president with as much experience in management and good connections as the current president. Despite the administrative issues noted, Gifu Sanken went on to expand overseas markets by preparing to invest in Vietnam and Thailand. Gifu Sanken asked an Osaka company to search for a partner with the hope of obtaining the same collaboration pattern as that of the Shanghai subsidiary. Gifu Sanken also decided to use the same pattern of venture capital as that of its Taiwanese partner. However, desired ownership is over fifty percent to obtain management power. If the market in Southeast Asia expands successfully, Gifu Sanken will adopt the consignment sale and focus on Japanese companies in the initial stage. Further, if the businesses goes well, OEM (Original Equipment Manufacturing) will be followed.

#### Bankyo Pharmaceutical Co., Ltd.

Bankyo Pharmaceutical Co., Ltd (hereafter Bankyo), a pharmaceutical plant for external use medicine, was established at Kobe in 1960 (Bankyo Pharmaceutical Co., Ltd., 2020). The plant was destroyed by the 1995 Great Hanshin Earthquake. It moved to Mie on November 1996 and produced skin care products. It expanded to ODM (Original Design Manufacture) in ointment, face cream, topical liquid, nasal spray and rhinitis capsules. Both soft and hard products pass the accreditation of GMP. Its registered capital was JP¥ 40 million and had 130 employees in 1960. Total revenues grew to JP¥ 2.3 billion by March 2015. Its businesses also include manufacture and sale of class II medicine and cosmetics, production of medical appliances, and the sale of medicine. Its Taiwanese partner is Chung Mei Pharmaceutical Co., Ltd (hereafter Chung Mei) established in 1936 (Chung Mei Pharmaceutical. Co., Ltd., 2020). The eighty-year-old company has expanded to a pharmaceutical group (Chung Mei Group) and is the fifth largest pharmaceutical company in Taiwan. Chung Mei obtained the 2011 National Biotechnology and Medical Care Quality Award of western medicine. It expanded business to the manufacturing of medicine, dietary supplement food and healthy food. We sent a questionnaire to Bankyo in 2017 and collected the background and history of two companies by an examination of the company websites.

Chung Mei contacted with Bankyo through the Exchange Goodwill Visit Group of Mie in 2012 (Medical Engineering Institute, Inc. 2020). President of Chung Mei, Ben-Yuan Lin, visited Bankyo through the assistance and support of Mie University and TJPO on 15 June 2015. An Industrial collaboration MOU was signed on 21 July 2015 in Taipei. The cooperative product is ointment in prefilled disposable applicators for medicine and hemorrhoids. Currently, the pattern of industrial collaboration includes OEM, sale agent and expansion of sales channels. Chung Mei produces some Bankyo's products (ointment in prefilled disposable applicators) by Chung Mei. However, the collaboration of production or techniques is not yet done. It is currently considering whether to authorize Chung Mei to produce cosmetics. If implemented, collaboration of technique will be possible. In terms of marketplace, Bankyo takes Taiwan as its Asian market expansion base. Yet, Bankyo does not sell its products to Taiwan because medicine must be approved before going to market in Taiwan. It takes over one year from application to approval.

In general, medicines cannot go to market without official approval which involves many variables. The hidden uncertainties constitute a major concern of bilateral industrial collaboration. However, through collaboration, Bankyo expanded markets and understands the current situation of the medicine administration system in Taiwan, benefiting its expansion in the medical area. For development of industrial collaboration, Chung Mei desires to overcome difficulties with Bankyo. Overcoming differences in regulations between Taiwan and Japan either in the approval or mutual development of new medicine is an important step. The closeness of geography, climate, and culture between Taiwan and Japan leads to significant opportunities.

#### Cloud Master Co., Ltd.

Cloud Master Co., Ltd (hereafter Cloud Master) is a Taiwanese subsidiary of TOKAI Communications Corporation (hereafter TOKAI) in Shizuoka, Japan (Cloud Master Co., Ltd., 2020; TOKAI Communications Corporation, 2020). It was jointly founded by TOKAI and Taiwanese SYSCOM Computer Engineering CO. (hereafter SYSCOM) in 2013. TOKAI is a subsidiary of Tokai Holdings. The Taiwanese Ministry of Economic Affairs actively promotes the Asian Silicon Valley Project to integrate the development of software and hardware. The collaboration between TOKAI and SYSCOM meets the "5+2 Innovative Industry" plan in the Project. We had a deep in-person interview with executives of Cloud Master on 5 April 2017. After the interview, we keep in touch with Cloud Master by a series of Q&A emails. Two companies have been trade partners since 2003 and SYSCOM is the agent of TOKAI since 2011. Information technology products of TOKAI are sold on consignment with SYSCOM by the tradename of "ATHELAS" in Taiwan. Located in Shizuoka, TOKAI focuses on local markets and has less experience of overseas investment. In contrast, SYSCOM has much experience in overseas investment and has many marketing bases in China, Thailand, Vietnam, USA, and UK. Through industrial collaboration, TOKAI utilizes personal connections and sale networks established by SYSCOM to expand its overseas market. Based on the conditions above, TOKAI visited and discussed collaboration with SYSCOM on December 2011.

Both companies signed MOU in 2012 and formed the Cloud Master in 2013. TOKAI and SYSCOM individually invested 50% ownership, about JP¥ four hundred million (NT\$ one hundred and thirty million), to form Cloud Master. The main businesses include information software, information processing and provision of electronic information. On May 2017, the total number of employees equalled 16, including 3 Japanese and 13 Taiwanese individuals. The President of Cloud Master is Senoo Masakatsu from TOKAI. In terms of marketing, both companies serve as agents mutually, but the target clients of Cloud Master are those of SYSCOM. In terms of production, Cloud Master further develops and sells information software or systems of TOKAI and SYSCOM, but differentiates its products from parent company. For example, SYSCOM develops a series of software systems from registration to cashier in a hospital. Cloud Master offers the soft system and service is not provided by SYSCOM.

Currently, services of Cloud Master include cloud system, medical, database, electronic transmission, and system integration. Regarding the target market, Cloud Master focuses on Taiwan and its clients are those of SYSCOM, such as banks, government agencies and hospitals. It is scheduled to expand into markets of China or Southeast Asia with SYSCOM and develop information systems to meet the demand of China. Further, Cloud Master established the Cloud Master Japan Co., Ltd in Tokyo. The division of businesses and target markets supports H1, industrial collaboration matches the cooperative pattern, competitiveness, and expansion of oversea market for Cloud Master. SYSCOM is a well-known company in Taiwan. Cloud Master focuses on the clients of SYSCOM. As Taiwanese companies have the image of good quality to Japanese products, this benefits the marketing of Cloud Master in Taiwan. Mutual respect and aggressive exchange of opinions between two companies turned Cloud Master from an operating loss to profit since 2016. In addition, SYSCOM and Cloud Master mutually support and exchange skills and technologies. Because of active R&D, Cloud Master won the Taiwanese 2016 System Integration Output Award and 2016 Cloud IoT Innovation Award.

TOKAI has difficulties in understanding the operating policy of Cloud Master. Being a subsidiary, Cloud Master should have consistent management style and direction with its parent company, TOKAI. Although high-level executives of the parent company understand the situation, basic-level employees still face difficulties. There is an insufficiency of talent with technology and Japanese capabilities. Cloud Master is an information selling and service company. In addition to the experts of information software and computers, talents with technology and Japanese capabilities are demanded. Third, the accounting system differs between TOKAI and Cloud Master. For example, installment sales are popular in Taiwan but lump-sum payment prevails in Japan. Faced these issues, the president of Cloud Master communicates with basic-level employees from TOKAI to ensure their understanding. Further, the demand for talent with technology and Japanese capabilities urges Cloud Master to enhance employees' Japanese capabilities. It placed advertisements of recruitment in the Taiwanese job bank. The analyses above indicate that Cloud Master actively takes the operating strategies to overcome the aforementioned business topics. As a result, its operating results turned from losses to profits. Hence, the H2 receives support because industrial collaboration plays a complementary role of industrial advantages for Cloud Master.

#### Nomura Unison Co., Ltd.

Nomura Co., Ltd. was established in Nagoya in 1954 (Nomura Corporation of Taiwan, 2020). It merged with Sun Seiki Co., Ltd. and was renamed Nomura Unison Co., Ltd. (hereafter Unison) at its 50th anniversary. Because of the expansion of business items and size, the company was again renamed to be the Nomura Unison Group (Nomura Unison Group, 2020). The initial registered capital of Unison was JP¥ 50 million. Sale revenues and number of employees are JP¥ 12.5 billion (entire group is JP¥ 20 billion) and 403 (entire group is 530), respectively. Its production bases, business offices and branch offices are located around the world. Manufacturing bases include five local and one oversea plants in Taiwan. Business offices have two local and one overseas location. Business expanded from material processing (precision hallow forging) and model design to the manufacturing of industrial machines and OEM, import and sale of wine, manufacturing and sale of grape wine, and production of medical machinery. Faced with an increasingly competitive market, Unison aggressively develops new technology to enhance its competitive advantage. In 2015, Unison won the Endeavour Award of Small and Medium-sized Enterprise by the Ministry of Economy, Trade and Industry in Japan. It also won the NAGOYA Award of the Manufacturing Industry in the same year. We visited and interviewed the executives of Unison on 29 August 2017. Through the in-depth interview, more valuable and implicative information is available to us.

Manufacturing cost in Taiwan were lower than that of Japan in 1980's. Unison was invited by its upstream company, KIZI, to establish Nomura Corporation of Taiwan (hereafter NCT) at the Kaohsiung Nanzi Export Processing Zone in 1987. NCT facilities were 3,300 square feet and started to sell valves. Production capacity of the Kaohsiung plant grew from 500 to 2,000 units before the Japanese bubble economy. NCT

is a Japanese sole proprietorship. The high-level executives, such as president, vice-president and general manager, are from Japan and basic-level employees are from Taiwan.

Registered capital of NCT was JP¥ 238 million and the number of employees was over 100 in September 2017. Because of active environment protection concerns, NCT won a series of awards in environment protection, such as Special Excellence Award, Outstanding Plant Award, High Distinction Award, Excellent Environmental Protection Company Award, and the 9th Environment Protection Award of the Republic of China. After establishment in 1987,

NCT actively adjusted its business products in response to the industrial structure and economy changes in Taiwan. The first adjustment was to stop the production of valve. After 1987, it became increasingly difficult to hire labor due to the rise of human capital and labor consciousness in Taiwan. Further, the affiliate company, KIZI, transferred its production base to Southeast Asia (Thailand). NCT, hence, stopped the production of valves and sold the manufacturing equipment to the Thailand plant of KIZI. Taking advantage of the opportunity, NCT transformed the production to liquid crystal equipment. Machines used to produce liquid crystal were imported from Japan. Production of liquid crystal equipment was expanded to manufacture related semi-conductor equipment, dedicated devices, and delivery equipment. Meanwhile, NCT continuously promoted international accreditations and obtained the ISO9001: 200 and ISO14001: 2004 certifications. Currently, NCT has an office in the Taipei World Trade Center.

The second adjustment was construction a plant in Taichung Processing Export Area in 2005. Expansion of related equipment for producing liquid crystal led to insufficient room for the Kaohsiung plant to accommodate the equipment. Entering into a new business area is the third adjustment. Major reasons include the: (1) increase in salaries; (2) increase in labor consciousness and increase in labor issues; (3) difficulties in personnel adjustment and deployment due to special social networks in Taiwan; (4) difficulties in recruiting employees and technicians because of competition with large-scale enterprises, and (5) an unwillingness of employees to transfer from Kaohsiung plant to Taichung plant and the uncoordinated labor force between two plants.

Faced with the operating issues noted here, NCT took the following countermeasures. First, in response to the culture, habits and customs in Taiwan, the Japanese general manager was replaced by a Taiwanese manager to facilitate efficient human resource management. Second, NCT stepped into other new business areas, such as the production of wine, automobile parts and electronic vacuum cleaners. The parent company, Unison, and a French company, Eno connection, formed Domaine de la senechaliere winery to produce and sell grape wine in 2008. As a result, NCT became the agent of Domaine de la senechaliere in 2012. Third, NCT integrated the Kaohsiung and Taichung plants in 2016. It moved the 3,300 square feet Kaohsiung plant to the 19,800 square feet Taichung plant. Kaohsiung plant sells equipment to the upstream company KIZI. One third of the employees in Kaohsiung plant were transferred to Taichung plant and the remaining un-transferred employees were introduced to other enterprises.

Unison expanded its market to Taiwan through the NCT. Responding to the industrial structure and economy changes in Taiwan, NCT adjusted its business production from valve to liquid crystal, increasing its competitiveness. Hence, H1 receives support as the industrial collaboration between Unison and NCT matches the competitiveness and expansion of overseas market of Unison. Instead of exiting Taiwan market, NCT responded to the changes in industrial structure and economic development. It took active operating strategies and countermeasures to match the local and global economy. No significant changes in the production of grape wine and B-pattern electronic vacuum cleaners were undertaken since. The company increased the output of automobile parts and materials but decreased that of liquid crystal equipment. In addition, business items quickly and flexibly responded to the demand of customers. The company plans to upgrade of product quality and the reduce of production costs.

**A PATH FORWARD**

The main industrial structure of Japan is similar to Taiwan and focuses on small and medium-sized enterprises (SMEs). These companies are also the key companies to expand overseas investment. The Japanese 2012 Taiwan-Japan industrial collaboration policy places SMEs as a priority target for counselling. Hence, this study takes Tokai region as an example to investigate the effects of industrial collaboration on Japan. We first investigate the background, status quo, and direction of the 2011 Bridging Plan examine industrial collaboration. Then, we examine the operating strategies, issues faced, and future development direction from the perspectives of Japan. We find that industrial collaboration plays a complementary role of industrial advantages for Japan. Industrial collaboration matches the visions and goals of the 2011 Bridging Plan, including cooperative patterns, industrial competitiveness, and expansion of overseas markets. Both Japan and Taiwan governments can take advantage of the successful experience in industrial cooperation to expand the scope of bilateral collaboration, such as in the service industry. Partners of Taiwan and Japan intensively interact to solve issues faced during the collaboration. They identified countermeasures and dynamically modified them to adapt to various situations. Further, we find that human resources, particularly the CEO in Taiwan, plays a critical role in the success of bilateral industrial collaboration. SMEs of Japan and Taiwan are strongly advised to cooperate further in more areas and fields.

**CONCLUSION**

After interviewing the six companies in Tokai region, we found that industrial collaboration matches the cooperative pattern, competitiveness, and expansion of Japanese overseas markets. Industrial collaboration plays a complementary role in the industrial advantages for Japan. Further, in-depth interviews indicate that motivations of Japan to cooperate with Taiwan includes maintaining existing operating scales, to expand international markets and to lower manufacturing costs. Because of insufficient experience in overseas investment and marketing, Japan takes advantages of Taiwanese specialization in multi-national business administration and marketing. Meanwhile, Taiwan and Japan promote the policy to push the opportunities of bilateral collaboration, resulting in some successful cases. We summarize our findings of the six cases in the following Table 2.

Table 2: Summary of Results

Companies	Haneda	Chubu	Gifu	Bankyo	Cloud Master	Unison
Main results	Industrial collaboration matches both sides' investing patterns and target markets. Industrial collaboration plays a complementary role of industrial advantages for Haneda.	Industrial collaboration matches both company's work division of marketing and target market and plays a complementary role of industrial advantages.	The division of businesses between Gifu and Hong-Yi corroborates that industrial collaboration enhances mutual industrial advantages.	Bankyo expands markets and understands the current situation of medicine administration systems in Taiwan. Chung Mei desires to overcome difficulties with Bankyo in the differences of regulations over new medicine between Taiwan and Japan	Industrial collaboration matches both companies work division of marketing and target market. Cloud Master actively utilized the operating strategies to change its operating results from losses to profits.	Unison expands market to Taiwan and NCT adjusts its business items from valves to liquid crystal, increasing its competitiveness.
Hypotheses supported	H1 and H2	H1 and H2	H2	None	H1 and H2	H1

*Note: Table 2 presents our in-depth interview and survey results of the six case companies in Japanese Tokai region.*

Small and medium-sized enterprises (SMEs) are the major targets of industrial collaboration. This property is consistent with the direction of overseas investment policy promoted by Japan to push SMEs going abroad. Most cooperative patterns are ODM (Original Design Manufacture) and sale on consignment. Joint ventures are common, leading to more win-win cases due to the infusion of bilateral capital. The target market focuses on Taiwan in the initial stage but will expand to mainland China and Southeast Asia. Industrial collaboration faces some issues because of differences in culture, institution, law and regulations, standards and language. Most difficulties are overcome as long as both countries mutually understand and resolve them with sincerity. Insufficient talent and how to foster talents are a question faced by both countries. High-level executives play a key role in sustainable development of industrial collaboration. Both Taiwan and Japan are advised to establish a management succession plan.

This study examines enterprises in the Tokai region by interview and questionnaire survey. As a foreigner, we are subject to the available time in Japan, budget limitations and social connections with companies. This limits the number of companies interviewed. Companies avoid or reserve some questions related to business secrets or core capabilities and the interviewing time with companies is a few hours. Some Japanese official statistics are not available on web pages of government agencies. Further, some information appears in hard copy or in non-government web pages. Difficulties in data collection constitute our third limitation. In addition to Tokai region, Japanese Shikoku region is an active region in promoting industrial collaboration with Taiwan. Shikoku region has four prefectures and three of them, Kagawa, Kōchi and Ehime have signed industrial collaboration MOUs with Taiwan. To examine the current state and topics of bilateral industrial collaboration is an avenue for future study. Further, comparing differences in industrial collaboration between Tokai region and Shikoku region is another fruitful and implicative research.

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### **BIOGRAPHY**

Dr. Kuan-Ju Lin is an Associate Professor and chairperson of the Department of International Business and Trade at Aletheia University in New Taipei City, Taiwan.

Dr. Yahn-Shir Chen is a full Professor of the Department of Accounting at National Yunlin University of Science and Technology in central Taiwan.