ISSN 1884-4332

名城アジア研究

Meijo Asian Research Journal

2019.03

VOL.9 NO.1

名城大学アジア研究センター
Meijo Asian Research Center

名城アジア研究

2019.03 | Vol.9 No.1

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The transformation of Japanese electronic industry – the impact of Sharp Foxconn merger –

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Abstract

The development of Taiwan's TFT-LCD industry began in the 1990s and has grown rapidly. After 20 years of development, Taiwan's TFT-LCD industry is now one of the two core industries in Taiwan the other one been semi-conductor industry. It has been influenced by Japan from the beginning. Most know-how and technology came to Taiwan through technology transfer by Japanese manufacturers. It has grown stronger by relying on imports from facilities and raw materials from Japan. In 2016, Foxconn in Taiwan acquired SHARP, a well-established Japanese TFT-LCD manufacturer. This study aimed to show the potential in synergistic effects with these diverse Japan-Taiwan alliance. Vertical integration of upstream companies often faces great difficulties. Especially in the consumer electronic industry which requires technological strength and high efficiency, acquisitions led by top manufacturers just taking advantage of their own financial superiority have always led to failure. For example, a Chinese manufacturer acquired Pioneer's TFT-LCD brand in 2009, and released various original products in the Chinese market including flat-panel TVs, digital cameras and smart-phones under Pioneer brand, without success.

Foxconn is different from conventional electronics manufacturers, in that they have been developing an integrated production system with Sharp for new 8K TFT-LCD TVs by linking Kansai district in Japan, Hsinchu Science Park area in Taiwan, and Guangzhou Longhua industrial area. By developing this" upgraded framework for the new strategic vertical integration" beyond regions, Foxconn, whose investments in TFT-LCD business have been unfruitful, is now likely to stand a chance to challenge Samsung Electronics, the global leader of the TFT-LCD industry. On the other hand, Foxconn, aiming to produce high added-value parts, is expanding its electronics manufacturing service areas, while expanding into new business areas with the help of Sharp.

Also Foxconn expand their new business by capital market restructuring and trade incentive negotiations. It is interesting because Foxconn's new business and Sharp's business can complement each other create better synergy. Foxconn Industrial Internet (FII) is Foxconn new business about combine the Cloud business. Networking equipment business and Apple's supply chain management vendors. Taiwan is a major Apple's supply chain vendors and Foxconn is the single largest employer in Taiwan and now, Foxconn attempt to become largest employer in mainland China now rank the 10th in China. Following the changes in Foxconn Group, shifting major focus on business innovation and business policy. These resulted in accelerating investments in USA and China. Sharp have more opportunities to play a major role in the new Foxconn electronic component empire.

KEY WORDS : Foxconn, Sharp, LCD TV, Japanese TFT-LCD manufacturer, Synergistic, Taiwan

1. Introduction

The rapid growth of the TFT-LCD industry since late 1990s has prompted electronics manufacturers in East Asia to enter this new industry. However, a drop in TFT-LCD's values starting in mid-2000s, and the financial crisis of 2008 have forced many TFT-LCD manufacturers to withdraw. By 2015, only four big TFT-LCD manufacturers were still alive: two of them were AU Optronics Corporation (hereinafter referred to as AUO) and Innolux, Taiwanese manufacturers, and the others were Japan Display Inc. (hereinafter referred to as JDI) and Sharp, whose businesses had been integrated by the Innovation Network Corporation of Japan.

Foxconn has always been pursuing advanced manufacturing technologies, and is showing its full competitive edges in today's manufacturing where the business process redesign and modulation of electrical equipment is taking place rapidly. Its revenue is fully reflective of Smiling Curve, which describes the correlations between manufacturing processes and their added values in the electronics industry. In order to achieve further profit growth, Foxconn, with its competitive edges in technology and capital, placed joint task force with Sharp for various types of co-operation for more than 5 years, which had the best business linkage with Foxconn. Now a brand-new Japan-Taiwan alliance model is going to be put to the test.

In March 2016, Foxconn was given the opportunities to acquire Sharp, becoming the first case of a prestige Japanese electronics manufacturer coming under the control of a foreign company. When this acquisition happened, many were skeptic about Sharp's reconstructing,

but it turned out that Foxconn's reconstructing plan enabled Sharp to reduce its loss to 24.8 billion yen for the fiscal year of 2016, about one tenth of what it was the previous year, according to their announcement in April, 2017. Thus they made the first successful step toward profitability.

This study focused on Sharp's reform led by Foxconn from 2016 and the changes in the TFT-LCD industry in Japan and Taiwan, and explores how Sharp's performance recovered. At the same time, it examines the meanings and influences of developments such as the next generation panel investment project by Sharp in Guangzhou, announced at the end of 2016, and the currently discussed investment project in the US, in line with developments in Foxconn today.

Many of the preceding studies on this field focus on the Academia Sinica's involvement in Taiwanese TFT-LCD industry during the period after 2002 when this industry's growth was part of Taiwan's national policy. While few studies were conducted on TFT-LCD after the development of the Taiwanese TFT-LCD industry was mainly led by corporations, there are many researches focused on Foxconn in Taiwan. Among them, Hu yu Hu (Tiger and Fox) a 2008 book by Dianwen Zhang, introduces Foxconn's evolution from an OEM assembly provider to an EMS provider and the development of Innolux up to 2007 under the Foxconn group flag. After Sharp's acquisition was confirmed in 2016, more and more case studies were conducted in Japan on Foxconn and Sharp, with many of them focused on their executives. Among them, Ambition — Biography of Terry Gou (2016) by Minetoshi Yasuda and Foxconn and Terry Gou — Sharp's Truth (2016) published by the Mainichi Newspapers both elaborate on the acquisition negotiation processes by Foxconn and Sharp from the viewpoints of their executives. Yukihiko Nakata, a Japanese researcher on the TFT-LCD industry, explained the reasons for Sharp's rapid deficit expansion in 2014 in his book Depths of Sharp's Defeat (2016) .

However, there have still been few studies shedding light on the connection between the rapid development by Foxconn of Sharp's investment project and its brand reconstruction, and the linkage of three regions in Japan, Taiwan and China. Thus previous studies can hardly explain the reasons why Foxconn, an EMS provider, can single-handedly sustain a TFT-LCD TV brand. My previous study Japan- Taiwan Industrial Alliance and Innovation (2017) discusses recent cases of Japan-Taiwan cooperation in the electrical equipment and electronic manufacturing industries, and thoroughly clarifies the changes in Japan-Taiwan alliances from a Taiwanese viewpoint.

Recently, the theory of Smiling Curve, which has often been cited to discuss the characteristics of the electronics industry in Taiwan, has also been applied to the electronic manufacturing industry including electronics and telecommunications. Foxconn, which makes full use of the electronic manufacturing industry's advantages by combining its established brand as an advanced manufacturer, product design, sales channels and dedicated services, and successfully maintains its competitive edge and operating profit, is now creating a new model of Japan-Taiwan alliance through the acquisition of Sharp. To provide more detailed explanations as to the changes in the TFT-LCD industry structure in Japan and Taiwan due to Foxconn's acquisition of Sharp, it is necessary to focus on the ever-changing situation of Sharp's business integration in East Asia before mid-2017 to have a better understanding of the status quo.

From the viewpoint of manufacturing technology, in addition to meeting the needs for multi-functional consumer electronic products and high performance, the concept of "Heterogeneous Integration" has become main stream in mobile device production. As mobile devices become widespread, the TFT-LCD industry has shifted its focus from up-sizing to diversification, with two panel models currently produced: large panels for TVs and small and medium-sized panels with high performance. Foxconn is working on integrating their TFT-LCD business with Sharp, in an attempt to step out from behind the scenes by handling everything from electronics manufacturing, high added-value parts production to final products.

In order to respond to the rise of protectionism worldwide Foxconn is planning to reduced 20% of the total investment amount at 2018. Foxconn changed its business model to accelerated the development of overseas investment to continue to generate profits. In addition to start construction of the U.S. factory, Foxconn had setup new affiliated company in China - Foxconn Industrial Internet (FII) (Established on March 6, 2015). Foxconn applied listing FII in Shanghai Stock Exchange on March 2018 and approved for listing on May this year. FII now listed on the SHSX. Foxconn has new company objective regarding capital flows, funds operation and trade negotiations become new company initiative and drive.

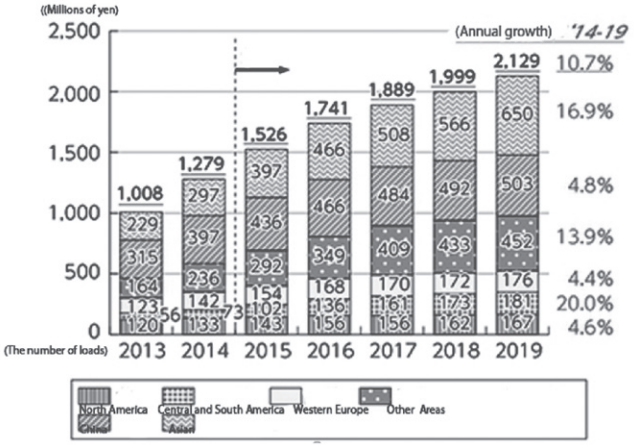
2. Situations of TFT-LCD Industry in Japan and Taiwan before Sharp's Acquisition

This section will look at the changes in the global TFT-LCD market due to rapid growth of small and medium-sized devices such as smart-phones and tablets, and the directions in which Japanese and Taiwanese TFT-LCD manufacturers are moving.

(1)Expanding Market Size for Small and Medium-Sized Mobile Devices

According to "White Paper 2015 – Information and Communications in Japan" by the Ministry of Internal Affairs and Communications, Japan, the total shipment of smart-phones in 2014 increased to about 1.3 billion units, and this rapid growth rate was expected to continue (Figure 1). The analysis by region showed that annual growth rates in advanced countries in North America and West Europe were expected to slow down to less than 5% on average, which matches the status quo. Today growth remains stable in India, the Middle East, Africa and emerging countries in East Asia. High growth rates are expected to continue in these regions as smart-phones become more and more widespread there, which will pull the global market along.

Figure 1 Smart-phone Market Size by Region

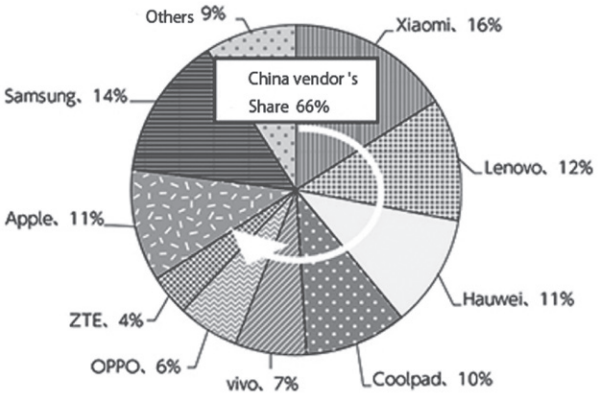


(Source) IHS Technology
Cited from："White Paper 2015 – Information and Communications in Japan" by the Ministry of Internal Affairs and Communications, Japan
http://www.soumu.go.jp/johotsusintokei/whitepaper/ja/h27/pdf/n5200000.pdf

Today, China is where mobile devices such as cost-down smart-phones and tablets are mainly produced. Since 2012, manufactures partly owned by the government, including Xiaomi and Huawei, have been achieving dramatic growth. The prices of small and medium-sized mobile devices are going down, with Chinese smart-phones sold at about half price of, but offering the same specifications as, ones by well-known manufactures. This pricing advantage accounts for Chinese manufacturers' dominant share in the global Smart-phone market, which in 2014 reached 66% (Figure 2). Just as Chinese Smart-phone manufacturers strengthen their technologies, Chinese TFT-LCD manufacturers drastically enhance their competitive edges in cooperation with foreign manufacturers. However, even though Xiaomi has the biggest market share in android smart-phones, defeating Samsung, small and medium-sized high-resolution panels for mobile devices have to be imported from Japan, Taiwan, and Korea since it is large-sized panels that are mainly produced in China.

Even a lot of Japanese people still using old style flip phone at this age, but the smartphone's market share is growing very fast. Especially since 2010 to 2014 it showed exponential growth for Smart-phone market share. Until 2016, the Market share of smartphone's and the market share of flip phone in Japan is closer to getting within level playing field. Overall, the influence of Japan's Smart-phone maker and Japan's TFT-LCD maker is getting weaker globally.

Figure 2 Smart-phone Vendors' Market Share in Chinese Market (Second Half of 2014)



(Source) IHS Technology
Cited from："White Paper 2015 – Information and Communications in Japan" by the Ministry of Internal Affairs and Communications, Japan
http://www.soumu.go.jp/johotsusintokei/whitepaper/ja/h27/pdf/n5200000.pdf

The TFT-LCD industry has entered a new era with the spread of smart-phones. Small and medium-sized panels' continuous evolution through the development of high-resolution panels and improvements in touch

panels is the main characteristic of the recent TFT-LCD industry. TFT-LCD manufactures are faced with more and more fierce competition, mass-producing new small and medium-sized panels one after another, and different small and medium-sized panel manufacturers take the top three places almost every year (Figure 3). These changes in the TFT-LCD supply system has strongly influenced the growth of the TFT-LCD industry in Japan and Taiwan for the past five years. Recent developments and characteristics of the TFT-LCD industry in Japan and Taiwan are organized below.

Sharp's sales performance continues to improve from 2016. At Sharp 2018 Annual report. Point out that consolidated profit rose 44.3% to 90.1 billion Japanese yen (about 8 billion USD) This is the first time Sharp to make the company profitable from 2014. This figure consolidated profit has shy away from the 95billion reported estimate from Nikke financial news. Sharp's Advance Display Systems department,（Sharp branded LCD TV, large plasma TV and medium to small LCD display panels） revenue increased by 29%,2017 huge gross profit increase to 37 billion Yen.

(2) Case of Japanese TFT-LCD Manufacturers

Many Japanese TFT-LCD manufacturers withdrew from the market after the financial crisis of 2008, with the remaining big TFT-LCD manufacturers shifting their focus of development to small and medium-sized high-resolution panels to maintain their competitiveness. Even today Japanese TFT-LCD manufacturers meet the world's top standards in small and medium-sized panel production. Among them, Sharp is a TFT-LCD manufacturer which has been part of Apple's supply chain from the very beginning, and is still supplying panels to Apple today. Since it was selected as a display supplier for iPhones, Sharp has been supplying panels to Apple while producing its own brand of TFT-LCD products.

Other Japanese TFT-LCD manufacturers had not produced as good results in the development of small and medium-sized panels as Sharp, and their dispersed power was integrated as the result of the reorganization of the TFT-LCD industry led by the Japanese government. In 2012, a new brand JDI was formed through the consolidation of the display panel businesses of Sony, Hitachi and Toshiba led by the Innovation Network Corporation of Japan, to put an emphasis on the development of small and medium-sized high-performance panels. In order to integrate their small and medium-sized panel businesses, Toshiba and Hitachi stopped production of large-sized panels while maintaining their brands. However, this development has made Sharp and JDI arch-rivals. Japanese manufacturers had hoped for the growth of mobile devices, as Taiwanese and Korean manufacturers surpassed them in investments in large-sized panels, and this single focus on the development of small and medium-sized has brought fundamental changes to the structure of the TFT-LCD industry in Japan.

(3) Case of Taiwanese TFT-LCD Manufacturers

Taiwanese TFT-LCD manufacturers have actively expanded their investments in China while fostering the growth of TFT-LCD parts manufacturers in Taiwan since late 2000s. AUO, once the largest TFT-LCD manufacturer in Taiwan, submitted an investment plan of a new-generation pre-process panel plant in China to the Ministry of Economic Affairs of the Republic of China in 2008 , and immediately after that, it also announced a plan to set up a 7.5th-generation TFT-LCD panel plant in Kunshan, Suzhou Prefecture, one of their bases in China. Later, AUO, together with Infovision Optelectronics, a Chinese TFT-LCD manufacturer, and a financial institute in Kunshan City, made an investment of about 334,113 million yen in a new plant.

On the other hand, Foxconn took advantage of this favorable trend as an EMS provider to expand its sales and TFT-LCD businesses. In 2010, Foxconn acquired, by share exchange, CMO, Taiwan's then second-biggest TFT-LCD manufacturer, which had suffered from bad performance, and founded "New CMO".[1] Even

Figure 3 Top Three Small and Medium-Sized Panel Manufacturers' Market Share from 2009 to 2015

Year	2009	2010	2011	2012	2013	2014	2015
No. 1	Sharp 16.5%	Sharp 14.8%	Sharp 14.8%	JDI 19.9%	JDI 16.2%	LGD 17%	Samsung 23%
No. 2	Samsung 12.8%	CMI 11.7%	Samsung 11.9%	Sharp 15.8%	Sharp 15.1%	JDI 15%	JDI 16%
No. 3	CMI 11.4%	Toshiba 9.2%	Toshiba 9.2%	CMI 11.1%	LGD 14.2%	Sharp 15%	LGD 14%

Created by the author based on websites and news articles

though it had been receiving Apple's orders since the first generation of iPhone, Foxconn was not able to produce TFT-LCD panels which accounted for 30% of the total production costs of iPhones, so its profit margin had been squeezed. Foxconn expected to be chosen as an iPhone display supplier with the help of IPS technologies by CMO, which inherited DNA from a Japanese TFT-LCD manufacturer, but in the end failed to do so.

As a result, Innolux, under the Foxconn group flag, merged with CMO, and Foxconn started to ask Japanese manufacturers for cooperation. Sharp got into the first financial crisis in 2012, due to the low capacity utilization of its 10th-generation panel plant constructed with massive investments in Sakai. By then, Sharp's loan amount had increased to 362.5 billion yen. In severe repayment difficulties, Sharp chose Foxconn as a business partner and sold 9.9% of its shares to Foxconn, making it the largest shareholder of Sharp. Terry Gou also personally[2] purchased 46.5% of Sharp's 10th-generation plant in Sakai for 66 billion yen, changing the plant's name to Sakai Display Product (SDP). Sharp has positioned this new partnership with Taiwan as "evolution into the framework of a new strategic vertical integration".

3. Factors of Sharp's Failure and its Reorganization Plan by Foxconn

Sharp was eventually acquired by Foxconn due to such problems as failure in its large-sized panel development plan in China and a rapid decrease in its sales of small and medium-sized panels with its market share lost to JDI. Even after it had new management, Sharp is still faced with several problems in terms of the industry and management, including a turnaround in technological development, rights to use its brand for the US and European markets, and its sales plan for Asia. The first half of this section analyzes the causes of Sharp's failure, and the second half organizes Sharp's reorganization by Foxconn and the current directions in which Sharp is going.

(1) Sharp's Investment in China and its Failure

Sharp's plan for investment in China was only to construct an TFT-LCD assembly plant in Nanjing City, Jiangsu province. In 2010, with the strategy of selling the 6th-generation production facilities in its Kameyama Plant No. 1 to CEC Panda, a Chinese TFT-LCD manufacturer, Sharp founded a new TFT-LCD enterprise Nanjing CEC Panda FPD Technology together with Nanjing City and Nanjing CEC Panda group, which marked the start of Sharp's full-fledged TFT-LCD panels in China to keep up with Taiwanese and Korean competitors. As a result, an integrated production line from TFT-LCD modules to TVs and "TFT-LCD R&D Center" were established in Nanjing City by duplicating the "Mie Prefecture Crystal Valley" model mainly developed in Sharp's Kameyama Plant before. However, in 2012, Sharp, faced with deficits, opted to reduce its investment burden by allotting part of technical guidance fees received from CEC Panda to its capital investment, instead of giving priority to further investment.

In 2013, Sharp also announced a new partnership plan in TFT-LCD panels with CEC Panda. This announcement was about a plan to found a joint venture to operate an 8.5th-generation TFT-LCD plant in Nanjing City with a capital of about 278.1 billion yen (investment ratio: CEC Panda 92%, Sharp 8%) in partnership with CEC Panda group. Sharp provided its energy-saving TFT-LCD technology IGZO to this new plant in Nanjing City, and started making prototypes of the 8.5th generation of IGZO. These efforts by Sharp to reduce deficits by selling its patents to China and Samsung accelerated its collapse.

(2) Competition between Sharp and JDI

Yukihiko Nakata, in his book *Depths of Sharp's Defeat,* pointed out one of the important reasons for the rapid increase in Sharp's deficit in 2014: the bankruptcy of Wintek, the then-second-biggest touch panel manufacturer in Taiwan. Wintek was a small and medium-sized TFT-LCD manufacturer founded in 1990 in Taiwan. It started off by producing STN and TFT-LCD panels, but from 2008 on, its business shifted to the production of touch panels with success. By joining Apple's supply chain, Wintek's sales expanded rapidly until 2011.

The speed of technological progress in touch panels for smart-phones is faster in Taiwanese manufacturers than in Japanese ones, so Sharp's Smart-phone panels were first sent to Wintek in Taiwan, before finally exported to China with touch panels mounted. Wintek constructed a new plant in Dongguan, China, by spending 50 billion NTD, forecasting that demands for Smartphone touch panels would continue to grow. However, Apple, during the process of adopting a new touch panel technology, decided to switch to capacitive touch panels with low power consumption, from glass capacitive touch panels. Losing its most important customer Apple,

Wintek was forced into bankruptcy within a short period of time. Its bankruptcy also made a serious impact on Sharp, which suddenly lost a business partner.

While Sharp was unable to deliver panels in time, JDI, another Japanese manufacturer started to take its place to provide small and medium-sized panels to China. In contrast to Sharp's massive deficit in 2014, JDI's sales substantially expanded in the fiscal year of 2015, grabbing the world's biggest market share in small and medium-sized panels.

(3) Sharp's Acquisition by Foxconn

Sharp's situation was temporarily improved when it received capital from Samsung in 2012, but still got into another financial crisis due to heavily discounted selling of panels and to competition with JDI. At this moment, Foxconn made another proposal for partnership. Partly in consideration of good results from the joint operation of SDP, Sharp decided to choose Foxconn as sponsor for its management reconstruction on February 25, 2016. Sharp announced a capital increase plan of about 489 billion yen underwritten by Foxconn, but the final agreement was delayed until April, partly due to debt risks notified by Sharp later. Eventually, Foxconn obtained 66% of Sharp's shares for a capital investment of about 388.8 billion yen, obtaining its management rights as of April 2016 (Figure 4).

(4) Sharp's Reform by Foxconn

Foxconn had already achieved a certain degree of name recognition in Asia as one of the top EMS providers in the world, but it was not until it was in charge of producing Apple's products that it made its presence truly felt in the world. Therefore, it was Foxconn's first and foremost task not only to achieve cost reduction by producing panels by themselves, but also to seek a more solid relationship with Apple by making itself more important to Apple. Since April 2016, Foxconn has been marketing itself to Apple by making good use of the resources available from Sharp to provide parts with even higher added value. The technologies Foxconn is currently working on after Sharp's acquisition is as follows.

① Panel Production

Currently, Foxconn is working in two directions: improvement of TFT-LCDs with IGZO technology and development of organic electroluminescence (OEL) panels. At this moment, TFT-LCDs, with such advantages as low power consumption, a longer lifespan, and less panel color loss, are more competitive than OEL panels because the current notebooks and iPads particularly prefer using TFT-LCDs. Sharp has continuously been emphasizing the advantages of TFT-LCDs, as the LTPS technology owned by Sharp is an essential part of competition in developing OEL panels. On the other hand, JDI is working on development of JOLED, its original equipment for manufacturing OEL panel by printing, but

Figure 4 Timetable of agreement over Sharp's acquisition by Foxconn

Time	Event
June, 2011	Foxconn's investment was approved in Sharp's shareholders' meeting.
July, 2011	Agreement was reached over mutual supply of TFT-LCD panels for TVs.
March, 2012	Agreement was reached over investments into Sharp's headquarters and Sakai Plant's operating company.
July, 2012	Foxconn invested 66 billion yen in Sakai Plant's operating company.
August, 2012	Foxconn announced agreement to review investments in Sharp's headquarters.
March, 2013	Agreement on investments in Sharp's headquarters expired.
October, 2015	Sharp announced that it was negotiating with multiple parties to sell its TFT-LCD business.
January 30, 2016	Chairman Terry Gou explained their support plans including investments in Sharp's headquarters.
February 4, 2016	Foxconn got the preferential negotiation rights.
February 25, 2016	Sharp decided to accept external capital investments. Foxconn put the contract on hold.
March 30, 2016	Sharp and Foxconn made decisions about investments respectively.
April 2, 2016	Both parties officially reached agreement and had a press conference.

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it seems very difficult for it to make large-scale investments in OEL panels due to financial restrictions.

Despite their various disadvantages, the development of OEL panels was to be accelerated when it was confirmed that OEL panels would be adopted for iPhone's 10th anniversary model in 2017. OEL panels will be the focus of R&D for each TFT-LCD manufacturer for the future. Currently, Sharp does not have the capability to mass produce OEL panels. So far Apple has always had two or three panel suppliers at the same time, but only two Korean TFT-LCD manufacturers, Samsung and LG, can mass produce OEL panels on a large scale, as they have put a lot of effort into OEL technologies from the very beginning. In 2018, only Samsung and LG is ready to supply OEL panels to Apple. Considering the potentially enormous business opportunity brought by OEL panels, Apple, in an effort to avoid depending on Samsung, its competitor in the Smart-phone market, for OEL panels for a long time, has been working on developing OEL panels by themselves, and is poised for cooperation with other panel manufacturers. Since the spring of 2017, rumors have been floating about in the market, suggesting that Apple is going to construct an OEL panel plant with Foxconn. If Apple works on OEL panels in Taiwan with all its might, this will be a big momentum for Foxconn to develop them.

Incidentally, it is true that Samsung is the world's most advanced manufacturer of OEL panels, but it has still been purchasing their manufacturing equipment from a Japanese manufacturer. Canon Tokki, a production facility manufacturer which was the leading TFT-LCD manufacturer before, almost monopolizes the OEL panel manufacturing equipment market.

② Camera Lenses

Camera lenses have become more and more important since 2016. Some of the high-end smart-phones have now begun to adopt a dual-lens camera system, and the demand for camera lenses amounts to 100 million units just in the Chinese market, which suggests a good chance of further growth. Faced with the ever-expanding camera lens market, big camera lens manufacturers in Japan and Taiwan have embarked on facility reinforcement. Largan Precision, a Taiwanese manufacturer, announced plans for plant expansion, and Kantatsu, a Japanese manufacturer, is planning to construct plants in China, in addition to expanding business in Japan. Foxconn, which is continuously looking for opportunities to manufacture new parts with its advanced technologies to enhance its profitability, has been actively examining chances to enter camera lens business since 2016.

Today, almost all the Smart-phone manufacturers outsource camera lenses except for Samsung. Camera lenses for iPhones are now supplied mainly by Largan, and by others including Genius Electronic Optical (GSEO) and Sunny Optical Technology, a Chinese manufacturer. Largan, a Taiwanese parts manufacturer, accounts for 30% of the world's share in the production of Smart-phone camera lenses, and is one of Apple's main suppliers. The only Japanese company which is part of Apple's camera lens supply chain is Kantatsu, a big camera lens manufacturer. After acquiring Sharp, Foxconn has been more motivated to expand business with Kantatsu, whose largest shareholder is Sharp, and increase orders from Apple.

Kantatsu, a Japanese camera lens manufacturer which has attracted Foxconn's attention after Sharp's acquisition, is an independently run company (Sharp's investment ratio is 44.4%). In addition to support given to Kantatsu by Apple itself (Kantatsu has received capital from Apple, increasing its monthly production capacity to 25 million units), a reinforced relationship between Foxconn and Kantatsu would bring changes to Apple's camera lens supply chain under Foxconn's initiative. On the other hand, Foxconn is trying to strengthen its camera lens business in Taiwan. In 2016, it decided to put more emphasis on camera lens production, investing capital in Zhong Yang Technology, the third biggest lens manufacturer in Taiwan. After that, Zhong Yang purchased a plant disposed of by Newmax Technology, another Taiwanese lens manufacturer for about 975 mil-

Figure 5 Status Quo of OEL Production

Manufacturer	Production Status
Samsung	Producing 4th,5th and 6th generations of OEL
LGD	Producing 4th,5th and 6th generations of OEL, only in small volume
AUO	Producing OEL panels that support 3.5 and 4.5 Smart-phone AR

Created by the author

lion yen. Foxconn has clearly shown its willingness to develop lens business in Taiwan through the expansion and reinforcement of Zhong Yang (Figure 6).

Foxconn will increase its competitive advantage if it can also provide multiple technologies and high precision parts for TFT-LDC panels and camera lenses, beyond iPhone assembly.

(5) Development of Vertical Integration of Panel Production across Regions

Before it was acquired by Foxconn, Sharp closed some of its plants in Japan to reduce its deficit, but was not able to fundamentally solve the high cost problem of its TFT-LCD TVs. To make the matters worse, Sharp's international competitiveness declined due to a smaller product portfolio after selling its plant in Mexico. In order to overcome these adversities, Foxconn has strengthened the link between Sharp and Innolux, making adjustments to their business outline since Q2 of 2017.

① Sharp Focused on Technological Development

Through business outline adjustments by Foxconn, Sharp remains poised to develop new technologies and produce high-end models, which Japanese manufacturers are generally good at, but the trend is now going to change. Currently, Sharp is trying to shift its development focus to mass production of OEL panels, while making its plants in Japan dedicated to production of TFT-LCD panels over 80 inches. At the same time, Foxconn is expanding its involvement in SDP and Sharp, pursuing further cost reduction. One of the problems Sharp has been faced with is that it has supplied TFT-LCD panels to Korean and Chinese manufacturers at discounted prices to reduce its deficit. In order to solve this, Foxconn made an additional capital investment of 52 billion yen in total in SDP, which it operates in partnership with Sharp, in December, 2016. As the result of this investment, Foxconn's investment ratio exceeded 50%, making SDP a subsidiary. Since 2017, in an effort to improve Sharp's profitability, Foxconn restricted its supply of TFT-LCD panels to outside customers including Samsung, LGD, Hisense, a Chinese home appliances manufacturer, which has led to a lawsuit against Samsung.

There are a few reasons for Foxconn's restriction of its TFT-LCD panel supply. The first reason is to secure SDP's panel production. After Foxconn got back Sharp brand from UMC in Europe in July, 2016, TFT-LCD panels made in Europe have been provided by Sharp Japan. In order to secure a stable position in the European market, it is necessary to maintain a certain level of production capacity, which can additionally be used to increase panel supply to Asia. Sharp is now shifting its policy to expanding its sales in the Asian market. As demands for large-sized TVs are growing in China and emerging countries in South East Asia, Foxconn is pushing for this expansion by investing capital, while expanding the production under its own brand.

Furthermore, in an effort to fundamentally solve the high cost problem of Sharp's made-in-Japan TFT-LCD TVs, Foxconn is transferring SDP's panels directly to Sharp in Sakai City to compensate for a lack of Sharp's production capacity in Japan. Through this parts supply inside the group, Sharp's production cost in Japan has been reduced. Of course, large-scale investments involve risks. Foxconn's net deficit for December 2016 amounted to 59.2 billion yen, apparently due not only to an additional capital investment in SDP, but mainly to a drop in the prices of large-sized TFT-LCD panels.

② Innolux Starting Production of TFT-LCD TVs under Sharp Brand

Innolux, a Taiwanese TFT-LCD manufacturer under the Foxconn group, plays different roles from Sharp's, but both of them have cost reduction as a common target. While Sharp's emphasis is on development, Innolux is focused on innovation in production methods and improvement in technological integration. Making good use of the experiences Foxconn has accumulated of producing TVs and developing fully automated plants, Innolux is trying various methods with an ambition to invent a new

Figure 6 Main Camera Lens Manufacturers

Manufacturer	Monthly Production (units)	Customers
Largan (Taiwan)	100 million	Huawei, Xiaomi, Sony
Sunny Optical (China)	30 million	Huawei, Lenovo, OPPO, Samsung
Kantatsu(Japan)	25 million	Sony and other Japanese Smart-phone manufacturers

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TV production method.

The vertical integration in the TFT-LCD industry in Japan had been stable up to early 2000s. In those days, each Japanese TFT-LCD TV manufacturer, with its own panel production technologies and parts manufacturers, conducted by itself everything from manufacturing, branding to sales of TFT-LCD TVs, for example AQUOS series by Sharp. However, after 2009, those surviving Japanese manufacturers started to mainly adopt "Open Cell" method of selling TFT-LCD panels to Chinese TFT-LCD manufacturers and TV manufacturers without sufficient production capacity, to increase sales. This resulted in separation of panel production and branding, and the vertical integration in the TFT-LCD industry rapidly declined. Faced with this trend, Foxconn is trying to realize vertical integration from manufacturing, branding to sales on its own again, based on the synergistic effect of Sharp's technological development and brand, and Innolux's production capacity. Innolux, under the Foxconn group, announced that part of Sharp brand's TFT-LCD TVs would start to be produced locally in a new production line in Taiwan in Q2 of 2017.

Sharp has limited-time special offer for the artificial Chinese singles festival, for single male and females at (1111) 11th November 2016, the sales promotion of RMB$14000 ($65000NTD), buy 70inch 4K LCD get 60inch LCD free, Sharp generated 3 billion NTD sales (about 100 million U.S. Dollars) a day. This was huge success for Sharp and Foxconn. These promotional offer included 40inch 4K LCD in Taiwan sells for $8000 NTD $270 USD leads to top sales volume or number 1 in Taiwan retail market and online shops. Sharp set up competitive pricing online and retails shops resulted in huge success in Taiwan and Chinese market. Some accusation point out that sharp segmented the market by using cheaper price panels to compete on the lower end of the market because of their new LCD use Innolux and Infocus, corporation panels. As for Japanese market or LCD selling at high-end, use sharp's panel only made in Japan. This is purely marketing strategy to segmented the market for sales in different regions and meet the customer demands.

Foxconn, which has actively enhanced its competitiveness partly by making good use of acquisitions, has its unique business development plan in the industry. Two year into the start of Sharp's business reorganization, the whole TFT-LCD industry is evolving into the next stage. Neither Foxconn nor Sharp has achieved their goals in the development of OEL panels, as they have no capabilities now, but have already achieved some progress in other components and corporate integration.

4. Integration of Sharp Brand and Expansion into Global Market

Sharp, lost in competition against Samsung and JDI, was forced into a situation where its technological edges did not lead to profitability, but is now trying again to expand into the global market with the help of Foxconn, which has reorganized Sharp's business and secured sales channels. After recovering the rights to use its own brand, Sharp announced a new Medium-Term Management Plan for the fiscal years from 2017 to 2019 in July 2017, aiming to achieve 3 trillion 250 billion yen of total sales and 150 billion yen of operating profit for the fiscal year of 2019 as "One SHARP". To ensure that these targets will be met, Sharp established "8K Ecosystem Business Strategy Office" and "AIoT(AI+IoT) Business Strategy Office", showing that its future business outline will be focused on 8K TFT-LCD panels and IoT business. "8K Ecosystem" and "Human Friendly IoT" are the two important pillars of the reborn Sharp. The first half of this section will organize the status and progress of brand rights recovery by Foxconn since the summer of 2016. The second half will explain Sharp's future 8K investment plan and its IoT business directions.

(1) Recovering Rights to Use Brand and Related Problems

Even if electronics-machinery manufacturers in technologically underdeveloped countries strengthen their production capabilities as subcontractors, and later establish their own brand, they are not very competitive because of their relatively short history. In order to overcome this weakness in a short time, some emerging manufacturers make efforts to increase the number of their customers through corporate acquisition and by obtaining the rights to use famous brands. Chinese home appliance manufacturers, which have become mature particularly after late 2000s, are now mainly acquiring Japanese home appliance manufacturers. In the case of Japanese white goods business, the long-lasting white goods business of Sanyo Electric, under the Panasonic group, was sold to Haier, a big Chinese home appliance manufacturer, in 2011, after Panasonic had recorded a massive deficit of more than 700 billion yen for two consecutive years. In another example, Chinese

Midea group obtained rights to use Toshiba brand for 40 years for business purposes all over the world in 2016. Foxconn is now faced with similar types of problems, aiming to sell Sharp's TVs to the global market just by recovering rights to use the brand.

Plan to Integrate TFT-LCD TV Brand

Currently, Sharp brand is controlled by multiple manufacturers in different areas of the world, making the situation very complex. Sharp's new management inaugurated in July 2016, under Foxconn's initiative, proposed a policy of integrating its TFT-LCD brands. Aiming to make Sharp a global brand in fields including AV business in the US and European markets, Foxconn has examined various measures, with different developments of recovering rights to use brands depending on the region.

① Restart of European Business

In 2015, Sharp withdrew from the TV market in Europe because of poor performance, transferring Sharp brand to Universal Media Corporation /Slovakia/ s.r.o. (hereinafter referred to as UMC). But Sharp restarted TV business in Europe by purchasing 56.7% of the shares of Skytec Group Limited (hereinafter referred to as Skytec), a medium-sized Slovakian home appliances manufacturer and UMC's parent company, for about 10.5 billion yen under Foxconn's initiative. Sharp embarked on partnership with Skytec in Sharp brand development in the European market in January, 2017. As Sharp also provides components such as TFT-LCD panels to UMC, sales channels of components are already secured for it.

② Asian Business and Problems Related to Technology Transfer

Sharp's expansion into Asia has mainly been through investments its subsidiaries made in various Asian countries, and the process of recovering brand rights is going well in China, India, Taiwan and Singapore. Before its acquisition, Sharp had two subsidiaries in Taiwan: Sharp Electronic Components in charge of TFT-LCD parts and business, and Sharp Corporation in charge of selling electrical equipment. But the merger process between the parent company and Taiwanese subsidiaries started after Foxconn announced the integration of Sharp brands. In Asia, Sharp is faced with the results of technology transfers. Currently, Samsung in Korea and CEC Panda, Sharp's Chinese partner, own Sharp's TFT-LCD technologies. Foxconn opted to approach CEC Panda, which had become Sharp's partner before Sharp's acquisition, by offering to share the profits generated from technology transfers with it.

③ US Business

While Sharp brand rights recovery process is going smoothly in Europe and Asia, the rights recovery is impossible in the US. The owner of Sharp brand in the US is Hisense, a big Chinese home appliances manufacturer. Trying to sell the same products to the global market, Hisense acquired Sharp's TFT-LCD plant in Mexico and the rights to use Sharp brand in the entire North and South Americas except for Brazil for 237 billion dollars. Now Sharp brand's TVs are sold in the US market by Hisense. In this situation, Foxconn, with production lines only in Mexico in American continents, is having difficulty getting into the US market. Faced with difficulties recovering its TV brand rights in the US, Sharp has shown willingness to get back into the US market on its own, announcing in July 2017 that it was going to set up a new brand there from 2018 on.

(2) Significance of Guangzhou TFT-LCD Panel Plant and Development of Next Generation TVs

Foxconn has been reconstructing its global strategy, restarting competition with Samsung in large-sized panels through Japan-Taiwan alliance. Aiming to expand its share in the TV market, Sharp has been putting a significant effort on TVs. For the moment, SDP in Sakai City, Osaka Prefecture, is the only plant in the world which can produce 8th to 10th-generation panels that can support 8K technologies. Foxconn is now working on construction plans of new-generation panel plants in China and the US, as Samsung and other competitors have already preceded Foxconn in the production of the current 4K TVs.

The decisive event in Foxconn's shift to taking aggressive action in new-generation panel production was the construction of a new plant in Guangzhou. On December 30, 2016, Foxconn formally announced the construction of one of the world's largest plants with Guangzhou City government. The Guangzhou plant, now under construction, will be the world's most advanced "10.5th-generation" plant which surpasses SDP, with the investment amount of 1 trillion 20 billion yen shared by both parties. The Guangzhou plant is planning to produce TFT-LCD panels with the world's largest glass substrates (2,940mm×3,370mm), even larger than those of the current 10th generation (2,880mm×3,130mm)

in SDP's Sakai Plant in Sakai City, Osaka Prefecture. Guangzhou was chosen mainly for two reasons: because the first assembly plant Foxconn established in China was in Guangzhou Longhua area, and because this is one of the biggest-scale industrial areas.

Back when Foxconn set up the plant, Guangzhou had not created this industrial area, and Foxconn was able to purchase the land for its Longhua plant at an extremely low price. Now Foxconn has two industrial areas in Guangzhou, including a new Huating plant. They are equipped with large capital and industrial scales and substantial labor force, so they are more conveniently situated than inland Chongqing in terms of panel transportation, with some more advantages including the short distances to Kansai district and Taiwan. Therefore, with the presence of these areas, Foxconn can make an even better use of its manufacturing abilities.

Foxconn is aiming to get back the leading position in the global market, by setting up the manufacturing system of the next-generation 8K TVs, which have 16 times higher resolution than Full High Definition. This construction plan was criticized by some investors for possible technology leakage, but has clearly shown that Foxconn is poised to compete against Korean TFT-LCD manufacturers by manufacturing large-sized glass substrates.

(3) Foxconn's Plan to Invest in US TFT-LCD Industry

On July 26, 2017, Foxconn's Chairman Terry Gou and the US President Donald Trump announced an investment plan in Wisconsin in White House. In the press conference, Trump told the media that Foxconn would make an investment of about 3.3 trillion yen in total to start the construction of a state-of-the-art plant, creating 13,000 local jobs. Trump, who aims to bring back manufacturing jobs to the US, is trying to attract investments in the US from all manufacturers. This investment in the US by Foxconn, a subcontractor of Apple and many other companies, is compatible with Trump's "Made in America" policy. More importantly, in this investment plan, Foxconn would not only construct an 8K panel plant in Wisconsin, but also lay the basis for the "ecosystem" for industries related to the 5th Generation of Wireless Communication Systems in six US states in total.

Foxconn already repatriated construction funds of 60 million U.S. dollars to the United States at October 2017 and starting construction of the new plant in Wisconsin at January 2018.In response to Trump's National Policy made in America, Foxconn's U.S. investment policy is moving very fast. However recent Nikkei Asian Review, said Foxconn is considering producing smaller screens at the Wisconsin plant than originally planned in order to lower initial costs at its proposed $10 billion campus in Mount Pleasant. The article cited industry sources and people familiar with the matter.

Indeed, there are various difficulties for Foxconn's shift of its TFT-LCD business to the US. Even though the place of investment was chosen in Wisconsin, which has rich water resources with the convenience of water transportation through the Great Lakes, one possible task for Foxconn is how to apply its past experiences of technological transfers mainly in Asia to building up the TFT-LCD industrial system in the US over a long distance from Japan. However, it should still be Gou's earnest wish to let Foxconn make further progress by creating a new base in the US through this plant investment plan.

Apple, realizing the limitations of hardware sales, has started to get into the media industry, working seriously on producing and purchasing original programs, and look for other manufacturing partner than Foxconn. For example, Apple chose Wistron, a Taiwanese EMS provider, as its partner and set up an iPhone development center in India, which Foxconn feels threatened. Foxconn recorded the first sales drop in 2016 since it got listed in 1991, not only because it made SDP a subsidiary, but also because it received less orders from Apple due to a slump in iPhone sales. Foxconn is now looking into new possibilities for expanding its power, while maintaining business with its current Japanese and Chinese partners. Forced to review its global strategy, Foxconn expects to use the technological edges brought by Sharp, which it acquired last year, to make a breakthrough. However, it seems to be a long shot for Foxconn to try to get out of Apple dependent EMS model and make enormous investments to introduce IoT into its products, while strengthening ties to its manufacturing business. Behind this lies Foxconn's aspiration to evolve out of EMS.

The relationship between Apple and Foxconn has been strengthened since Foxconn was chosen as a main contract manufacturer of iMacs in 2000. So far Foxconn has not only ensured good supply of Apple's products, but also helped Apple generate profits by constantly meeting the quality standards and by realizing a shorter production time with the help of massive labor force and robots. However, their partnership has been gradually changing, with the recent slow-down in iPhone sales and the shrinking Chinese market this forced Foxconn to regroup and refocus its core business units and major

investment objectives.

(4)Foxconn's new business at 2018- Foxconn Industrial Internet (FII)

Foxconn held a press conference at May 11, 2018 and announce that Foxconn group's decision to reduce the 20 percent of listed share capital（34.657 billion NT）in 2018. Even Foxconn announced the financial report for the first quarter of this year at March 2018. Due to appreciation of $NTD and increased operating costs, the gross margin, profitability and net profit set a new low this year compare to the past 5 years. But appreciation of NTD offsets the increased in customer and sales in combined mobile phone handset, LCD TV, networking products. The introduction of new products pushes up sales growth and volume also increased the cost of operating expenses.

Another reason due to iPhone X recent slowdown in sales also this leads to that Foxconn speed up changes in the business model at 2018 for itself and Sharp with re-positioning itself for the tough competition time ahead. The foreign investment fund has advantage compare to the domestic funds investors. This is the biggest issue about Foxconn's valuation due to foreign funds linking its performance to Apple sales because of iPhone is a real cash cow for past ten years for Apple Inc. and the foreign funds always treat the Foxconn and Apple Inc. as one or highly correlated. Also Foxconn business group and operations are not limited only to hardware manufacturing, but expand to software and platform business model.

Foxconn Industrial Internet (FII) established 6th March 2015 and listed in May 2018 on Shanghai Stock Exchange, this is special case for a new company applying for listing. Foxconn FII include group's cloud server production department, advanced central processing technology department, router and switches production department, cyber security equipment production department, and iPhone production department. Also focus on unmanned factory system's developing Foxconn R&D for many years FII also makes FOXBOT. They made 40000 automation manufacturing robots for the whole FOXCONN Group. The main reason is an automation specialist Mr. Dai from MIT who is vice general manager for Foxconn FII automation department who help Foxconn advanced into the new era of internet industrial manufacturing 4.0.

In Chinese market the development of Virtual economy is very rapid. Foxconn Industrial Internet (FII) has three target segments, 1. mobile phone components and other network telecommunication components and equipment, 2.Cloud services and equipment 3. Precision machinery and automation robot .(Figure 8) The biggest feature of Foxconn Industrial Internet (FII) in the prospectus for listing, the title has no association or link to original equipment manufacturer OEM business. It shows Foxconn actively seeking to move towards next-generation technology, Foxconn FII is getting rid off the OEM image which was the intrinsic value of Foxcoon Ltd.

Figure 8 Foxconn Industrial Internet's Subsidiary company

Company Title	Mainly Business	CITY	AREA
Ingrasys Technology Inc.	Embedded network System	Tao-yuan	TAIWAN
Foxconn Cloud Network Technology .LTD.	Cloud network business	Republic of Singapore	Singapore
Ambit Micro-systems	ADSL,modem, modulator	Huizhou	CHINA
Foxconn Precision Industry	iPhone Components	Zhengzhou	CHINA
Foxcoon Precision Industry	Communication equipment	Xiaoping	CHINA
Foxconn Precision Industry	Smart-phone Components, Smart-phone manufacture	Jincheng	CHINA
Hong Fujin Precision Industry	Server equipment	Tianjin	CHINA
FU YI Precision Industry	Solar power	Dongguan	CHINA
Tong He electronic	Network equipment	Hangzhou	CHINA
Precision Industry	Network communication equipment	Nam Ding	CHINA
Bu Zang Precision Technology	Cell phone Components, Cell phone manufacture	Henan	CHINA

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Also under the merger of Sharp and Foxconn, plus Foxconn's FII listing development can give Sharp new synergy and possibilities of greater influences in the global electronic business as it focused on R&D and Foxconn on manufacturing and distribution of Sharp products and components.

5. Conclusion

"Upgraded Framework for New Strategic Vertical Integration" by Sharp and Foxconn alliance

Foxconn has evolved in the opposite way to Japanese consumer electronic manufacturers such as Toshiba and Sharp, which first developed technologies in semiconductor and TFT-LCD fields, and later started to manufacture electrical equipment. Foxconn has been attracting the world's attention partly because it has expanded into the development field through its service was originally dedicated to manufacturing only and manufacturing has declined. In the East Asia, Samsung is also an example of upgrading its business outline through expansion of electronics manufacturing business. But in contrast to Samsung, which has expanded its business scale through systematic cooperation with Japanese manufacturers in the semiconductor and TFT-LCD fields, tapping into national resources since 1980s, Foxconn is a completely private company with limited financial and policy support from the government.

An attempt by an unknown manufacturer to acquire a famous brand using its financial strength without fully understanding the acquired company's business and simply put the brand name to its own products doesn't necessarily work. Foxconn, which aims to make further progress by handling everything from modal manufacturing, high added-value parts production to final products, in addition to targeting brands, adopts a strategy of changing its business model from the conventional horizontal specialization to a new vertical integration. The new vertical integration differs from the existing "one brand for one country" type of vertical integration, in that Foxconn is aiming to create an integrated production system across regions by linking Sharp's headquarters in Sakai, Osaka, Innolux in Zhunan outside the Hsinchu Science Park, and the electronics equipment plant in Guangzhou Longhua area. One and a half years after Sharp's acquisition, the current situation of the TFT-LCD business integration by Foxconn and Sharp is as follows (Figure 9).

This paper examined the factors that made Sharp's reform successful and the methods used for its restructuring into Foxconn group, clarifying Foxconn's characteristics. As the global specialization system developers,

Figure 9 TFT-LCD Business Integration by Sharp and Foxconn Alliance

Region	Manufacturer / Location	Large-Sized Panel Business	TV Business	Smart-phone Business
Japan	Sharp (Sakai City, Osaka)	Production of TVs and development of new technologies for the Japanese market in Kameyama plant. The biggest large-sized TV production center in Japan.	Restarting Aquos business in Europe. Considering getting into the US market under a new brand.	Sales of Sharp brand smart-phones in Japan. Also starting overseas sales.
Japan	SDP (Sakai City, Osaka)	All the outsourced production will end by the end of 2017. Produces and provides panels to Sharp's headquarters in Sakai.	N/A	N/A
Taiwan China	Foxconn (Neihu, Taipei) (Guangzhou Longhua) (Guangzhou Huating) Innolux (Zhunan, Miaoli)	Foxconn's Innolux produces small and medium-sized panels as well as large-sized panels.	Produces part of Aquos brand TFT-LCD TVs.	Manufactures iPhones and its own Smartphone brand INFOCUS.

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changes in the power relationships in the electronics equipment industry have become even more fierce since 2012. Though there are more and more cases of foreign electronics manufacturers with their financial superiority acquiring Japanese manufacturers with better technological strength and brand recognition now, there have been few such cases of very close partnership as one between Sharp and Foxconn, which matched closely together from manufacturing to brand sales. Their cooperation this time, from the viewpoint of the positioning of the global electronics industry today, can be referred to as the leading example by a Japanese manufacturer with its superiority in development and technology, and a Taiwanese manufacturer with its superiority in original equipment manufacturing. (Figure 10).

Foxconn expanded their new business by capital market restructuring and trade incentive negotiations. It is interesting because Foxconn's new business and Sharp's business can complement each other to create better synergy. Foxconn Industrial Internet (FII) is Foxconn new business about combine the Cloud business、Network equipment business and Apple's supply chain vendors. Taiwan is a major Apple's supply chain vendors and Foxconn is the single largest employer in Taiwan and now, Foxconn attempt to become largest employer in mainland China now rank the 10th in China. Following the changes in Foxconn Group, shifting major focus on business innovation and business policy. These resulted in accelerating investments in USA and China. Sharp have more opportunities to play a major role in the new Foxconn electronic component empire internationally. This is the most successful case of merging between branded consumer electronic company with OEM company also cross national merger with great synergistic effect.

Notes:

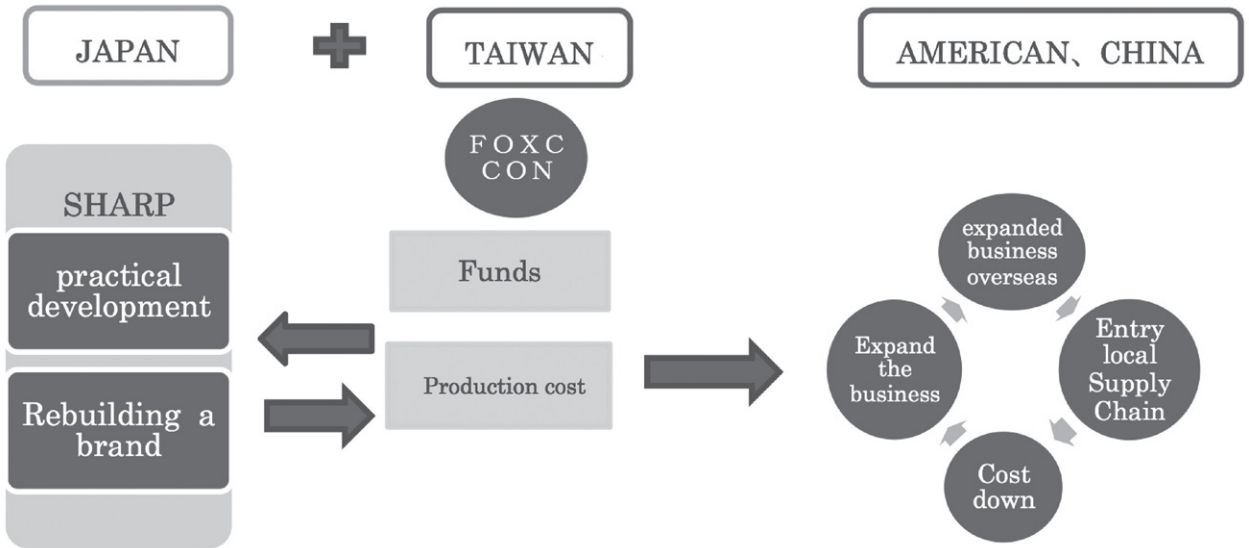
(1) CMO did not immediately change its name after it was acquired by Foxconn, but when the media reported about CMO after 2009, it was referred to as "New CMO" for ease of differentiation.

(2) There are mainly two views as to why he invested in SDP under his own name. One is that he aimed to avoid impacts on Foxconn's performance and share price even if SDP continued to be in deficit or resulted in even bigger losses; the other is that he wanted to show his passion for Sharp.

References

1) Consolidater Financial Results For the Year Ended March 31,2018 for SHARP P1
2) AUO's Capital Investment in Infovision Optelectronics Approved: Taiwan's first 8.5th Line Overseas Will Be Born. Huaxia Network. July 27, 2011 http://big5.huaxia.com/tslj/qycf/2011/06/2470039.html
3) Innolux without Name of Chimei. Nikkei Technology

Figure 10 The corporate reconstruction of Sharp



Created by the author

ONLINE. November 1, 2012
http://techon.nikkeibp.co.jp/article/NEWS/20121101/248791/?rt=nocnt

4) Terry Gou Tells Us All, The Weekly Toyo Keizai. June 21, 2014, p 34
5) Summary of Sharp's Financial Results in FY 2011, p 11
http://www.sharp.co.jp/corporate/ir/library/financial/pdf/2012/1/1203_4pre.pdf
6) Sharp Announced Partnership in TFT-LCD Panels with CEC Panda. The Nikkei. July 27, 2013
https://www.nikkei.com/article/DGXNASFL270PJ_X20C13A6000000/
7) Sharp to Jointly Operate TCD-LCD Panel Plant with Chinese Company with Technology licensing. Zaikei Shimbun. July 27, 2013
8) End to Second Biggest Panel Manufacturer – Four Lessons from Wintek Falling from 100 Billion Sales into Bankruptcy in Five Years. Global Views Monthly. September 2015
https://www.gvm.com.tw/Boardcontent_29450.html
9) Sharp's Fall – Reorganization under Foxconn Group. Nikkei VDATA. February 25, 2016
10) OEL Panel Plant by Foxconn and Sharp under consideration in Henan Province, China. The Nikkei. January 8, 2017
http://www.nikkei.com/article/DGXLZO11450070X-00C17A1TJC000/
11) Canon Tokki Influences OEL Market by Doubling Production of Vacuum Deposition Equipment – Part of Unit Production Subcontracted to Canon Group. March 22, 2017
http://newswitch.jp/p/8391
12) Foxconn Turns TFT-LCD Joint Venture with Sharp into Subsidiary with Additional Investment of 52 Billion Yen. The Nikkei. December 29, 2016
http://www.nikkei.com/article/DGXLASFK29H0I_Z21C16A2000000/
13) Samsung's Damage Compensation Claim against Sharp for Suspended Panel Supply. The Nikkei. January 20, 2017
http://www.nikkei.com/article/DGXLASDZ20HO8_Q7A120C1TJC000/
14) Foxconn and Sharp Alliance Faces 60 Billion Yen Deficit in TFT-LCD Joint Venture-What Will Become of New Plant Plans in China and USA? Key is Expansion of Sharp's TV Business. Nikkan Kogyo Shimbun. April 3, 2017
http://newswitch.jp/p/8540
15) Sharp's limited-time special offer for the artificial Chinese singles festival, sales promotion of RMB$14000 Apple daily November 13, 2016
https://tw.appledaily.com/new/realtime/20161113/987908/
16) FY2017-2019 Medium-Term Management Plan by Sharp. May 26, 2017
www.sharp.co.jp/corporate/ir/event/policy_meeting/pdf/shar170526_1.pdf
17) Sanyo Formally Announces Selling White Goods Business to Haier. The Nikkei. October 18, 2011
http://www.nikkei.com/article/DGXNASDD180GN_Y1A011C1000000/
18) Toshiba's White Goods Business Aiming to Become Profitable in FY 2017 under Midea Group. The Nikkei. August 8, 2016
http://www.nikkei.com/article/DGXLASDZ08HW2_Y6A800C1000000/
19) Comeback to European TV Business. Mainichi Newspapers. December 22, 2016
https://mainichi.jp/articles/20161223/k00/00m/020/048000c
20) Sharp's Overseas Affiliated Companies
http://www.sharp.co.jp/corporate/info/outline/consolidated/oversea.html
21) Sharp's Comeback to North American TV Business under New Brand – Unable to Use Aquos Sales Starting after 2018. Sankei WEST. July 24, 2017
http://www.sankei.com/west/news/170724/wst1707240031-n1.html
22) Foxconn Reaches Basic Agreement with City Government to Construct SmartphonePlant in Nanjing, China. The Nikkei. September 13, 2017
https://www.nikkei.com/article/DGXLASDX13H1B_T10C17A9FFE000/
23) Foxconn and Sharp Formally Announce Construction of 1-Trillion-Yen Largest Panel Plant in Guangzhou, China. The Nikkei. December 30, 2016
https://www.nikkei.com/article/DGXLASDZ30H2Q_Q6A231C1TJC000/
24) Foxconn Invests 1 Trillion Yen in New US Plant – Trump: "Great Day". The Asahi Shimbun Digital. July 27, 2017
http://www.asahi.com/articles/ASK7W2CCKK-7WUHBI002.html
25) Foxconn Bets on Massive Investment in USA with Partnership with Sharp for TV Production to Reduce Dependence on Apple. The Nikkei. August 3, 2017
http://www.nikkei.com/article/DGKKASDZ02I35_S7A800C1FFE000/
26) Foxconn refutes report that it will cut back initial investment in Wisconsin plant May 23, 2018

http://host.madison.com/ct/news/local/govt-and-politics/election-matters/report-foxconn-could-scale-back-initial-investment-in-wisconsin-facility/article_2f0886aa-87eb-588b-9635-c07172b7b0e1.html

27) Apple Goes Head to Head with Amazon and Netflix! 1 Billion Dollars to Create and Purchase Original Programs. iPhone-mania. August 20, 2017 http://iphone-mania.jp/news-178269/

28) Apple to Reduce Latest iPhone Production by 30% from January to March, Blow to Parts Suppliers. The Nikkei. January 6, 2016 http://www.nikkei.com/article/DGKKASDZ28HX4_V00C16A1MM8000/

29) Consolidater Financial Results For the Year Ended March 31,2018 for FOXXCON P1

30) The stock price of FII is expected to exceed 500 billion RMB Economic Daily May 12, 2018 https://money.udn.com/money/story/5641/3138711

31) Apple Goes Head to Head with Amazon and Netflix! 1 Billion Dollars to Create and Purchase Original Programs. iPhone-mania. August 20, 2017 http://iphone-mania.jp/news-178269/

32) Apple to Reduce Latest iPhone Production by 30% from January to March, Blow to Parts Suppliers. The Nikkei. January 6, 2016 http://www.nikkei.com/article/DGKKASDZ28HX4_V00C16A1MM8000/

33) AUO's Capital Investment in Infovision Optelectronics Approved: Taiwan's first 8.5th Line Overseas Will Be Born. Huaxia Network. July 27, 2011 http://big5.huaxia.com/tslj/qycf/2011/06/2470039.html

34) Comeback to European TV Business. Mainichi Newspapers. December 22, 2016 https://mainichi.jp/articles/20161223/k00/00m/020/048000c

35) Consolidater Financial Results For the Year Ended March 31,2018 for FOXXCON P1

36) Consolidater Financial Results For the Year Ended March 31,2018 for SHARP P1

37) Canon Tokki Influences OEL Market by Doubling Production of Vacuum Deposition

38) Dianwen Zhang (2008). Hu yu Hu (Tiger and Fox). Commonwealth Publishing

39) End to Second Biggest Panel Manufacturer – Four Lessons from Wintek Falling from 100 Billion Sales into Bankruptcy in Five Years. Global Views Monthly. September 2015 https://www.gvm.com.tw/Boardcontent_29450.html

40) Equipment – Part of Unit Production Subcontracted to Canon Group. March 22, 2017 http://newswitch.jp/p/8391

41) Foxconn and Sharp Alliance Faces 60 Billion Yen Deficit in TFT-LCD Joint Venture-What Will Become of New Plant Plans in China and USA? Key is Expansion of Sharp's TV Business. Nikkan Kogyo Shimbun. April 3, 2017 http://newswitch.jp/p/8540

42) Foxconn and Sharp Formally Announce Construction of 1-Trillion-Yen Largest Panel Plant in Guangzhou, China. The Nikkei. December 30, 2016 https://www.nikkei.com/article/DGXLASDZ30H2Q_Q6A231C1TJC000/

43) Foxconn and Terry Gou — Sharp's Truth (2016). Mainichi Newspapers

44) Foxconn Bets on Massive Investment in USA with Partnership with Sharp for TV Production to Reduce Dependence on Apple. The Nikkei. August 3, 2017 http://www.nikkei.com/article/DGKKASDZ02I35_S7A800C1FFE000/

45) Foxconn Invests 1 Trillion Yen in New US Plant – Trump: "Great Day". The Asahi Shimbun Digital. July 27, 2017 http://www.asahi.com/articles/ASK7W2CCKK-7WUHBI002.html

46) Foxconn Reaches Basic Agreement with City Government to Construct SmartphonePlant in Nanjing, China. The Nikkei. September 13, 2017 https://www.nikkei.com/article/DGXLASDX13H1B_T10C17A9FFE000/

47) Foxconn refutes report that it will cut back initial investment in Wisconsin plant May23,2018 http://host.madison.com/ct/news/local/govt-and-politics/election-matters/report-foxconn-could-scale-back-initial-investment-in-wisconsin-facility/article_2f0886aa-87eb-588b-9635-c07172b7b0e1.html

48) Foxconn Turns TFT-LCD Joint Venture with Sharp into Subsidiary with Additional Investment of 52 Billion Yen. The Nikkei. December 29, 2016 http://www.nikkei.com/article/DGXLASFK29H0I_Z21C16A2000000/

49) FY2017-2019 Medium-Term Management Plan by Sharp. May 26, 2017 www.sharp.co.jp/corporate/ir/event/policy_meeting/pdf/shar170526_1.pdf

50) Innolux without Name of Chimei. Nikkei Technology ONLINE. November 1, 2012 http://techon.nikkeibp.co.jp/article/NEWS/20121101/248791/?rt=nocnt

51) Japan Display to Record Extraordinary Loss of 170 Billion Yen for Q1, 2018. Tokyo Shoko Research. August 16, 2017
http://www.tsr-net.co.jp/news/analysis/20170816_01.html
52) Minetoshi Yasuda(2016). Ambition — Biography of Terry Gou. President
Mainichi Newspapers Economic Department(2016).
53) OEL Panel Plant by Foxconn and Sharp under consideration in Henan Province, China.TheNikkei. January8,2017 http://www.nikkei.com/article/DGXLZO11450070X00C17A1TJC000/
54) Sharp Announced Partnership in TFT-LCD Panels with CEC Panda. The Nikkei. July 27, 2013
55) Sams31.Sharp's Comeback to North American TV Business under New Brand – Unable to Use Aquos — Sales Starting after 2018. Sankei WEST. July 24, 2017
http://www.sankei.com/west/news/170724/wst1707240031-n1.html
56) Samsung's Damage Compensation Claim against Sharp for Suspended Panel Supply. The Nikkei. January 20, 2017
http://www.nikkei.com/article/DGXLASDZ20HO8_Q7A120C1TJC000/
57) Sharp's Fall – Reorganization under Foxconn Group. Nikkei VDATA. February 25, 2016
58) Sanyo Formally Announces Selling White Goods Business to Haier. The Nikkei. October 18, 2011
http://www.nikkei.com/article/DGXNASDD180GN_Y1A011C1000000/
59) Sharp's limited-time special offer for the artificial Chinese singles festival, sales promotion of RMB$14000 Apple daily November 13, 2016
https://tw.appledaily.com/new/realtime/20161113/987908/
60) Sharp's Overseas Affiliated Companies
http://www.sharp.co.jp/corporate/info/outline/consolidated/oversea.html
61) Summary of Sharp's Financial Results in FY 2011, p 11
http://www.sharp.co.jp/corporate/ir/library/financial/pdf/2012/1/1203_4pre.pdf
62). Sharp to Jointly Operate TCD-LCD Panel Plant with Chinese Company with Technology licensing. Zaikei Shimbun. July 27, 2013
63). Toshiba's White Goods Business Aiming to Become Profitable in FY 2017 under Midea Group. The Nikkei. August 8, 2016
http://www.nikkei.com/article/DGXLASDZ08HW2_Y6A800C1000000/
64) Terry Gou Tells Us All, The Weekly Toyo Keizai. June 21, 2014, p 34
65) The stock price of FII is expected to exceed 500 billion RMB Economic Daily May 12, 2018 https://money.udn.com/money/story/5641/3138711
66) Wu(2017). From Alliance to Partnership. Japan-Taiwan Industrial Partnership and Innovation. SOSEISHA Co.,Ltd.
67) Yukihiko Nakata(2016). Depths of Sharp's Defeat. East Press

Problem Analysis and Reform of Higher Education in Myanmar from the Case of Japanese Higher Educational Reform

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Abstract

This paper spotlights the main weaknesses in Myanmar higher education and reveals the best ways for the governmental policymakers of Myanmar to reform higher education, with a Japanese higher-education-reform case study as a model. After over 50 years of isolation, Myanmar's higher education system is in need of intensive renovation in order to meet global standards. Therefore, this study attempts to present the major obstacles in higher education that have hindered the process of economic and social development in Myanmar for so many years. Moreover, this study looks at the best ways to overcome these obstacles. The purpose of this study, using the framework of Japanese reform of higher education, is to show that Myanmar's higher education can apply its strong points to establish the right direction for providing huge vision and breakthroughs in Myanmar's industrial development, thus changing a poor nation into a rich nation rapidly.

Key words : Myanmar, Japan, policy, higher education, universities

1. Introduction

In the modern economy, it is very important for a developing country to build quality and capacity in universities to produce a skilled work force that creates a middle-income country. Moreover, fundamental capacity building in a developing country must be practiced through good universities that place a large focus on STEM — science, technology, engineering and mathematics — and specific growth industries. To build these fundamental capacities, universities in developing countries seriously need to apply a vital resource, brainpower, rather than money (MacGregor, 2015; Ramphele & Rosovsky, 2015). Additionally, to catch up with the modern knowledge-based economy or participate in the globalised environment of higher education, a developing country urgently needs to open more research universities. Thus, research universities play a critical role in producing many high-quality academic professionals and experts, high-level scientists and researchers needed by the economy (The World Bank, 2000; University World News, 2013).

In Japan, universities play a central role in advanced educational and research activities. Japanese universities contribute to social and economic development through wide-ranging education and the cultivation of human resources with expert knowledge and skills in various academic disciplines and high-level research. For higher education (HE) development, the Japanese ministry of education guarantees the quality of universities, oversees the the internationalisation of universities, deals with social issues, and ensures financial assistance for students (MEXT, retrieved: 2018).

The major challenges for the developing country of Myanmar are having a strong financial services sector, an infrastructure sector and an education sector. Building a competitive HE system plays a very important role, because Myanmar needs a better educated and skilled young population to dramatically move the economy forward. The problem is that, after over 50 years of isolation military rule, Myanmar's HE system is a complete failure, making it difficult to find skilled workers today. Absent a dramatic change in higher education policy over the next several years, Myanmar's human capital in all sectors will endure a serious decline due to the very outdated management of the education system.

Therefore, the purpose of this study is to reveal the main issues surrounding the development of Myanmar's HE system in recent times. Moreover, this study is aimed at examining the best ways for Myanmar's HE policymakers to reform this currently poor system more effectively and systematically, by comparing it to the reform of the Japanese higher education system, for the purpose of enabling economic change. Under this framework, Myanmar's HE can apply its strong points to establishing a strategic model that points in the right direction for providing strong vision and breakthroughs in Myanmar's

industrial development; changing a poor nation into a rich one, rapidly. Additionally, these findings will be useful for those in charge of HE policies, as well as prospective students and professors who are considering doing further research on Myanmar's HE development.

This research asks the following two questions:

(1) What are the solutions to the major problems faced by Myanmar's HE?

(2) How can Myanmar's HE policymakers reform Myanmar's poor HE system more effectively?

To answer the research questions, data was collected from experts' opinions (e.g., rectors and professors, and heads of universities).

This study is divided into five sections. Section 1 serves as a general introduction to the study. It presents the background and the purpose of the study. Section 2 discusses some theoretical issues set out by various scholars and researchers. Section 3 reports the historical background. Section 4 describes how to study is conducted by providing information about the subjects of the study, instruments used in collecting data and the data collection procedure. Section 5 illustrates the analysis of the collected data. Finally, Section 6 provides the conclusion for this study.

2. Literature Review

Currently, HE continues to play a key role in economic development because our world economy has become knowledge- and network-based, and high-quality research and technology are increasingly important for maintaining innovations in a new economy (Pillay 2011; The World Bank 2002; Pinheiro & Pillay 2016; Varghese 2009 Powell, & Snellman 2004). The World Bank's 2002 study found that the international community is now re-examining the importance of HE for increasing a country's intellectual capacity development because participation in an increasingly knowledge-based world economy has become essential for progress (Asian Development Bank 2007; Watkins 2015; Arvanitidis & Petrakos 2011; University of Oxford 2015; Kruss, Mcgrath, Petersen, & Gastrow 2015). For example, Pillay (2011) highlights how Finland's economy was dramatically diversified over the past two decades. In the face of economic crisis, the government made two important policy decisions. The first one was to further develop the Nordic welfare model,[1] and the second was to invest substantially in the development of the knowledge economy. In line with this economic policy decision, the role of higher education assumed much greater importance in the 1990s. The author describes that now, Finland's government has started to invest in education generally, and in HE in particular. In addition, the state invests substantially in research and development (R&D) spending. Finland's national objective is 'sustainable and balanced social and economic development.' High employment, productivity and competitiveness are key factors. High-quality HE systems, as well as measures to increase research and technological development, play a significant part in attempts to attain the country's national development goals. Beyond primary and secondary schooling, HE is necessary for building technical and professional capacity, as well as for producing qualified teachers at every level (OECD 2000; Jongsma 2016).

Developing countries risk being further marginalised in the competitive world economy if their tertiary education systems are not adequately prepared to capitalise on the creation and utilisation of knowledge and respond to changing labour market requirements for advanced human capital (OECD 2000; The World Bank 2002; Gastrow, & Lorentzen 2012). Therefore, developing countries should effectively prepare very good HE policy for increasing capacity-building programmes for teaching skills and techniques, research and technological development, innovations, and advanced human capital through a high-quality HE system.

2.1. Capacity-building Programmes for Teaching Skills and Techniques

It is very necessary to do more capacity-building activities for HE in developing countries (Stig 2006; Deuren 2013; Lancrin 2004; The World Bank 2000). Teacher training is an important matter of national capacity development in any country in the world, because high-quality teacher education for teaching future citizens contributes to the reduction of poverty in a long run (OECD 2000; Barnes, Berendt,m Csirik, Hares, Haar, Jones, Kashoki, Kearney, Maamouri, McDonald et al. (1994); CHET 2006). However, capacity building for HE in developing countries is a complicated and on-going process that needs to be deeply focused on historical, cultural and academic contexts (Stig 2006; Quinlan 2011; Jackson 2016).

2.2. Capacity-Building Programmes for Research and Technological Development

As universities in every country take on entrepre-

neurial roles, industries are able to organise academic education and research, and public–private relationships between industries. As a result, governments can be redefined in the light of new technological options in universities (Leydesdorff 2018; Dezure 2002; Lall 1992). Developing countries must provide an opportunity for quality academic research in HE, because academic research is a major source of knowledge and innovation at national, regional and international levels (Meek, & Davies 2009; The Group of Eight 2013). Most of the industrialised countries are trying to invest in high-level research of HE, and their governments continue to build world-class systems of universities as research-oriented institutions (Salmi 2009; Altbach & Salmi 2011; Fernate, Surikova, Kalnina, & Romero 2009). With the rise of the knowledge-based, creative economy, universities are increasingly seen as a source of knowledge, innovation, and technological progress that companies desire (Kim, Ryoo, & Ahn, 2017; Department for Business Innovation and Skills 2009; OECD 2000; The Higher Education Authority 2002). It can be said that many of the economic benefits of academic research comes from inventions in the private sector that build on the scientific and engineering base created by university researchers (Henderson, Jaffe, & Trajtenberg, 1998; Poyago-Theotoky, Beath, & Siegel ,2002). However, most of the universities in developing countries are trying to produce knowledge workers rather than innovators (Bell and Pavitt 1997; & Gereffi 1995). A few developing countries are interested in having a systematic national structure for R&D, and their universities are providing advanced innovation courses because of the following factors (Arocena and Sutz 2002):

(1) Developing countries borrowed technology so that their R&D is less significant for the production process.
(2) Market demand for expensive, high-tech products is weak, so local industries and universities have little incentive for investing in R&D activities.
(3) Most technology-transfer arrangements are sophisticated.
(4) Local firms have low human resource power for absorbing innovation.
(5) Limited financial resources cause the majority of universities to lack technological innovation.

Thus, it is obvious that technology absorption is not simply a process of copying, but rather, involves a considerable amount of additional work to adapt it to a different practical environment and assimilate it in commercial production for the conditions of an emerging market (Malecki 1991). That there is a problem with HE in most of the developing countries is evidenced by the fact that they are impressed with the HE systems of developed countries. They try to copy, exactly, the rich countries' HE policies and ideas to upgrade their own HE system. Zgaga (2014) notes that there is an hypothesis that HE systems of peripheral countries basically follow the systems of central countries in their attempts to modernise their systems. Zgaga mentions that these developing countries can be very fast, and even careless, in assuming the role of an experimental laboratory for the great ideas that come from the great world. However, Zgaga thinks that this is only half the story; the other half is internal. The question is whether the policy development processes of developing countries are determined by the same principles and conditions as in the developed countries – or perhaps in some ways they fundamentally diverge from them. Zgaga states that copying generalised policy recommendations, regardless of the particular national context, cannot lead to success. Applying the general principles of HE policies in the specific circumstances of a given country necessitates a deeper insight into those policies' historical, cultural and academic contexts. Doing so can directly assist the knowledge transfer between universities and enterprises.

E-learning does not require regular class attendance, and it can reduce the time constraints of working people and industry (Becker and Eube 2018). It is useful to have some e-learning instruments to overcome the gap between the two stakeholders, business and university, on a micro-level More countries are seeing the significance of HE and its role in providing economic growth and reducing poverty in developing countries (Bloom, Canning and Chan 2006; Varghese 2008).

2.3. Capacity-Building Programmes for Innovations

Universities can differentiate their roles by placing more emphasis on cognitive effects as a model of problem-solving ability that emerges as innovative behaviour through the opportunity of university entrepreneurship education (Kim, Choi, Sung & Park 2018; Brennan, Ryan, Ranga, Broek, Durazzi & Kamphuis 2014). Today's economy can be called a 'creative' economy, and the university has the important role of providing a support system and a good environment for fostering creativity. This helps students obtain results and profit through experimentation, as well as gain experience in each step of the process of performing innovation, as they develop their ideas through the utilisation of self-directed information and knowledge (Kim, Ryoo, & Ahn, 2017).

Therefore, developing countries must well-organise their HE policies for increasing capacity-building programmes, research and technological development, innovations, and advancing human capital through a high-quality HE system.

3. Historical Background of Higher Education Reforms

This section provides a contextual understanding of Myanmar's and Japan's HE reforms. It looks briefly at the history of HE reforms in Myanmar.

3.1. Overview of Myanmar's Past Higher Education Policy and Its Development Plans for Reform

According to the Myanmar University Education Law of 1973, academic and administrative policy matters relating to higher education are organised by the two councils chaired by the Minister of Education (MOE). These are Universities Central Council and Council of University Academic Bodies. All institutions of higher education are state-run, and financing of these institutions is totally dependent on funds provided by the government. Allocation of the budget of these institutions is undertaken by the Department of Higher Education. The amount allocated to each institution is based on its size and the nature of courses offered. [(2)]

3.2. Overview of Recent Higher Education and Its New Policy and Strategic Reforms

This section provides a brief look at Myanmar's recent HE sector, and the laws and policies that have tried to steer the improvement of the quality of HE for all Myanmar students and citizens.

According to the National Education Strategic Plan (2016), there are 171 higher education institutions (HEIs) (colleges, degree colleges and universities), which are overseen by eight ministries. In the 2015 academic year, there were 225,178 students studying full-time in HEIs under the responsibility of the MoE, while an additional 411,164 students were accessing HE through Distance Education Universities. [(3)]

Myanmar's HE system consists of a 4–1–3 structure: four years for a bachelor's degree, one year for a qualifying class and two years for a master's degree. The education structure of Myanmar is divided into Administration Structure and Academic Structure.

There are three main government organisations supervising the higher education subsector:

(1) The National Education Committee (NEC)
(2) The Universities Central Council (UCC)
(3) The Council of University Academic Bodies (CUAB)

Policies and administrative guidance on education are fully supervised by the National Education Committee chaired by the Union Minister for Education. The committee was organised by the new government. The committee facilitates the development of an education system that is compatible with the traditional, cultural and social values of the nation and that stays current with the economic and political aspirations of the nation.

In 2017, the government's main reform goals for HE were to develop a world-class HE system, where universities have autonomy over their own curriculum and governance. These goals included establishing HE systems with the ability to conduct independent research; develop a technical and vocational education and training system equal in status to other universities; establishing effective education services that did not burden parents and communities; ensuring the effective, efficient and transparent allocation and use of government, private sector, other domestic and international funding; and implementing effective educational reforms, as well as management and monitoring programmes, based on accurate information and data (MOE 2016).

According to the National Education Strategic Plan (2016)[(4)] , the following three complementary and linked strategies and programmes will be implemented to achieve the transformational shift for higher education (Tables 1–3).

Tables 1–3 show that the new government is trying to support social and economic development by embarking on education reforms such as allowing greater knowledge production and effectively developing highly-skilled research centres.

Many international investors say that it is still very difficult to find skilled workers in Myanmar, particularly outside of the big cities, Yangon and Mandalay. It has been pointed out that the problem of the shortage of skilled workers in Myanmar is the result of Myanmar's HE system's lack of academic achievements, student participation and high quality graduates. [(5)]

3.3. Japanese National University Reform Plan

The Ministry of Education, Culture, Sports, Science and Technology (MEXT) has undertaken many efforts to reform universities in a competitive environment, with the

Table 1 The relationship between Strategy 1 and its programme of higher education.

Strategy 1: Strengthen higher education governance and management capacity
Programme:nstitutional capacity development program
Programme Component 1: Undertake overseas study tours to document best practices and establish partnerships with international universities, research centres and other higher education institutions.
Programme Component 2: Establish a National Institute for Higher Education Development (NIHED) to improve higher education governance and management, build individual skills and strengthen institutional capabilities.
Programme Component 3: Strengthen governance of HEIs through university charters and university councils.
Programme Component 4: Strengthen autonomy and accountability of HEIs to realise more efficient and effective management, better value for money and significant improvements in access to quality higher education.
Programme Component 5: Establish a Higher Education Quality Assurance Agency to lead the development of national quality standards for higher education and undertake quality assurance (QA) assessments of all HEIs.
End Outcome (by 2021): Strengthened governance and management by officials from the MOE and line ministries and managers of HEIs improves access to quality higher

Source: The Government of the Republic of the Union of Myanmar Ministry of Education
(National Education Strategic Plan 2016–2021 Summary

Table 2. The relationship between Strategy 2 and its programme of higher education.

Strategy 2: Improve the quality and relevance of higher education
Programme: Higher education quality and career-relevance
Programme Component 1: Establish a National Research and Innovation Fund and Research and Development Centres at HEIs to benefit university teaching and learning, and develop university-managed income streams.
Programme Component 2: Develop a policy and strategy for world-class national universities and comprehensive universities.
Programme Component 3: Upgrade facilities at selected HEIs.
Programme Component 4: Enhance the status of e-learning centres and e-libraries in HEIs.
Programme Component 5: Improve the effectiveness of the distance education system.
Programme Component 6: Undertake professional development for faculty and laboratory technicians.
End Outcome (by 2021): Non-academic staff deliver effective administration; academic staff deliver effective teaching and undertake quality research.

Source: The Government of the Republic of the Union of Myanmar Ministry of Education
(National Education Strategic Plan 2016–2021 Summary)

Table 3. The relationship between Strategy 3 and its programme of higher education.

Strategy 3: Expand equitable access to higher education
Programme: Equitable access to higher education programme
Programme Component 1: Create good teaching and learning environments at HEIs.
Programme Component 2: Promote student support programmes.
End Outcome (by 2021): Equitable access for students to HEIs, regardless of their socio-economic backgrounds.

Source: The Government of the Republic of the Union of Myanmar Ministry of Education
(NationalEducation Strategic Plan 2016–2021 Summary)

objective of invigorating higher education and encouraging excellent education and research activities.

MEXT created the National University Reform Plan to boost higher education in Japan. Figures 1 and 2 are summaries of the National University Reform Plan that will be implemented to achieve a more transformational shift for HE in Japan.

4. Methodology

4.1. Research Design

Qualitative research design is used in this study. In-depth individual interviews were conducted with the Department of Higher Education of Myanmar, Mandalay

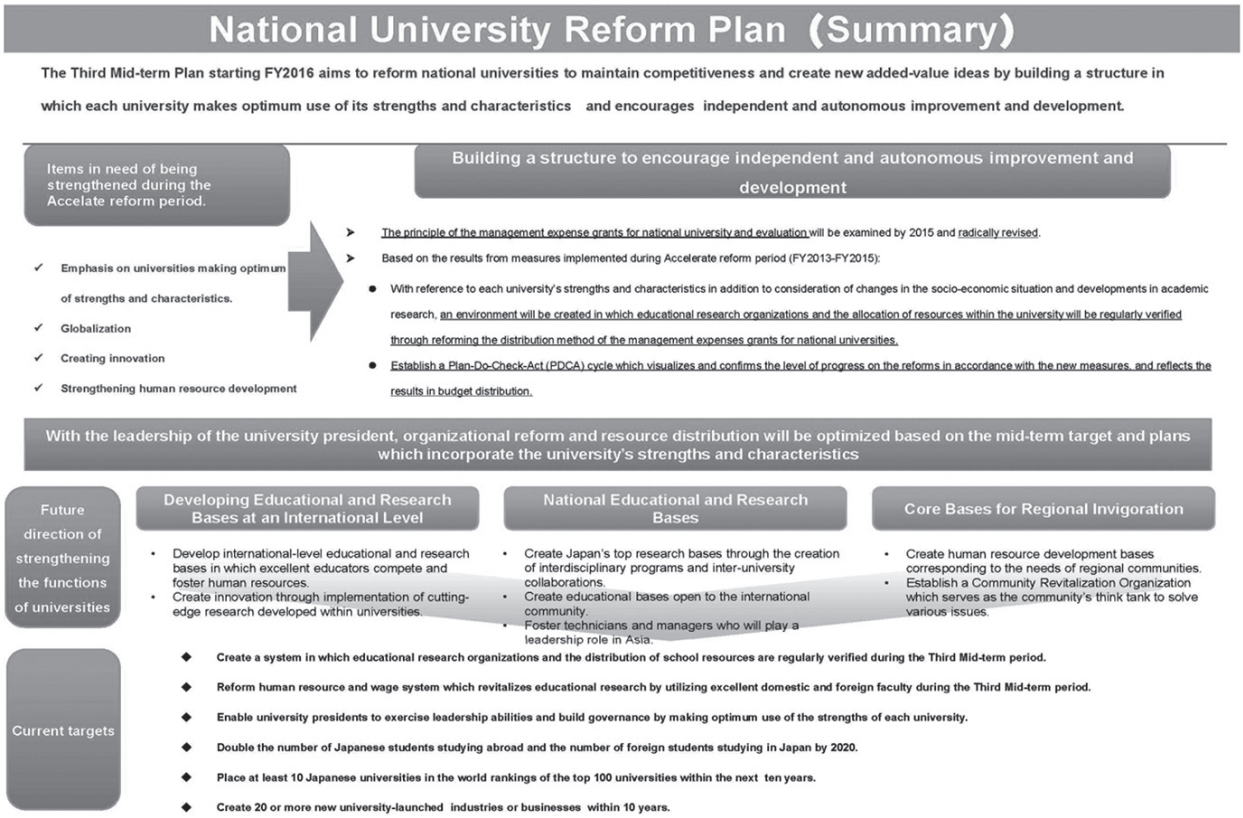


Figure 1. The National University Reform Plan (Summary).
Source: Ministry of Education, Culture, Sports, Science and Technology

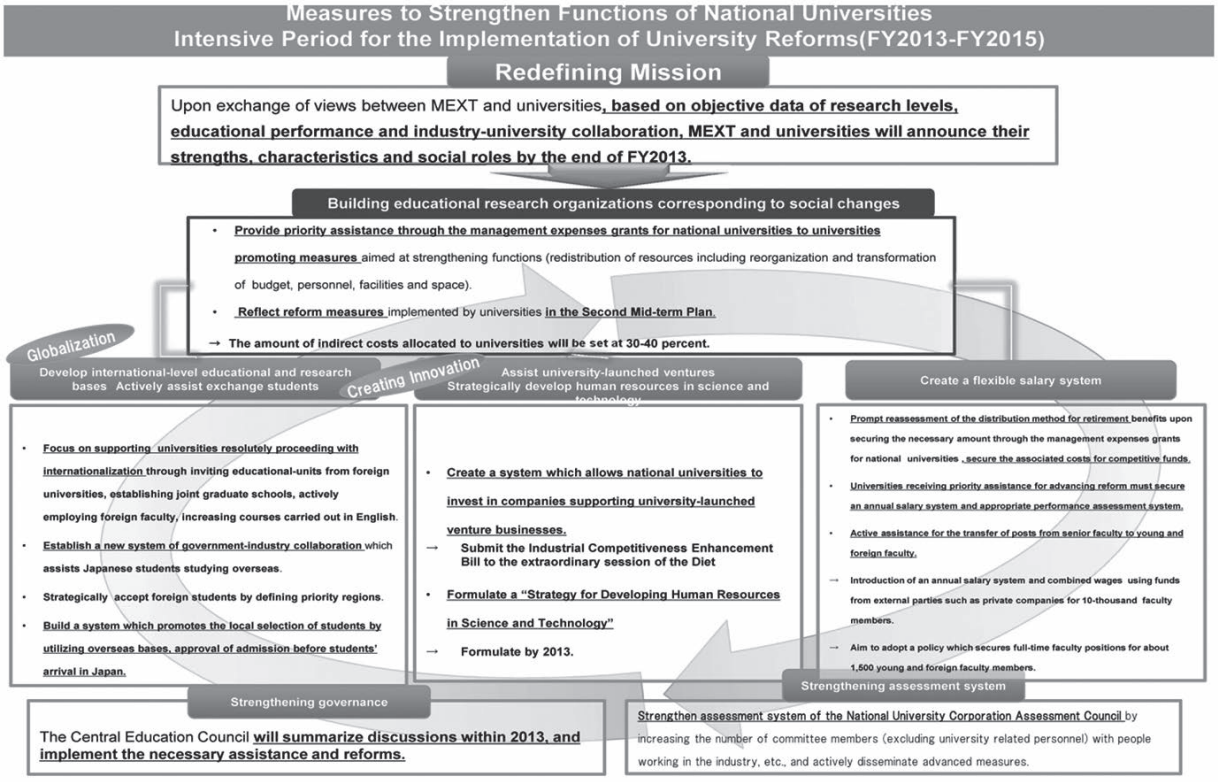


Figure 2. The National University Reform Plan (Summary)
— Measures to strengthen functions of national universities.
Source: Ministry of Education, Culture, Sports, Science and Technology

University and Mandalay Technological University to closely analyse the main weak points of the Myanmar HE system during the policy reform period. This section also provides details of the methods and procedures that are employed in carrying out this study.

4.2. Research Question

After briefly reviewing Japanese HE reform, two research questions were set, as follows:

(1) What are the solutions to the major problems of Myanmar's HE?

(2) How can Myanmar's HE policymakers more effectively reform Myanmar's HE system?

4.3. Sampling Method

The sample was selected from academic experts' opinions (e.g., important high-ranking government officers or policymakers of the Department of Higher Education, rectors and professors, and heads of universities) in Mandalay and Nay Pyi Taw. The data collected from Mandalay University and Mandalay Technological University and the Department of Higher Education was sufficient to efficiently obtain meaningful results..

4.4. Data Collection

The data collection procedure used a semi-structured questionnaire that served as an interview guide. Certain questions were prepared in reference to three complementary and linked strategies, and programmes of the Myanmar Ministry of Education. Some additional questions arose during the interviews.

Firstly, to ascertain the current major problems with Myanmar's HE, the following questions from the semi-structured questionnaire were asked:

Question (1) for Strategy 1: Strengthen higher education governance and management capacity

What are the main problems and challenges of strengthening higher education governance and management capacity by using five institutional capacity development programmes as a higher education policy-maker?

Question (2) for Strategy 2: Improve the quality and relevance of higher education

What are the main problems and challenges of improving the quality and relevance of higher education by using six higher education quality and career-relevance programmes as a higher education policy-maker?

Question (3) for Strategy 3: Expand equitable access to higher education

What are the main problems and challenges of expanding equitable access to higher education by applying two equitable accesses to higher education programmes as a higher education policy-maker?

To examine the best solutions for Myanmar's HE policymakers to reform the HE system effectively, these questions were included in the semi-structured questionnaire:

(1)What do you think about the purposes and objectives of your university?

(2)What do you think about some requirements of the faculty in your university?

(3)What do you think about autonomous quality assurance activities in your university?

(4)What do you think about your strategies for the internationalisation of universities?

- Introducing classes in English
- Inviting international students to study in Myanmar
- Developing universities as centres of internationalisation

(5)What activities does your university apply for solving the problems of human resource development?

(6)What have you done as an educator to promote higher education? Were your activities effective?

(7)What are the improvements that your university should make in order to increase its efficiency and promote higher education more effectively?

(8)What do you think about the role of private universities in terms of quality for developing Myanmar's higher education?

4.5. Classification for Data Analysis

Based on the review of the interview results, the main problems with Myanmar's HE system were extracted. The groups in this analysis are drawn from three complementary and linked strategies and programmes of Myanmar Ministry of Education, broken into three groups. They are:

Category (A): Current Situation (Governance and Management Capacity)

Category (B): Current Situation (Quality)

Category (C): Current Situation (Equitable Access)

The data comparing Myanmar's and Japan's HE reform plans was analysed through interviews with HE administrators. The categories in this analysis were drawn from the comparison of Myanmar's and Japan's HE reform plans and divided into three categories:

Category (A): Current Situation (Governance and Management Capacity)
Category (B): Current Situation (Quality)
Category (C): Current Situation (Equitable Access)

5. Data Analysis

5.1. The Main Problems That Higher Education Faces in Myanmar

5.1.1. Category (A): Current Situation (Governance and Management Capacity)

5.1.1.1 Strategy 1: Strengthen higher education governance and management capacity

What are the main problems and challenges of strengthening higher education governance and management capacity by using five institutional capacity development programmes as a higher education policy-maker?

Programme Component 1: Undertake overseas study tours to document best practices and establish partnerships with international universities, research centres and other higher education institutions.

Interviewee (S1) [6] : All Memorandums of Understanding (MOU) are proposed by other foreign universities and we have never been able to ask for it ourselves. Moreover, we don't have enough budgets or funds to send lecturers to study abroad.
Interviewee (S3)[7] : The International Relationship department was founded six months ago and it is still very weak, with no experience, no funds, and no clear policy (interview on 11/11/2017).
Interviewee (S4)[8] : We are weak in international competency and we need a lot of training and experience to catch up.
Interviewee (S7)[9] : Accreditation shows that most of the lecturers are still weak in English, so international relationships are sometimes not very effective.

Although the Department of Higher Education has recently realised that strategies for internationalisation of universities in Myanmar (Programme Component 1) play important roles in the process of higher education reform, in reality, there is not enough money to send lecturers to study in foreign countries, no adequate experience for international relationships and competency, no strong English language proficiency and insufficient funds to strengthen HE governance and management capacity.

Programme Component 4: Strengthen autonomy and accountability of HEIs to realise more efficient and effective management, better value for money spent and significantly improve access to quality higher education.

Interviewee (S2)[10] : Our higher education organisations are not autonomous and lack budgets.
Interviewee (S3): Quality assurance is a challenge without full autonomy, because even small things that are necessary for QA cost money. With autonomy, we can make budgets ourselves for hiring good office staff and qualified lecturers.
Interviewee (S1): Autonomy is still limited. But deciding what subjects to teach each year is not controlled by the government.
Interviewee (S2): Openly expressed that autonomy and budgeting for HE in Myanmar has a long way to go.
Interviewee (S3): Without autonomy, it would be very hard to perform QA in Myanmar's HE development.
Interviewee (S4): There is no autonomy at all in the university, except for the curriculum.
Interviewee (S6)[11] : There is no autonomy for budgeting for the university and the library has grown little since 2015, with around 1,800 USD provided by the government for buying books. This is because Myanmar's new government has increased spending education spending from the national budget from 1% of GDP to 11% of GDP in 2013.

Therefore, in Myanmar, there is very little autonomy for all universities, because all are state-owned. The previous data shows the recent conditions of lack of autonomy, budgets, and funds in all universities in Myanmar.

Interviewee (S1): Our university has ISO 9001:2008, but it needs to be updated. QA and accreditation system were just proposed at my university.

Programme Component 5: Establish a Higher Education Quality Assurance Agency to lead the development of national quality standards for higher education and undertake QA assessments of all HEIs.

Interviewee (S2): Our ministry of education is starting to ask us to set up an internal QA System (IQA) and QA, but external QA (EQA) might take around 1–5 years.
Interviewee (S3): A university that has ISO and QA is different from a university that has no ISO and QA. The problem is finding the budget to have them, because there is less support from the government.
Interviewee (S4): Our university has an IQA team for the whole university and also a QA team for each department, and we are also a member of the ASEAN QA network. But we don't have system, so we are trying to

encourage university members to be systemic. No EQA team has come to check yet. But our IQA team is ready to show them our reports.

Interviewee (S5)[12] : We are recently starting to engage with EQA teams in seven departments out of 21 departments.

Interviewee (S7): QA without full autonomy is very challenging, because we need to spend money, even on small things, to fulfill the needs of quality assurance. With autonomy, we can make our own budgets for hiring good office staff and qualified lecturers.

These interview answers show that, despite the indisputable fact that Myanmar's HE authority is trying to establish a Higher Education Quality Assurance Agency to lead the development of national quality standards for HE, there has always been the argument over whether the government will contribue enough budget and provide full autonomy to universities to make their own decisions.

Table 4 shows the annual library budget allocation of Mandalay Technological University.

Table 4. Annual library budget allocation of Mandalay Technological University (MTU).

Year	Budget Allocation (USD)
2005-2006	844
2006-2007	968
2007-2008	1,153
2008-2009	1,615
2009-2010	2,454
2010-2011	1,474
2011-2012	18,411
2012-2013	1,989
2013-2014	2,000
2014-2015	1,800
2015-2016	1,800
2016-2017	1,800

Source: Responses of the Librarian of MTU (09/11/2017)

5.1.2. Category (B): Current Situation (Quality)

5.1.2.1 Question (2) for Strategy 2: Improve the quality and relevance of higher education

What are the main problems and challenges of improving the quality and relevance of higher education by using six higher education quality and career-relevance programmes as a higher education policy-maker?

Programme Component 1: Establish a National Research and Innovation Fund and Research and Development Centres at HEIs to benefit university teaching and learning, and develop university-managed income streams.

Interviewee (S1): Centralisation is still going on because when we ask them to buy good brands of lab tools for our faculty, they never give us the right ones; we always get low-quality tools from different brands. Therefore, we cannot conduct quality research. Most of our curriculums are helped by The Japan International Cooperation Agency (JICA) to update students' equipment. There is no research support for lecturers.

Interviewee (S4): We do research without enough budget.

Interviewee (S7): The Department of Human Resources (HR) in universities is very weak and we cannot hire many new teachers, and universities are also weak in research and campus facilities.

The previous answers illustrate that, in spite of the HE authority wanting to establish a National Research and Innovation Fund and Research and Development Centres at HEIs to benefit university teaching and learning, and develop university-managed income streams, the current situation shows the struggle with government centralisation. The result is poor-quality research, no support research by university lecturers, no budget for research, and no adequate research facilities at the universities.

Programme Component 2: Develop a policy and strategy for world-class national universities and comprehensive universities.

Interviewee (S3): The whole system of HE is very confusing; all the requirements need to have a clear policy, autonomy and budgets.

Interviewee (S2): Our HE organisations have no autonomy and no budgets. Our Ministry of Education is starting to ask us to set up an IQA System and QA, but EQA might take around 1–5 years.

Interviewee (S4): We need competency training for all our lecturers and we also need exposure to the world, because a lecturer who has been to foreign countries thinks differently.

These answers demonstrate that, while the Ministry of Education is trying to develop a policy and strategy for world-class national universities and comprehensive universities, the main problem is that they still must reduce ambiguous policy within the entire HE system. Moreover, they still do not provide to any universities the full autonomy or large-enough budgets to become world-class national universities. Additionally, com-

petency training is desperately required for almost all universities lecturers in order for them to become internationally qualified teachers.

Programme Component 3: Upgrade facilities at selected HEIs.

Interviewee (S1): There are no funds from the government and they cannot support the purchase of lab equipment. Therefore, our lab facilities are very poor now. Moreover, we are very weak in research and campus facilities.

Interviewee (S4): Most students don't use critical thinking in class and they never read ahead; perhaps our culture does not foster challenging classes. Therefore, we should start to change our teaching and learning culture first. To change these cultures, we need actual support, especially for facilities (materials and tools), and so on. We are facing time problems, financial problems, and problems with students' participation. Those are my challenges.

Although the government wants to upgrade facilities at selected HEIs, they still cannot provide enough funds to buy the latest lab equipment, useful high-tech materials and tools, standardised research centres, or advanced campuses.

Programme Component 4: Enhance the status of e-learning centres and e-libraries in HEIs.

Interviewee (S6): The library is very important for HE development. But in our university's library, we are still using manual system to find books and are not yet able to develop an online library. Our library is weak because we do not have much support or a budget from the government. We can get a small fund each year. We have no authority to buy books ourselves; we need to submit our entire book requirement list to the Ministry of Education. International e-librarian training is very necessary.

While the government would like to enhance the status of e-learning centres and e-libraries in HEIs, the major problem is the shortage of qualified e-librarians and standardised e-libraries.

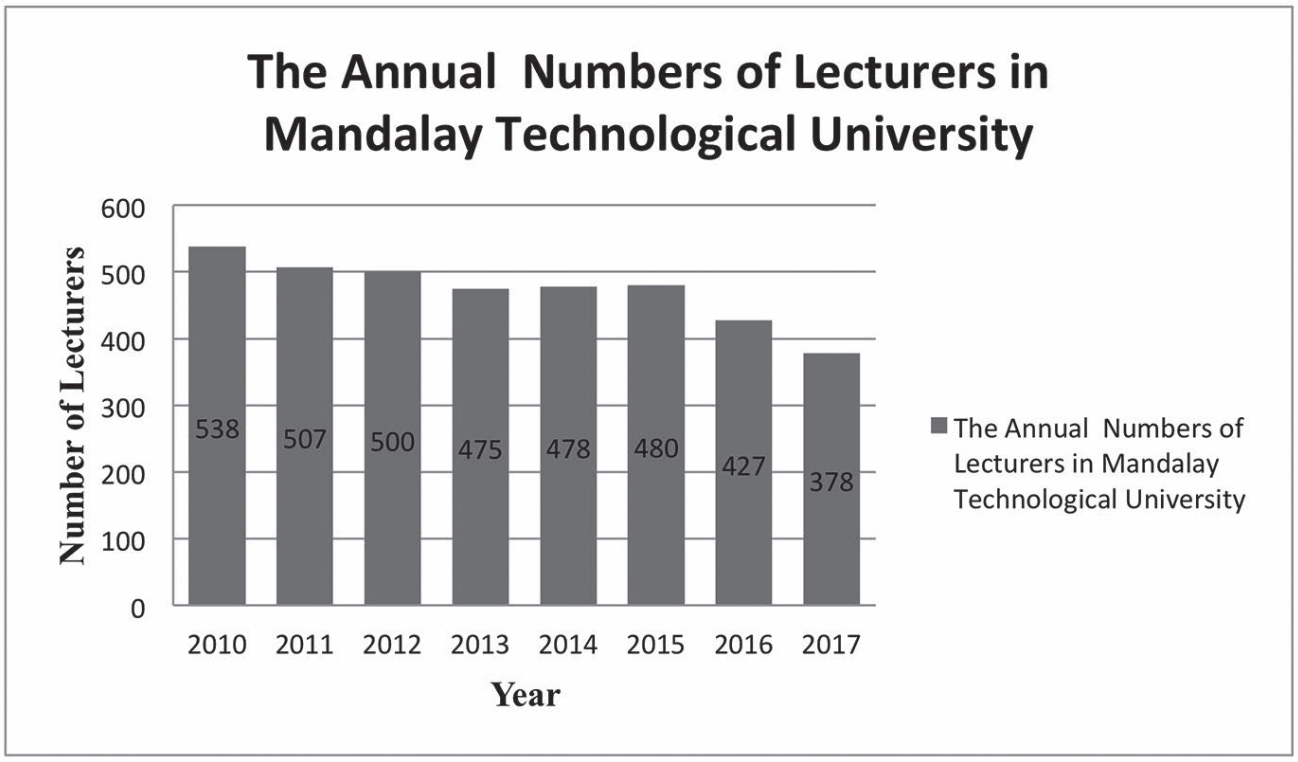
Programme Component 6: Undertake professional development for faculty and laboratory technicians.

Interviewee (S1): Centralisation is still happening, because when we ask them to buy good brands of lab tools for our faculty, they never give us the right ones, and we always get low-quality tools from different brands.

Interviewee (S2): The quality of all the faculties at my university is poor in terms of infrastructure and facilities because of the large budget that is needed.

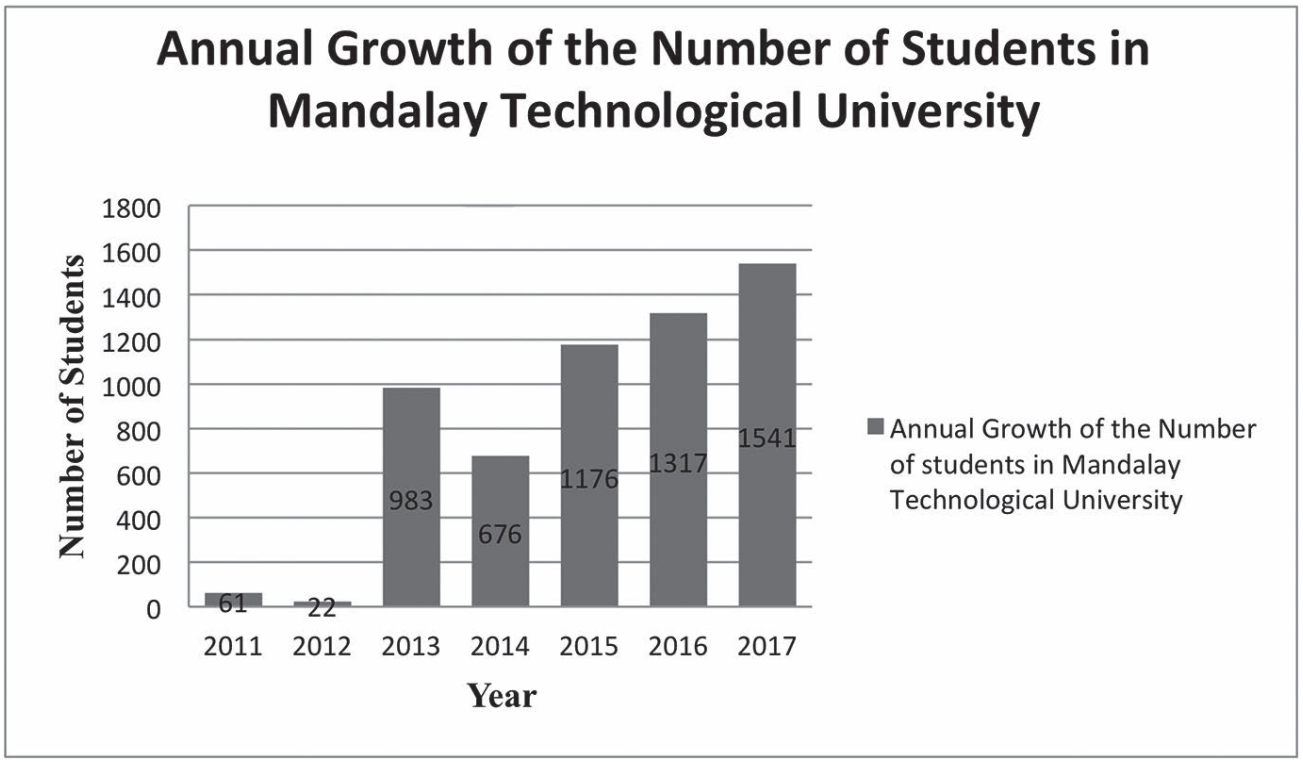
Interviewee (S3): There are promotion transfers of lec-

Figure 3. The Annual Numbers of Lecturers in Mandalay Technological University (2010–2017)



Source: Department of Administration (15/11/2017)

Figure 4. The Annual Growth of Number of Students in Mandalay Technological University (2010-2017)



Source: Department of Student Affair (16/11/2017)

turers to other universities in difference cities around the country and a shortage of classroom materials needed for teaching.

Figures 3 and 4 provide information about the annual changes in the number of lectures and students in MTU. It is clear from the charts that the annual number of students is growing each year, from 61 students in 2011 to 1541 students in 2017 (over a 25% increase). However the percentage of lecturers' decreased by about 30%. The number of students is increasing year by year, due to a change in government policy allowing bachelor's degrees to be reopened at MTU in 2012. At the same time, the unstable policy of moving lecturers through the transfer order policy[13] is reducing the number of educators over time.

The previous answers show that, although Myanmar's HE authorities are trying to undertake professional development for faculty and laboratory technicians as part of their national HE reform, all universities' faculties in Myamar are still facing the problem of using the traditional centralised model; a lack of autonomy, budgets and funds for faculty development; and an inequitable ratio of teachers to students. The teacher shortage is the result of the instability caused by the transfer order policy, which is reducing the number of educators over time. The transfer order policy has created hardships for teachers, many of whom are posted to universities far from their families; some lecturers are sometimes prohibited from teaching the same subjects in their new universities[14] ; and some places are still experiencing fights between the Myanmar government and ethnic groups in Myanmar.

5.1.3. Category (C): Current Situation (Equitable Access)

5.1.3.1 Question (3) for Strategy 3: Expand equitable access to higher education

What are the main problems and challenges of expanding equitable access to higher education by applying two equitable accesses to higher education programmes as a higher education policy-maker?

Programme Component 1: Create a good teaching and learning environment at HEIs.
Programme Component 2: Promote student-support programmes.

Interviewee (S1): There are no exchange programmes for students to study in other countries and there are no rooms here for international students who can study at our universities. That's why our education markets are losing to Thailand and other neighbouring countries. All the MOU's are proposed by other foreign universities, while we have never been able to ask for one ourselves because we don't have the funds. Moreover, we don't

have the budget or enough funds to send lecturers to study abroad.

Interviewee (S3): HR is more important than everything else, and the capacity to build a teaching staff requires paying good salaries and the support of funds and budgets.

Interviewee (S4): Most students don't use critical thinking in class and they never read ahead; perhaps our culture does not foster challenging classes. Therefore, we should start to change our teaching and learning culture first. To change these cultures, we actually need support, especially for facilities (materials and tools), and so on. We are facing time problems, financial problems, and problems with students' participation. Those are my challenges.

Interviewee (S7): Having private universities in Myanmar is very important for HE development. But we still need strong national universities because students with financial problems are able to afford studying at national universities. Although private universities cost a lot, they have a good quality return. It is really useful to have private universities.

As observed in these answers, while Myanmar's HE policymakers are trying to create good teaching and learning environments and promote student-support programmes at HEIs, the major problems are: a lack of official private HE institutes; availability of very good salaries for a teacher capacity-building programme; the need for supporting funds and budgets for students' exchange programmes for studying in foreign countries; and a lack of rooms for international students to study at Myanmar universities.

In conclusion, based on the data analysis, the solutions to the main problems of HE reform in Myanmar are:

Firstly, to strengthen HE governance and management capacity, it is seriously necessary for all universities in Myanmar to have large enough budgets to send lecturers to study in foreign countries; adequate experience in international relationships and competency; strong English language proficiencies; and sufficient funds to strengthen HE governance and management capacity. Moreover, universities must have funding for travel to the other countries to propose and sign MOUs. Because the universities are all state-owned, they have never been given full autonomy, budgets, and the necessary funding to make their own decisions.

Secondly, to improve the quality of HE, decentralisation is required, along with strong budgets and funding for qualified research and world-class national universities, the purchase of the latest lab equipment, useful high-tech materials and tools, the standardisation of research centres and the building of advanced campuses. HE government authority must reduce ambiguous policy throughout the entire HE system. Additionally, competency training is desperately required for almost all universities' lecturers in order for them to become internationally qualified teachers.

Thirdly, to improve career-relevance (research quality), the government must immediately acquire many qualified e-librarians, and standardise e-libraries. Policymakers must retreat from the traditional centralised model and solve the problem of the poor teacher–student ratio resulting from the transfer policy.

Finally, to be able to expand equitable access to higher education, the government must officially open private HE institutes as soon as possible, provide very good salaries for a teacher capacity-building programme, and support the funding and budgeting for students' exchange programmes and the housing of international students wishingto study at Myanmar's universities.

5.2. Comparative analysis of Myanmar and Japan higher education reforms plans

5.2.1. Category (A): Current Situation (Governance and Management Capacity)

Table 5 shows that policymakers believe that sending Myanmar's students abroad to study is a first priority for establishing partnerships with international universities, research centres and other HE institutions. But, Japan's reform plan shows that their first step is to invite educational units from foreign universities to Japan, establish joint graduate schools, actively employ foreign faculty and increase the number of courses carried out in English. After that, they worked to establish a new system of government–industry collaboration, which assists Japanese students studying overseas. Myanmar's policymakers should adjust their plan to consider sending Myanmar's students abroad to study, and invite foreign universities to open useful programmes within Myanmar.

Myanmar's very basic ideas for strengthening governance and management capacity cannot effectively solve the problems with Myanmar's HE, because the factors of autonomy, accountability, and quality assurance are consistently repeated year after year in Myanmar's HE development process. Japanese programme components for strengthening management capacity based on the needs of regional and international communities, and the creation of future technicians and managers who will play a leadership role in Asia, should

Table 5. Myanmar Higher Education Reform Plan & Japanese Higher Education Reform Plan for their Current Situation (Governance and Management Capacity)

Myanmar Higher Education Reform Plan	Japanese Higher Education Reform Plan
• Undertake overseas study tours to document best practices and establish partnerships with international universities, research centres and other higher education institutions	• Focus on supporting universities by resolutely proceeding with internationalisation by inviting educational units from foreign universities, establishing joint graduate schools, actively employing foreign faculty, increasing courses carried out in English
• Establish a National Institute for Higher Education Development (NIHED) to improve higher education governance and management, build individual skills and strengthen institutional capabilities	• Establish a new system of government-industry collaboration which assists Japanese students studying overseas
• Strengthen governance of HEIs through university charters and university councils	• Create human resource development bases corresponding to the needs of regional communities
• Strengthen autonomy and accountability of HEIs to realise more efficient and effective management, better value for money and significant improvements in access to quality higher education	• Create educational bases open to the international community
• Establish a Higher Education Quality Assurance Agency to lead the development of national quality standards for higher education and undertake quality assurance assessments of all HEIs	• Foster technicians and managers who will play a leadership role in Asia

be of interest to Myanmar. Myanmar's policymakers must modify their basic ideas so that they are more realistic and effective.

5.2.2. Category (B): Current Situation (Quality)

In this comparison of Myanmar's and Japan's HE reform plans (Table 6), each side of the programme components is suited to its country's social and economy conditions. Because Myanmar is a developing country, it needs to strengthen its basic research and innovation funds, develop a policy and strategy for world-class national universities and comprehensive universities, enhance the status of e-learning centres and e-libraries in HEIs, etc. Japan is a developed country, so it requires the development of international-level educational and research bases, where excellent educators compete and

Table 6. Myanmar Higher Education Reform Plan & Japanese Higher Education Reform Plan for their Current Situation (Quality)

Myanmar Higher Education Reform Plan	Japanese Higher Education Reform Plan
• Establish a National Research and Innovation Fund and Research and Development Centres at HEIs to benefit university teaching and learning, and develop university-managed income streams	• Develop international-level educational and research bases in which excellent educators compete and foster human resources
• Develop a policy and strategy for world-class national universities and comprehensive universities	• Create Japan's top research bases through the creation of interdisciplinary programmes and inter-university collaborations
• Upgrade facilities at selected HEIs	• Create innovation through implementation of cutting-edge research developed within universities
• Enhance the status of e-learning centres and e-libraries in HEIs	• Establish a community revitalisation organisation which serves as the community's think tank to solve various issues
• Improve the effectiveness of the distance education system	• Create a system that allows national universities to invest in companies supporting university-launched venture businesses
• Undertake professional development for faculty and laboratory technicians	• Formulate a 'Strategy for Developing Human Resources in Science and Technology'
	• Universities receiving priority assistance for advancing reform must secure an annual salary system and appropriate performance assessment system

foster human resources, and the creation of top research bases through the establishment of interdisciplinary programmes and inter-university collaborations, etc.,

5.2.3. Category (C): Current Situation (Equitable Access)

To expand equitable access to higher education, Myanmar's policymakers must deeply consider the role of foreign students with very high standards of education who wish to study in Myanmar, as demonstrated in Japan's reform plan (Table 7).

6. Conclusion

The purpose of this study is to reveal solutions for the main issues surrounding the development of Myanmar's HE in recent times. Moreover, this study is aimed at examining the best ideas for reforming Myanmar's HE system effectively and systematically, using Japan's HE reform as a comparison. This study shows that Myanmar's HE can apply its strong points in order to establish the right direction for the generation of huge vision and breakthroughs in Myanmar's industrial development; thereby changing a poor nation into a rich one, rapidly. These findings will be useful for those in charge of higher education policies, as well as prospective students and professors who are considering doing further research on Myanmar HE development.

These results highlight that: it is seriously necessary for all universities in Myanmar to have large enough budgets to send lecturers to study in foreign countries; there must be adequate experience in international relationships and competency; there must be strong English language proficiencies; and there must be sufficient funds to strengthen HE governance and management capacity. Moreover, universities must have funds for travel to other countries. Additionally, universities, even those that are state–owned, must be given full autonomy, budgets, and the necessary funding to make their own decisions.

Secondly, it is a significant requirement that all of Myanmar's universities apply decentralisation, and maintain strong budgets and funds to conduct qualified research and support world-class national universities; buy the latest lab equipment, useful high-tech materials and tools; standardize their research centres and build advanced campuses. HE government authority must reduce ambiguous policies throughout the entire HE system. Competency training is desperately required for almost all of the universities' lecturers, in order for them to become international qualified teachers. Thirdly, the government must immediately acquire many qualified e-librarians, and create standardised e-libraries. Policymakers must retreat from the traditional centralised model and solve the problem of the poor teacher–student ratio resulting from the teacher transfer policy. The government must open more private HE institutes as soon as possible, provide very good salaries for a teacher capacity-building programme, and support funding and budgeting for students' exchange programmes and creating housing for international students who wish to study at Myanmar universities.

Finally, Myanmar's policymakers should adjust their reform plan to consider sending Myanmar's students abroad to study, while also inviting foreign universities to open useful programmes within Myanmar. Myanmar's policymakers must modify their basic ideas by focusing on Japan's interesting programme components for strengthening management capacity based on the needs of regional and international communities, thereby creating future technicians and managers who will play a leadership role in Asia. Myanmar's policymakers must

Table 7. Myanmar Higher Education Reform Plan & Japanese Higher Education Reform Plan for their Current Situation (Equitable Access)

Myanmar Higher Education Reform Plan	Japanese Higher Education Reform Plan
• Create a good teaching and learning environment at HEIs • Promote student-support programmes	• Strategically accept foreign students by defining priority regions • Build a system which promotes the local selection of students by utilizing overseas bases, approval of admission before students' arrival in Japan • Active assistance for the transfer of posts from senior faculty to younger, foreign faculty by introduction of an annual salary system and combined wages using funds from external parties, such as private companies for 10,000 faculty members, and aim to adopt a policy which secures full-time faculty positions for about 1,500 young and foreign faculty members

deeply consider the role of foreign students with very high standards of education who wish to study in Myanmar, as demonstrated in Japan's universities reform plan.

Notes

[1] The Nordic model refers to the economic and social policies common to the Nordic countries (Denmark, Finland, Norway, Iceland, the Faroe Islands and Sweden). This includes a combination of free market capitalism with a comprehensive welfare state, and collective bargaining at the national level, with a high percentage of workers belonging to a labour union and state provision of free education and free healthcare, as well as generous, guaranteed pension payments for retirees funded by taxation.

[2] International Conference on Education 43rd session, Geneva, 1992, UNESCO: IBE 1993

[3] National Education Strategic Plan 2016–2021 Summary.

[4] The Government of the Republic of the Union of Myanmar Ministry of Education (National Education Strategic Plan 2016–2021 Summary)

[5] Myanmar Business Today is Myanmar's largest circulating business publication. It is Myanmar's first and only bilingual (English–Myanmar) business newspaper, distributed in Myanmar and Thailand.

[6] S1: Professor and Head of IR Department at Mandalay Technological University (interview on 11/11/2017).

[7] S3: Professor and Head of Administration Department at Mandalay Technological University (interview on 11/11/2017).

[8] S4: Professor and Head of Economics Department at Mandalay University (interview on 09/12/2017).

[9] S7 = Very important high-ranking governmental policymaker in the Department of Higher Education in Nay Phyi Taw (interview on 03/04/2018).

[10] S2 = The Rector of Mandalay Technological University (interview on 05/10/2017).

[11] S6: Head of Library in Mandalay Technological University (interview on 09/11/2017).

[12] S5: Professor and Head Quality Management Representative at MTU (interview on 08/11/2017).

[13] Under the Ministry of Education's policy, all universities' lecturers and staff (sometimes including rectors) have moved from one university to another university within the same or different regions or states every three to five years.

[14] This is because his or her subject might be taken over by old lecturers.

References

1) Asian Development Bank (2007). Moving Toward Knowledge-Based Economies: AsianExperiences. *Technical Note for AD*. Retrieved April 12, 2018, from https://www.adb.org/sites/default/files/publication/.../knowledge-based-economies.pdf

2) Altbach, P. G., & Salmi, J. (Eds.) (2012). *The Road to Academic Excellence: The Making of World-Class Research Universities.* Washington, D.C.: The World Bank.

3) Arvanitidis, P. A., & Petrakos, G. (2011). Defining Knowledge-Driven Economic Dynamism in the World Economy: A Methodological Perspective. In P. Nijkamp & I. Siedschlag (Eds.), *Innovation, Growth and Competitiveness: Dynamic Regions in the Knowledge Based World Economy* (pp. 15-39). doi:10.1007/978-3-642-14965-8.

4) Arocena, R., & Sutz, J.(2002). Innovation Systems and Developing Countries. *The working paper No (02-05) for Research Gate.* Retrieved March 29, 2018 from C:\Users\User\Downloads\Documents\Innovation_Systems_and_Developing_Countries pd

5) Barnes, J., Berendt, B., Csirik, J., Hares, H.E., Haar, G.t., Jones, J., Kashoki, M.E., Kearney, M.L., Maamouri, M., McDonald, G., et al. (1994). Higher education staff development: directions for the twenty-first century. *The paper for UNESCO*. Retrieved July 12, 2018 from unesdoc.unesco.org/images/0010/001097/109744e.pdf

6) Brennan, J., Ryan, S., Ranga, M., Broek, S., Durazzi, N., & Kamphuis, B. (2014). Study on *innovation in higher education: final report.* Retrieved from http://eprints.lse.ac.uk/55819/

7) Bloom, D. E., Canning, D., & Chan, K. (2006). *Higher education and economic development in Africa.* Washington, *D.C: World Bank.*

8) Becker, B. A., & Eube, C. (2018). Open innovation concept: Integrating universities and business in digital age. *Journal of Open Innovation: Technology, Market, and Complexity(2018)*4:12. doi:10.1186/s40852-018-0091-6

9) Background paper for the OECD/Poland conference "Effective Governance on the Local Level". (16-17 April 2012). *The report of Getting Right: Capacity Building for Local*

https://Stakeholders in Education. Retrieved January 25, 2018 from www.oecd.org/edu/ceri/50294371.pdf

10) Bell, M., & K. Pavitt. (1997). Technological accumulation and industrial growth: contrasts between developed and developing countries, in Archibugi , D., & Michie, J. (eds), *Technology, Globalisation and Economic Performance,* Cambridge: Cambridge University Press: 83-137.

11) CHET. (2006). *An Approach To Developing Higher Education as a Field of Study in Africa.* Retrieved March 26,2018 from https://www.chet.org.za/files/CHET%202006%20HE%20expertise%20network.pdf

12) Dezure, D. (2002). *Encyclopedia of innovations in the undergraduate curriculum.* Retrieved from https*://www.encyclopedia.com/education/encyclopedias-almanacs transcripts-and-maps/curriculum-higher-education*

13) Department for Business Innovation and Skills (2009). *Higher ambitions: The future of universities in a knowledge economy.* London. Retrieved from https://www.ed.ac.uk/files/atoms/files/bis-higher-ambitions-summary-nov2009.pdf

14) Deuren, R. V. (2013). *Capacity Development in Higher Education Institutions in Developing Countries.* Working Paper for No. 2013/30 The Maastricht School of Management, website: https://ideas.repec.org/p/msm/wpaper/2013-30.html

15) Fernate, A., Surikova, S., Kalnina, D., Sanchez Romero, C. (2009). Research-based academic studies: Promotion of the quality of learning outcomes in higher education? Education Line, 1-23. Retrieved June 6, 2018 from http://www.leeds.ac.uk/educol/documents/187885.pdf.

16) Gastrow, M., & Lorentzen, J. (2012). Multinational strategies, local human capital and global innovation networks in the automotive industry: the case of Germany and South Africa. *Journal of Innovation and Development* . Volume 2 (Issue 2), 265-248. doi: 10.1080/2157930X.2012.713197

17) Gereffi, G. (1995). Global production systems and Third World development, in Stallings, B. (ed),Global change, regional response: The new international context of development, University Press, Cambridge.

18) Henderson ,R., Jaffe A.D., & Trajtenberg, M., (1998). Universities As a Source of Commercial Technology: A Detailed Analysis of University Patenting, 1965-1988. Review of Economics and Statistics 80, 1 (February): 119-127.

19) Jackson, L. (October, 2016). Globalization and Education. *The PhD reference for Globalization, Economics, and Education.* doi: 10.1093/acrefore/9780190264093.013.52

20) Jongsma, A. (2016). *Erasmus capacity building in higher education: EU support to higher education institutions around the world.* Brussels: European Union. doi: 10.2797/215579

21) Kruss, G., Mcgrath, S., Petersen, I., & Gastrow, M. (2015). Higher education and economic development: The importance of building technological capabilities. *International Journal of Educational Development,43*, 22-31. doi:10.1016/j.ijedudev.2015.04.011

22) Kim, J. Y., Choi, D. S., Sung, C., & Park, J. Y. (2018). The role of problem solving ability on innovative behavior and opportunity recognition in university students. *Journal of Open Innovation: Technology, Market, and Complexity,4*(1). doi:10.1186/s40852-018-0085-4

23) Kim, S. A., Ryoo, H. Y., & Ahn, H. J. (2017). Student customized creative education model based on open innovation. *Journal of Open Innovation: Technology, Market, and Complexity, 3*(1). doi:10.1186/s40852-016-0051-y

24) Lall, S. (1992).Technological capabilities and industrialization. *Journal of World Development,* 20 (1), 165–186. Retrieved from https://pdfs.semanticscholar.org/7562/30e98f37fc2cecf0d3c978ede8e63aee1ee2.pdf

25) Leydesdorff, L. (2018). Synergy in Knowledge-Based Innovation Systems at National and Regional Levels: The Triple Helix Model and the Fourth Industrial Revolution. *Journal for Open Innovation: Technology, Market, and Complexity.* doi:10.20944/preprints201804.0252.v1

26) Lancrin, S.V. (2004). Building Capacity through Cross-border Tertiary Education. *The paper for the Unesco/OEDC Australia Forum on Trade in Educational Services.* Retrieved January 5, 2018 from https://www.oecd.org/education/skills-beyondschool/33784331.pdf

27) Myanmar Ministry of Education: Department of Higher Education (2013). Panorama of Myanmar Higher Education. Retrieved January 1, 2018, from http://203.81.81.180/dhel/panorama-of-myan-

mar-higher-education/introduction/

28) Myanmar Ministry of Education (2016). National Education Strategic Plan 2016-21 Summary. *The report for The Government of the Republic of the Union of Myanmar Ministry of* Education. Retrieved June 30, 2018 from http://www.moe-st.gov.mm/wp content/uploads/2018/01/NESP_20Summary_20-_20English_20-_20Final_20 _20Feb_2023.pdf

29) MEXT: Ministry of Education, Culture, Sports, Science (n.d). Higher Education. Retrieved January 1, 2018, from http://www.mext.go.jp/en/policy/education/highered/index.htm

30) Meek, V. L., & Davies, D. (2009). Higher education, research and innovation: Changing dynamics. In L. Meek, U. Teichler, & M. L. Kearney (Eds.), *Report for the UNESCO Forum on higher education, research and knowledge, 2001-2009*. Kassel: International Centre for Higher Education Research Kassel. Retrieved May 1, 2018, from https://www.uni-kassel.de/.../fileadmin/.../T_18__UNESCO_Forum_Report__2009.pdf

31) MacGregor, K. (2015,). Higher education is key to development . *The report for World Bank.* Retrieved June 13, 2018 from http://www.universityworldnews.com/article.php?story=20150409152258799

32) Malecki, M.J. (1991) Technology and Economic Development: The Dynamics of Local, Regional, and National Change. Longman, Essex.

33) OECD (2000). Science, technology and innovation in the new economy. Policy Brief for OECD. Retrieved March 12, 2018 from http://www.oecd.org/science/sci tech/1918259.pdf

34) Pillay, P. (2011). Higher Education and Economic Development Literature review. The paper for *the Centre for Higher Education Transformation (CHET)*. Retrieved December 23, 2017, from https://www.chet.org.za/files/uploads/reports/Pillay%202010%20HE%20and%20Econ mic%20Development%20Literature%20Review.pdf

35) Pinheiro, R., & Pillay, P. (2016). Higher education and economic development in the OECD: Policy lessons for other countries and regions. *Journal of Higher Education Policy and Management,38(2)*, 150-166. doi:10.1080/1360080x.2016.1150237

36) Powell, W. W., & Snellman, K. (2004). The Knowledge Economy. *The paper for School of Education and Department of Sociology, Stanford University, Stanford, California 94305; Santa Fe Institute, Santa Fe, New Mexico 87501*. Retrieved April 23, 2018, from http://scholar.harvard.edu/files/kaisa/files/powell_snellman.pdf

37) Poyago-Theotoky, J., Beath, J., & Siegel, D.S. (2002). Universities and Fundamental Research: Reflections on the Growth of University-Industry Partnerships. *Oxford Reviewof Economic Policy* 18, 1: 10-21.

38) Quinlan, K. M. (2011). Developing the whole student: Leading higher education initiatives that integrate mind and heart. *The Stimulus Paper for Leadership Foundation for Higher Education.* Retrieved June 15, 2018, from https://www.learning.ox.ac.uk/media/global/wwwadminoxacuk/localsites/oxfordlearnin nstitute/documents/overview/research/publications/Quinlan_Developing_2011.pdf

39) Rumbley, L E., Altbach, P. G., Stanfield, D. A., Shimmi, Y., de Gayardon, A., & Chan, R. (2014). *Higher education: A worldwide inventory of research centers, publications (3rd ed.)*. Lemmens Media: Bonn.

40) Ramphele, M., & Rosovsky, H. (2015). New Report on Higher Education in Developing Countries: Educated People Are No Luxury, They're Essential. *The paper for International Higher Education,* (20), 7-8. doi:10.6017/ihe.2000.20.6883. Retrieved February 22, 2018, from https://ejournals.bc.edu/ojs/index.php/ihe/article/viewFile/6883/6100

41) Stig, E. (2006). Capacity building for higher education in developing countries. *Proceedings of the International Workshop 17 - 18 May 2005 - How can Manpower Needs in Knowledge Based Economies Be Satisfied in a Balanced Way?*Swanger, D. (june 2016). *Innovation in Higher Education: Can Colleges Really Change.* Retrieved December 28,2017 from http://static.uvm.dk/publikationer/2006/unesco-workshop/hel.html

42) Salmi, J. (2009). The Challenge of Establishing World-Class Universities. *The paper for The World Bank.* Washinton,D.C. Retrieved December 27,2017 from https://openknowledge.worldbank.org/handle/10986/2600

43) The World Bank (2000). *Higher education in developing countries: Peril and promise.* Washington, D.C. Retrieved from

https://iteresources.worldbank.org/EDUCATION/Resources/278200.../peril_promise_en pdf

44) The Group of Eight (2013). The role and importance of research intensive universities in the contemporary world. *Discussion paper for Group of Eight.* Retrieved March 12, 2018 from https://go8.edu.au/sites/default/files/docs/role-importanceofresearchunis.pdf

45) The World Bank. (2002). Constructing Knowledge Societies: New Challenges for Tertiary Education. Washington, D.C.: The World Bank.

46) University of Oxford (2015). *International Trends in Higher Education.* Retrieved from https://www.ox.ac.uk/sites/files/oxford/International%20Trends%20in%20Higher%20E ucation%20 2015.pdf

47) University World News (2013, August 11). The role of research universities in developing countries. Retrieved April 12, 2018 from http://www.universityworldnews.com/article.php?story=20130811091502202

48) The Higher Education Authority. (2002). *Creating and sustaining the innovation society. Retrieved from hea.ie/assets/uploads/2017/06/Creating-And-Sustaining-The-Innovation Society.pdf*

49) UNESCO. (1994). Higher education staff development: directions for the twenty-first century Varghese, N. V. (2008). Overcoming Inequality: why governance matters.
Contribution of higher education and research to education for all (EFA) (Rep. No. 2009/ED/EFA/MRT/PI/33). UNESCO. Retrieved July 9, 2018 from http://unesdoc.unesco.org/images/0018/001800/180085e.pdf

50) Varghese, N. V. (2009). *Contribution of higher education and research to education for all (EFA)* (2009/ED/EFA/MRT/PI/33). Retrieved from United Nations Educational, Scientific, and Cultural Organization website: unesdoc.unesco.org/images/0018/001800/180085e.pdf

51) Watkins, K. (2015, July 7). Why education is essential for growth. Retrieved December 22, 2017 from file:///F:/PhD%20referece/Why%20education%20is%20essential%20for%20growth _%20World%20Economic%20Forum.html

52) Zgaga, P. (2014). The role of higher education centres in research and policy: a case from a European periphery. The journal for Studies in Higher Education Volume 39, 2014 Issue 8: Researchers and Policy Makers: A Strategic Alliance. Retrieved March 27, 2018 from https://www.researchgate.net/profile/Pavel_Zgaga2/publication/282943117_The_role_o _higher_education_centres_in_research_and_policy_A_case_from_a_European_periphe y/links/56235d8608aed8dd19461e90/The-role-of-higher-education-centres-in-research and-policy-A-case-from-a-European-periphery.pdf?origin=-publication_detail

研究ノート
Research Note

インドにおけるミルク増産の要因
Causes of Rise in India's Milk Production

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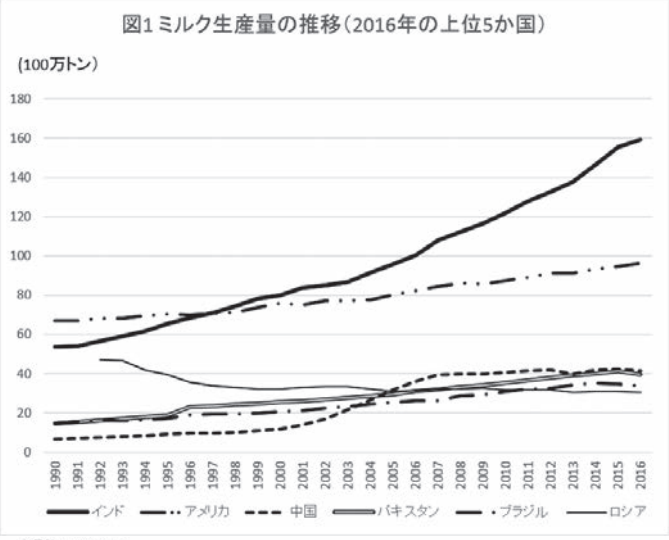
要旨
21 世紀に入って以来，インドではミルクの大幅な増産が続いている。本稿ではその原因を，インドの乳畜頭数や種類，ミルクの生産性，酪農経営規模の分析等を通じて明らかにする。分析に際しては，インドにおける農業経営の多くが作物栽培と家畜飼育から構成される小規模な混合農業であり，家畜飼育のための飼料生産が耕種農業の規模に制約されることに注目した。分析の結果，ミルクの生産量の増加には，搾乳中の牛・水牛の頭数の増加と 1 頭当たりのミルク生産量の増加がともに貢献したことが明らかになった。また飼料供給の制約にもかかわらず搾乳中の牛・水牛が増加した理由の 1 つは，耕耘作業や地下水の揚水など従来役畜によって行われていた農作業がトラクターや動力ポンプによって機械化され，在来種のオス牛を中心とする役畜が減少したことにあった。
キーワード：インド，混合農業，酪農，牛，水牛

1．はじめに

図 1 は主要ミルク生産国における 1990 年から 2016 年までのミルク生産量の推移を示したグラフである。なんと言っても目を引くのはインドにおけるミルクの増産の鮮やかさである。1997 年にアメリカを追い抜いて世界第 1 位となってからも生産量の拡大は続き，2016 年には 1 億 6000 万トンに達した。第 2 位のアメリカとの差は実に 6000 万トンである。本稿ではインドにおいてなぜこうしたミルクの増産が実現したのかを検討する。

インドのミルクの生産について，先行研究ではオペレーション・フラッドが注目されてきた。オペレーション・フラッドとはグジャラート州アナンド県での酪農協同組合の取り組みを母体として 1970 年から 30 年近くインド各地で実施された酪農振興政策である。オペレーション・フラッドでは，農村のミルク生産者と都市消費者とを結びつけることを目的として，酪農協同組合等がミルクの集荷施設や大規模な加工工場を整備した。この事業によって酪農発展の 1 つのモデルが提示されたことを契機として，インドの酪農は大きく発展したといってよい[1)]。しかし本論で指摘するように，酪農協同組合による酪農家の組織化は現在においても一部の地域にとどまっており，近年のミルク生産の主要な拡大要因と考えることは難しい。この他，インドのミルク生産に関する最近の論考としては，Kurup（2001），Birthal，Joshi and Gulati（2005），Birthal and Negi（2012）などがあるが，いずれの研究においても中心的な論点とされたのは，いかにしてミルク生産を拡大させるか，それをいかにして所得向上に結び付けるか，酪農経営の発展をいかにして



出所）FAOSTAT.

貧困緩和に役立てるかといったことであった[2]。インドの社会的経済的課題に即してこうした研究課題が設定されていることは十分理解できるが，その一方でなぜミルク生産量が増えているのかという基本的な問題にはあまり注意が向けられてこなかったといってよい。

そこで本稿では，牛の頭数や種類，ミルクの生産性，酪農経営の規模などを分析することによって，インドにおけるミルク増産の要因を明らかにする。それはまた，現在のミルク生産の拡大がどのような条件の下で可能となっているのか，制約要因があるとすればそれがどこにあるのか，といったことを明らかにするのにも役立つはずである。分析に際しては，インドの酪農が混合農業経営の一部として作物栽培と共に営まれている点を重視する。これは本論で示されるように，家畜飼育の目的や規模が，作物栽培のありようと深くかかわるからである。

分析の基礎資料とするのは以下の統計である。まずミルクの生産量や搾乳中の牛・水牛の頭数についてはインド政府農業・農民福祉省が発行する「畜産・漁業基本統計」を[3]，家畜頭数の詳細な分析には同省が基本的に5年に1度実施している「家畜センサス」の結果を[4]，それぞれ使用する。また，農村部の経営規模別農家構成等についてはインド政府統計・計画実施省の全国標本調査機構が毎年実施している「全国標本調査（National Sample Survey，以下NSSと略）」のうちの第70次調査の結果を使用する[5]。第70次NSSは2013/14年に実施され，インド全土から抽出された3万5000の標本世帯に対して，土地所有や農業経営，家畜飼育について調査が行われた。本稿ではその個票データを再集計して，先行研究で十分には示されてこなかった酪農経営の規模や，作物栽培と酪農との結びつきを検討する。

本稿の構成は以下の通りである。第2章では家畜の種類，作物栽培と家畜飼育から構成される混合農業の規模，飼料の供給とミルクの生産性，屠畜の制約，ミルクの自家消費と流通･加工について順に検討を行い，インド酪農の特徴を明らかにする。第3章では前章での分析を受けて，インドにおいてミルク増産を促進する要因が意外に少ないことを指摘したうえで，それにも拘わらず近年ミルクの生産量が増加している理由を，乳畜頭数と乳畜1頭当たり乳量の変化から検討する。第4章では前章までの分析で得られた結論と今後の検討課題を述べる。

2. インドの酪農の特徴

(1) 在来種及び外国種・交雑種の牛と在来種の水牛によって成り立つ酪農

2016/17年にインドで生産されたミルクは1億6540万トンと推計されている。生産されたミルクの96.5%は牛もしくは水牛のミルクであり，残りはヤギ・ヒツジ等のミルクである[6]。牛と水牛のミルクが圧倒的なシェアを占めていることから，以下では牛と水牛によるミルクの生産のみを検討の対象とする。なお，インドにおいて牛と水牛は，宗教的な意味でも飼育目的の点でも全く異なる家畜であり，以下それらを区別して考察を進める。

牛は，在来種，外国種，交雑種の3種類に分けられる。在来種はゼブ牛といわれ，肩の上のコブ（肩峰）と，首から胸にかけての肉のひだ（胸垂）を外観上の特徴とする。ゼブ牛には多数の品種があるが，機能的には役用専用種，乳用専用種，乳役兼用種に分けられる。本章第4節で述べる通り，インドで牛が食用を目的として飼育されることはない。また，水牛も牛と同様，基本的に食用目的では飼育されていない。ただし様々なルートを通じて牛・水牛肉は一定程度流通しており，消費もされている。イスラム教徒が牛肉を食するほか，貧困層で消費量が多くなる傾向がある[7]。

役用専用種としてはカルナータカ州原産のアムリトマハル（Amritmahal）種や，マハラシュトラ州原産のキッラリ（Khillari）種などがある。乳用専用種としては，パキスタンのカラチ付近原産のレッド･スィンディ（Red Sindhi）種やパキスタンのモントゴメリ地域原産のサヒワル（Sahiwal）種がある。乳役兼用種としては，ハリヤナ州原産のハリヤナ（Haryana）種や，グジャラート州およびラージャスタン州原産のカンクレジ（Kankrej）種がある。もとより実際には，品種のはっきりしない在来種の牛が多数飼育されている。

外国種はヨーロッパから輸入された品種であり，日本でもよく知られるジャージー種やホルスタイン・フリージア種等である。外国種は乳用種であり，基本的に役用には用いられない。

交雑種は，在来種と外国種を交配した牛である。インドでは1960年代初めに，ミルクの生産性向上のために，純血在来種の選抜と繁殖が取り組まれたが，芳しい成果は得られなかった。そこで1960年後半から，輸入した外国種と在来種とを交配して交雑種を増やしていく方針が打ち出された。交配する外国種のほとんどは，ホルスタイン・フリージア種かジャージー種である[8]。こうして得られる交雑種は，在来種の頑健さや耐病性をある程度備えているうえに，在来種よりもミルクの生産能力が高い。牛の総頭数に占める外国種・交雑種の割合は1992年の7.4%から，1997年の14.5%，2012年の27.7%へと上昇している[9]。

水牛は通常，乳用を目的として飼育する。役用に飼育することはあまりない。水牛のミルクは牛に比べて乳脂率が高く，高値で取引される。インドは在来種の水牛の種類が豊富であり，特にハリヤナ州近辺を原産地とするムラー（Murrah）種はミルク生産能力が高いことで知られている。牛と異なり水牛の場合，外国種を輸入して使

用したり，在来種と交配させたりすることはあまり行われていない。したがって，特にそれと示されていなくても水牛は在来種と考えてよい。

各種の牛・水牛の利用方法の相違は，それらの用途別の頭数に反映されている。本論文で用途別とは，繁殖用か，役用か，搾乳用か，あるいはまだそれらの役割を果たすに至らない子牛かという区別を指す。後掲の表3によって2012年における役用のオスと搾乳中のメスの割合を見ると，外国種・交雑種の牛及び水牛では役用のオスの割合が非常に低く，搾乳中のメスの割合が高い。したがってこれらの家畜ではメスをミルク生産のために飼育しており，オスは繁殖のために必要な限りで飼育しているとみてよい。これに対して在来種の牛では役用のオスと搾乳中のメスの割合がともに高く，オスを農作業等のために，メスをミルク生産のために，それぞれ飼育していることがわかる。

同表によると2012年における外国種･交雑種の牛の総頭数は3973万頭，在来種の牛は1億5117万頭，水牛は1億870万頭，合計3億頭弱であり，構成比は順に13%，50%，36%となっている。外国種・交雑種の牛はほかに比べて格段に頭数が少なく，交雑種の普及は限定的であることが確認できる。在来種の牛はもっとも頭数が多いが，これは第3章で述べるようにオスとメスの成畜を両方とも利用するからであろう。水牛は基本的に乳畜としてしか飼育されていないが、それでも頭数が多い。

(2) 小規模混合農業の一環として営まれる酪農

次にインドにおける酪農経営の規模を検討する。先行研究ではインドの酪農の小規模性が繰り返し指摘されているが，統計データとしては，NSSの報告書に記載されている経営農地面積規模別の平均家畜飼育頭数に基づいて，農地経営面積の小規模な農家ほど平均家畜飼育頭数が少ないことと，そうした小規模な農家が農家全体の中で多数を占めていることが示されるのみであった。以下では家畜飼育頭数別の農家構成を示すことによって，より直接的に酪農経営の規模を明らかにする。

標本調査からの推計値なので目安にすぎないが，NSSによると2013/14年における農村部の総世帯数は約1億5000万戸である。表1に示す通り，そのうち非耕作世帯は40%，自作地や小作地で耕作を行っている耕作世帯は60%であった。非耕作世帯の多くは農業労働や土木・建築労働等に従事して 生計を立てているとみてよい。酪農経営を行っている世帯には，耕作世帯も非耕作世帯も含まれる。

では次に酪農経営の規模を飼育頭数の点から検討してみよう。表1には経営農地面積規模別・飼育総頭数規模別に世帯数の構成比が示されている。牛・水牛の飼育総頭数には役用，搾乳中，乾乳期，子牛等を含むすべての牛・水牛が含まれている。

まず耕作世帯に焦点を当てると，牛・水牛を飼育している世帯は63%である。このうち飼育総頭数が2~3頭の世帯がもっとも多く51%を占め，これに続いて4~5頭の世帯が19%を占めている。飼育総頭数が5頭以下の世帯は89%に及ぶ。同表の注に示す通り，飼育総頭数2~3頭の世帯が飼育している搾乳中の牛・水牛の頭数は1.0頭であり，4~5頭の世帯では1.8頭である。後継表4に示す平均乳量を考慮すると，搾乳中の牛・水牛が1頭であれば1日にとれるミルクの量は平均して2kg弱，2頭であれば4kg弱である。酪農経営の零細性は明らかであろう。また表掲は略すが，役用のオスの頭数は搾乳中の牛･水牛の頭数よりも少なく，飼育総頭数2~3頭の世帯で0.6頭，4~5頭の世帯で0.9頭である[10)]。このようにミルク生産を主たる目的として1~2頭の搾乳牛・水牛を飼育して1日2~4kgのミルクを得る一方で，場合によってはそれ

表1　経営農地面積規模別・飼育頭数規模別の世帯数構成（2013/14年，農村部）

経営農地面積	経営耕地面積規模別世帯構成	経営農地面積規模別世帯計	牛・水牛を飼育していない世帯	牛・水牛を飼育している世帯	牛・水牛を飼育している世帯計	牛・水牛の飼育総頭数規模				
						1頭	2～3頭	4～5頭	6～10頭	11頭以上
農村世帯計	100.0%	100.0%	53.9%	46.1%	100.0%	21.6%	50.4%	17.8%	8.8%	1.4%
非耕作世帯	39.6%	100.0%	79.5%	20.5%	100.0%	37.1%	48.3%	10.7%	3.7%	0.3%
耕作世帯計	60.4%	100.0%	37.2%	62.8%	100.0%	18.3%	50.9%	19.4%	9.9%	1.6%
～0.5ha	30.0%	100.0%	46.6%	53.4%	100.0%	28.1%	54.2%	14.0%	3.5%	0.2%
0.5～1.0ha	13.9%	100.0%	32.5%	67.5%	100.0%	12.0%	56.8%	18.8%	9.9%	2.4%
1.0～2.0ha	9.7%	100.0%	26.4%	73.6%	100.0%	13.0%	46.7%	25.8%	13.2%	1.4%
2.0～4.0ha	4.9%	100.0%	23.8%	76.2%	100.0%	8.8%	39.3%	26.3%	23.0%	2.7%
4.0～10.0ha	1.8%	100.0%	15.8%	84.2%	100.0%	3.8%	31.0%	30.9%	26.4%	7.8%
10.0ha以上	0.2%	100.0%	4.1%	95.9%	100.0%	0.5%	18.4%	28.2%	35.8%	17.1%

注）搾乳中の牛･水牛の平均頭数は，飼育総頭数1頭で0.7頭，2～3頭で1.0頭，4～5頭で1.8頭，6～10頭で2.9頭，11頭以上で9.1頭である。

出所）National Sample Survey Organisation, Ministry of Statistics and Programme Implementation, Government of India, Unit-Level NSS Data provided in the form of CD-ROM: 70th National Sample Survey (2013/14), Schedule 18.1, Land Holding. より筆者作成。

らの乳畜とともに役用のオス牛を飼育する零細な家畜飼育が農村部で広く行われている。これらの農家では，自分の経営する農地で飼料を生産して家畜に与える一方で，家畜の排せつ物のうち，調理用燃料等として使用しなかった部分を厩肥として農地に投入している。零細な作物栽培と家畜飼育が有機的なつながりを保ちながら営まれているという点で，インド農業の中心に位置するのは零細な混合農業といってよい。Thornton，P. K.，R. L. Krushka，N. Henninger，et al.（2002）は，インドの土地の 83% において混合農業（mixed system）が行われていると推測している[11]。

次に非耕作世帯についてみてみよう。興味深いことに，非耕作世帯の 21% が，牛・水牛を飼育している。飼育総頭数規模別の世帯構成が示す通り，非耕作世帯の酪農経営は耕作世帯よりも小規模である。非耕作世帯は自家で飼料を生産できないので，その多くは共有地での放牧や道端，刈跡地などでの雑草等の収集に頼って乳畜を飼育し，わずかな量のミルクを生産している。耕耘作業を行わないので役用のオスを飼育する必要はなく，基本的に乳畜のみを飼育しているとみてよい。

次に耕作世帯における経営農地面積規模と牛・水牛の飼育総頭数との関係を見ると，経営面積の大きな耕作世帯ほど，飼育総頭数が大きくなる傾向を読み取ることができる。経営農地面積 0.5ha 未満層では，飼育総頭数 3 頭以下の農家が 8 割以上を占めているが，10ha 以上層になると 3 頭以下の農家は 2 割弱しか存在せず，6 頭以上の農家が半数以上を占めている。次項で指摘するように，飼料の供給量が，穀物（ワラが飼料として利用される）の作付面積や，飼料作物の作付面積に制約されるために，経営農地面積が大きい農家ほど飼育総頭数を増やすことが可能になると考えられる[12]。

では，インドにおけるミルク生産の中核を担っているのはどのような規模の農家なのだろうか。経営規模別のミルク生産量を知ることはできないので，ミルクの生産量に直接かかわるメスの牛・水牛（成畜）頭数の経営農地面積規模別・飼育総頭数規模別分布を示した表 2 によってこの点を検討してみよう。表頭は牛・水牛の飼育総頭数だが，集計されているのは総頭数のうちのメスの牛・水牛頭数（成畜）のみである。

同表によると，経営農地面積 2ha 未満かつ飼育総頭数 5 頭以下の世帯（非耕作世帯を含む）に，メスの牛・水牛（成畜）の 64% が集中していることがわかる。また，経営農地面積を考慮せず，飼育総頭数のみに注目すると，飼育総頭数 5 頭以下の酪農経営が，メスの牛・水牛（成畜）の 72% に集中している。したがって，小規模な酪農経営，なかでも小規模な混合農業経営がインドのミルク生産の中核を担っているといってよい。

もちろん大規模な専門的酪農経営の存在を忘れてよい訳ではない。NSS の結果によると，所得の半分以上を酪農経営から得ている世帯は農村世帯の 1.8% であった[13]。この中には専門的で大規模な酪農経営が含まれていると考えられる。また，表 1 によると，飼育総頭数 11 頭以上の世帯は農村世帯全体の 0.6% を占めるに過ぎないが（46.1% × 1.4% ≒ 0.6%），表 2 によるとそうした世帯にメスの牛・水牛（成畜）の 9.2% が集中している。メスの牛・水牛（成畜）の平均飼養頭数は 9.1 頭である。さらに，筆者が 2017 年 3 月にパンジャーブ州農村部で実施した調査では，飼養頭数 200 頭を上回り，先進諸国と比べても何らそん色のない酪農経営を展開する農家が存在することも確認された[1]。しかし，そうした大規模な酪農経営はインドの酪農経営全体に占めるシェアの点でも，ミルク生産に占めるシェアの点でも今のところ点的な存在である。

（3）飼料の供給の不足と低い 1 頭当たり乳量

飼料は粗飼料と濃厚飼料からなる。このうち粗飼料としては，乾燥飼料（dry fodder）と青刈り飼料（green fodder）が与えられている。乾燥飼料はほとんどが麦わらや稲わらを細断して乾燥させたものである。また青刈り飼料としては，酪農家が農地で栽培したトウジンビエ，

表 2　経営農地面積規模別・飼育頭数規模別のメス牛・水牛（成畜）の構成（2013/14 年，農村部）

経営農地面積	牛・水牛の飼育総頭数					合計
	1 頭	2 ～ 3 頭	4 ～ 5 頭	6 ～ 10 頭	11 頭以上	
非耕作世帯	3.5%	6.6%	3.1%	1.6%	0.4%	15.2%
～ 0.5ha	4.7%	14.4%	6.5%	2.4%	0.3%	28.3%
0.5 ～ 1.0ha	1.1%	7.6%	4.4%	3.9%	4.0%	20.9%
1.0 ～ 2.0ha	1.1%	5.2%	5.3%	4.4%	1.2%	17.3%
2.0 ～ 4.0ha	0.4%	2.4%	2.9%	4.4%	1.3%	11.4%
4.0 ～ 10.0ha	0.1%	0.7%	1.4%	1.9%	1.5%	5.6%
10.0ha 以上	0.0%	0.1%	0.2%	0.4%	0.5%	1.2%
合計	10.9%	37.0%	23.8%	19.1%	9.2%	100.0%

出所）National Sample Survey Organisation, Ministry of Statistics and Programme Implementation, Government of India, Unit-Level NSS Data provided in the form of CD-ROM: 70th National Sample Survey (2013/14), Schedule 18.1, Land Holding. より筆者作成。

アワ，エジプト・クローバーなどの飼料作物が与えられるほか[2]，耕地・非耕地を問わずあらゆるところで農家が集めた草や雑草，木の葉も与えられる。村の共有地や刈り跡地で行われる放牧も家畜に青切り飼料を与える重要な方法の1つである。濃厚飼料としては，穀物の他，綿実やナタネなどの油糧作物の搾油後の残渣などが与えられている。Diksit and Birthal（2010）はインド全体を対象とするサンプル調査に基づいて搾乳牛の1日のエサの消費量を，青刈り飼料5.9kg，乾燥飼料5.5kg，濃厚飼料0.6kgと推計している。放牧の割合は青刈り飼料全体の25%とされている[14]。

農村での筆者の観察によると，農家は乾燥飼料と青刈り飼料を基本的に自分の経営する農地で生産しており，消費しきれなかった場合は販売し，不足した場合は購入している。農家が家畜飼育のために生産できる飼料の量は，経営農地面積や作物構成に依存している。したがって，飼育可能な牛・水牛の頭数もまたそれらに依存する。濃厚飼料は農家が自ら生産するケースもあれば，飼料製造企業が販売しているタブレット状のものを購入するケースもある。

Birthal and Taneja（2006）によると，エサは不足基調にある。1972/73年における乾燥飼料の不足率（飼料の必要量に対する給餌量の不足分の割合）の推計値は49%，青刈り飼料は53%，濃厚飼料は43%であった。こうした飼料の大幅な不足傾向は近年緩和しつつあるとはいえ，2003年においても青刈り飼料の不足率は9%，乾燥飼料50%，濃厚飼料27%であった[15]。

このように給餌量が不十分であることと，交雑種の普及が進まず在来種が多数飼育されていることから，インドにおける牛・水牛の1頭当たり年間乳量は先進国と比較すると非常に低い。FAOSTATによると2016/17年の1頭当たり年間乳量は，インドの1.5トンに対して，アメリカ10トン，日本8.5トン，フランス6.7トン，ドイツ7.7トンであった[16]。

（4）屠畜の制約と家畜の「過剰」問題

人口の79.8%を占めるヒンドゥー教徒，1.7%を占めるスィク教徒，0.4%を占めるジャイナ教徒は[17]，宗教上の理由から，在来種，外国種，交雑種の別を問わず，牛を殺さず，また食さない。このことから，多くの州において牛の屠畜は法律で禁じられている[18]。他方水牛は，牛ほど聖性を帯びた存在とはみなされず，宗教上食することも許されている。とはいえ水牛も，屠畜されることはあまりない。このため総頭数に対する屠畜頭数の割合はヒツジが40%，ヤギが46%，豚が80%であるのに対して，牛と水牛は2%に過ぎない[19]。

しかし酪農経営を行う上で，経済的な価値が低下した家畜を飼育し続けることは不合理である。このため，インドにおいても役用として使用しないオス牛や，性能の落ちたメス牛などは，給餌量を減らすなどの手段で意図的に短命に終わるよう仕向けられることも多い。また，そうした家畜が収容される慈善施設が開設されている地域もある[20]。このような手段によって牛・水牛の寿命が人為的にコントロールされていることは，それらの性比を見れば明らかである。動物の性比は自然状態であればほぼ1対1であるが，表3によって2012年におけるオスの割合をみると，オスがあまり経済的価値を持たない外国種・交雑種と水牛では15%，オスを役用に使用する在来種では41%であった。

このように，経済的に価値の低い家畜の人為的淘汰は，宗教的禁忌の存在にもかかわらずある程度行われているが，不十分とならざるを得ない。このため1960年代からインドでは牛の「過剰」について激しい議論が戦わされてきた。牛の「過剰」を問題視するV.M.ダンデカールらは，年老いた役用のオス牛や，ミルクを生産する能力が落ちたメス牛など，経済的に価値の低い牛・水牛が大量に飼育されているために，経済的に価値の高い家畜に与えるべき飼料までもが不足し，その結果生ずる栄養不良が家畜の生産性をさらに落とすと主張した[21]。牛の「過剰」をどのような状態として理解し，その状況をどこまで許容するかという問題はおくとしても，ダンデカールが指摘した事実自体は現在においても存在し続けているといってよい。

（5）自家消費比率の高さと近代的流通機構の未発達

インドのミルクの大半を生産しているのは，すでに述べたように混合農業の一環として営まれる小規模な酪農経営である。そうした経営におけるミルク生産の一義的目的は世帯内での消費であり，販売に向けられるのはその後に残る余剰分である。生産されるミルクのうち，どれくらいの割合が自家消費に向けられるのかということについては見解が分かれるが，例えばKurup（2001）は30%強とし[22]，Birthal and and Taneja（2006）は55%としている。いずれにしてもかなりの割合のミルクが自家消費されているとみてよい。農家は紅茶などに混ぜてミルクを飲むほか，保存性を高めるために自家でヨーグルト（ダヒ），バター（マカン），精製バター（ギー）などにミルクを加工する[23]。酪農家の大半を占める，搾乳中の牛・水牛を1~2頭飼育する農家（飼育総頭数にして5頭以下）は生産されたミルクのかなりの部分をまず家族で消費し，余剰部分を販売していると考えてよい。杉本（2015）によると，農村世帯のミルク自給率（ミルク消費量に対する自家生産部分の割合）は59%であり，農家の場合は81%に達する[24]。乳畜を飼育しているほとんどの農民にとってミルク生産の主な目的は自家消費にあるといってよい。

次にミルクの販売について検討してみよう。Kurup（2001）の見解に従うと，生産されたミルクの20%が乳

業関連事業体（酪農組合，政府系加工業者，比較的大規模な民間の加工業者）に販売され，50% がインフォーマル・セクターに販売される。前者の乳業関連事業体のうち，取扱量がもっとも大きいのは酪農組合である[25]。

酪農組合はいくつかの系統に分かれるが，加盟単組数がもっとも大きいのは全国酪農開発委員会（National Dairy Development Board，以下 NDDB と略）が統括する酪農組合のネットワークである。NDDB の傘下には 2016 年現在で 17 万 7314 の単組と 1628 万 2000 人の組合員が組織されており，乳加工工場や流通関連施設，小売り会社等が設立されている[26]。NDDB を中心とする酪農組合の活動は，その本部が所在するグジャラート州において特に活発であり，酪農組合が集荷するミルクの割合は生産量の 52% に及ぶ。しかしインド全体を見渡すと，NDDB が乳業全体に占める地位が高いとは言えない。2016 年における NDDB の年間集乳量約 1560 万トンは，インドのミルク生産量 1 億 5937 万トンの 1 割程度に過ぎないからである。前途の Kurup（2001）によると乳業関連事業体への販売量は生産量の 20% とされるので，酪農組合はその半分程度を取り扱っており，残りの半分は政府系加工業者と民間の比較的大規模な加工業者が取り扱っていると考えてよい。

したがって，近年注目されることの多いネスレ等の多国籍アグリビジネスや国内乳業メーカーによるミルクの契約生産は，都市部への乳製品の供給や，個々の企業の事業展開にとって大きな意義をもつ可能性はあるものの，インドの酪農全体を見渡せばそのプレゼンスは今のところ限定的である[27]。コールド・チェーンの確立を前提とする近代的な流通販売網でカバーされているのは，酪農協同組合や民間乳業メーカーが活発に活動している一部の地域に限られるといってよい。

このように乳業の近代的加工・流通機構は未発達であり，生産されるミルクの 50% 程度は，インフォーマル・セクターに販売されているとみてよい。農家がインフォーマル・セクターにミルクを販売するとは，具体的には，毎日庭先にやってくる小規模な集乳業者にミルクを販売することであり，購入した販売業者はそのミルクを顧客に販売する。販売業者の顧客とは，都市部の個人宅や菓子店（いわゆるミターイ・ショップ）である。インドの菓子の多くは，乳製品といっても過言ではないほど多くのミルクを使って作られるので，菓子店はミルクの需要先として重要である[28]。このほか生産農家が個人宅や菓子店に直接販売することも多い。

3. インド酪農の成長要因

ここまでの検討の結果，インド酪農の特徴として，混合農業の一環として営まれる小規模経営を中核とすること，飼料が不足基調にあること，屠畜に制約があることから交雑種の普及が進んでいないこと，飼料の不足と交雑種の普及の遅れによりミルクの生産性が低位にとどまっていることが示された。また，ミルクを農村部から都市部へと大量に移送するための，コールド・チェーンを備えた流通販売網は一部の農家をカバーするのみであることが明らかになった。一言でいうと，乳業発展の条件が整っているとはいいがたい。しかしそれにもかかわらず，インドにおける牛・水牛ミルク生産量は 1999/2000 年の 7490 万トンから 2016/17 年の 1 億 5937 万トンへと，17 年間で 2 倍以上増加した。本章ではこの乳業発展の原因を検討する。

ミルク生産量の増加をもたらした要因のひとつは，搾乳中の牛と水牛の頭数が増加したことである。表 3 によると，1997 年から 2012 年にかけて，搾乳中の外国種・交雑種の牛は 838 万頭，在来種の牛は 229 万頭，水牛は 816 万頭増加した。またメスの子牛も外国種・交雑種が 708 万頭，在来種が 30 万頭，水牛が 1149 万頭増加した。ミルクを泌乳中の牛・水牛と，しばらく後にそれを泌乳

表 3　品種別・機能別の牛・水牛頭数の変化　（単位：1000 頭）

		1997 年の家畜頭数				2012 年の家畜頭数				品種毎の構成比 (2012 年)				総頭数に対する構成比 (2012 年)				1997 年から 2012 年にかけての増減			
		外国種・交雑種	在来種	水牛	合計	外国種・交雑種	在来種	水牛	合計	外国種・交雑種	在来種	水牛	合計	外国種・交雑種	在来種	水牛	合計	外国種・交雑種	在来種	水牛	合計
オス	子牛	2,617	24,210	10,679	37,506	3,839	15,205	10,805	29,849	10%	10%	10%	10%	1%	5%	4%	10%	1,222	▲9,005	126	▲7,657
	繁殖用	209	11,296	791	12,296	318	2,084	836	3,238	1%	1%	1%	1%	0%	1%	0%	1%	109	▲9,212	45	▲9,058
	役用	2,009	50,170	4,819	56,998	1,424	39,854	3,468	44,746	4%	26%	3%	15%	0%	13%	1%	15%	▲585	▲10,316	▲1,351	▲12,252
	繁殖・役用兼用	231	3,351	1,983	5,565	222	2,981	621	3,823	1%	2%	1%	1%	0%	1%	0%	1%	▲9	▲370	▲1,362	▲1,742
	その他	278	1,177	353	1,808	169	1,825	374	2,367	0%	1%	0%	1%	0%	1%	0%	1%	▲109	648	21	559
	オス計	5,344	90,202	18,625	114,171	5,971	61,949	16,103	84,023	15%	41%	15%	28%	2%	21%	5%	28%	627	▲28,253	▲2,522	▲30,148
メス	子牛	5,412	33,503	24,524	63,439	12,492	33,807	36,013	82,312	31%	22%	33%	27%	4%	11%	12%	27%	7,080	304	11,489	18,873
	搾乳中	5,924	27,361	28,410	61,695	14,305	29,649	36,572	80,526	36%	20%	34%	27%	5%	10%	12%	27%	8,381	2,288	8,162	18,831
	乾乳期	2,432	22,513	14,322	39,267	5,115	18,475	14,482	38,071	13%	12%	13%	13%	2%	6%	5%	13%	2,683	▲4,038	160	▲1,196
	非経産	778	4,393	3,329	8,500	1,565	6,031	4,538	12,135	4%	4%	4%	4%	1%	2%	2%	4%	787	1,638	1,209	3,635
	メス計	14,756	88,580	71,292	174,628	33,760	89,224	92,599	215,583	85%	59%	85%	72%	11%	30%	31%	72%	19,004	644	21,307	40,955
合計		20,100	178,782	89,917	288,799	39,732	151,172	108,702	299,606	100%	100%	100%	100%	13%	50%	36%	100%	19,632	▲27,610	18,785	10,807

出所）Department of Animal Husbandry, Dairying and Fisheries, Ministry of Agriculture, Government of India(2003), 16th Livestock Census, Summary Report, All India, Vol. I A, Livestock and Poultry 1997, p.7, Department of Animal Husbandry, Dairying and Fisheries, Ministry of Agriculture, Government of India(2014), 19th Livestock Census-2012, All India Report, p.13. より筆者作成。

する子牛が，合計で 3770 万頭増加したのである。注目されるのは，この乳畜の増加が役用のオス牛の減少を伴っていたことである。同じ期間に在来種の役用牛（オス）は 1032 万頭，在来種オスの子牛は 901 万頭，在来種オスの繁殖牛は 920 万頭減少した。減少頭数は合計で 2850 万頭に及んだ[29]。こうした頭数の変化は，牛・水牛の構成比にも反映されており，牛と水牛の総頭数に占める搾乳中の牛・水牛とメスの子牛・水牛のシェアは 1997 年の 43% から 2012 年の 54% に上昇したが，役用牛・水牛とオスの子牛のシェアは 33% から 25% へと低下した。

かつてインドで牛を飼育する最大の目的は，役用のオス牛を耕耘作業や地下水の揚水作業に用いることにあった。したがって，メス牛を飼育する第 1 の目的はオス牛の再生産であり，ミルクの生産には二義的な意義しか付与されていなかった[30]。しかしパンジャーブ州などの農業先進州では 1960 年代から，その他の州においても遅くとも 1980 年代から，トラクターや揚水用の動力ポンプが普及し，役畜として牛・水牛を飼育する意義は薄らいでいる[31]。他方で，ミルクの消費量は増加しており，農家は乳畜の飼育をより重視するようになっている。したがって，役畜の減少と乳畜の増加という牛・水牛の構成の変化は農業生産の変化と消費市場の変化とを反映している。

しかしそうした変化が急激に進展しているとも言い難い。表 3 に示されているように，2012 年において種類別・機能別に見てもっとも頭数が多いのは，牛・水牛の総頭数の 13% を占める在来種の役用牛である。また種類別に見てもっとも多いのは在来種の牛で，50% を占めている。すなわち，役畜が急減して乳畜に代替されているわけでもない。考えうる理由として 2 点を指摘しておきたい。ひとつはトラクター等によって役畜を代替することが容易ではないという農業の現実である。例えば排水施設の整備が不十分で過湿となりやすい圃場が多い地域では依然として役畜の活躍の場が多く，トラクターやトラックの導入が容易ではないと推察される。

もうひとつは飼料基盤の制約である。牛・水牛の総頭数はこの 15 年間で 1080 万頭，3.7% 増えたに過ぎず，あまり変化していない。総頭数が大きくは増えないマクロ・レベルの理由は，飼料基盤の制約であろう。乳畜の飼育頭数の増加が，役畜頭数の減少をあまり上回ることができないのはこのためであると推察される。役畜をある程度飼育しなければならないという条件と，飼料基盤が不十分であるという条件に制約されながら，役畜の減少と乳畜の増加が今のところゆっくりと進行しつつあるとみてよい。

ミルクの増産を可能にしたもう一つの要因は，1 頭当たり乳量の増加である。表 4 に示されているように，牛・水牛合計の 1 頭あたり平均年間乳量は，2000 年の 1.22 トンから 2015 年の 1.70 トンへと 15 年間で 38.9% 増加した。年率にすると 2.21% となる。すでに述べたように飼料の不足がやや緩和していることは，乳量の増加をもたらした要因であろう。また，同じ期間における搾乳牛の頭数の年平均増加率は 2.29%，ミルク生産量のそれは 4.55% であった。「ミルク生産量の年平均成長率 = 家畜頭数の年平均成長率 +1 頭当たり年間乳量の年平均成長率」という関係がおおむね成立することから，メス牛の頭数の増加と，1 頭当たりミルク生産量の増加は，ミルク生産量の増加に対して同じくらいずつ貢献したということができる。

もっとも，ミルク生産量の増加率や，増加を促した要因は，家畜の種類ごとに異なる。表 4 によると，まず外国種・交雑種の牛は，1 頭あたり乳量は比較的高いものの，その増加率は低く，ミルク生産の増加要因は主として頭数の増加にあった。ミルク生産量の増加に対する外国種・交雑種の牛の寄与率は 36% であり，かなり大きいといってよい。次に水牛は 1 頭当たり乳量と頭数の両方が穏やかに上昇している。比較的乳量が高い上に頑健で酷暑にも強いことが頭数の増加につながったと考えられる。ミルクの増産への増加寄与率は 46% と約半分に及ん

表 4　牛・水牛の種類別のミルク生産量，搾乳牛頭数，1 頭当たり年間乳量の推移

		外国種・交雑種	在来種	水牛	合計
ミルク生産量 (1000 トン)	2000 年	14323	19047	43699	77069
	2015 年	40883	31840	77478	150201
搾乳牛の頭数 (1000 頭)	2000 年	6096	27376	29639	63110
	2015 年	15174	32240	41162	88575
1 頭当たり乳量 (トン / 年)	2000 年	2.35	0.70	1.47	1.22
	2015 年	2.69	0.99	1.88	1.70
年平均増加率 (2000 ～ 2015 年)	搾乳牛の頭数	6.27%	1.10%	2.21%	2.29%
	1 頭当たり乳量	0.92%	2.36%	1.64%	2.21%
	ミルク生産量	7.24%	3.48%	3.89%	4.55%
ミルク生産量への増加寄与率		36%	17%	46%	100%

注）2000 年は 1999 年から 2001 年までの 3 年間の平均値，2015 年は 2014 年から 2016 年までの 3 年間の平均値。
出所）Department of Animal Husbandry, Dairying and Fisheries, Ministry of Agriculture, Government of India, *Basic Animal Husbandry & Fisheries Statistics*, Various Issues. より筆者作成。

だ。最後に在来種の牛は頭数の増加が小さかったが，1頭当たり乳量の伸びが比較的大きかった。在来種の牛は1頭当たり乳量が極めて低く，上昇の余地が大きかったと考えられる。とはいえ，もともとの生産性が格段に低いことから，ミルク生産の増加そのものは小さく，増加寄与率は17%にとどまった。

4. 結び

インドにおける近年のミルク増産の要因は，搾乳牛・水牛の頭数と1頭当たりのミルク生産量が共に増加したことにある。搾乳牛・水牛の頭数を増加させることが可能になったもっとも大きな要因は，耕耘作業や地下水の揚水作業が機械化され，在来種のオスを中心に役畜の頭数が減少したことにある。飼料供給の制約から牛・水牛の飼育総頭数があまり増加しない状況において，乳畜の増加頭数は基本的に，役畜の減少頭数から大きくは乖離しないとみられる。

また本稿では，作物栽培と家畜飼育の両面から農業経営の規模を明らかにしたうえで乳蓄の分布を検討した。その結果によると，メスの牛・水牛（成畜）の64%は経営面積2ha未満かつ，牛・水牛の飼育総頭数5頭以下（搾乳中の牛・水牛の頭数は2頭以下）という零細な農家に集中していた。こうした農家は基本的には，自分の経営農地で生産可能な飼料の範囲内で家畜を飼育している。農家は農業の機械化によって役畜飼育の必要性が低下するにしたがって徐々に役畜頭数を減らし，浮いた飼料を利用して乳畜を増やしたとみてよい。役畜の必要性が低下した際に，農家が家畜の飼育総頭数を減らすのではなく乳畜を増頭してミルク生産を指向した背景には，現金収入の拡大という目的とともに，ミルクの自家消費分の確保による世帯員の栄養改善という目的があったと考えられる。個々の農家レベルでのこうした経営変化の堆積が，ミルク増産の中心的な要因となったのである。

もとより，ここで示したミルクの増産過程は，全インドレベルのデータによって描き出されたものであり，地域ごとに見ると，ミルクの増産規模やそれを可能にした背景は大きく異なると予想される。この点の検討は今後の課題としたい。

謝辞：本研究は，名城大学アジア研究センター公募型研究助成金により行われたものであり，ここに深く感謝申し上げる。

注

(1)パンジャーブ州ルディアナ県G村のS氏は，ホルスタイン・フリージア種約200頭を飼育する大規模な酪農経営を行っている。飼育総頭数のうち100頭弱が搾乳中のメス牛で，残りは子牛等である。純血種の精液を用いて交配を重ねているので，飼育している牛はほぼ純血種といえる。乳量は平均して1日1頭40~50リットルであり，搾乳期間1期で1頭当たり約7000リットルを生産する。経営農地面積は50haであり，10haが所有地，40haが借入地であった。この農地のうち28haでコメ・馬鈴薯・メイズの輪作を行い，残りの22haで飼料作物を栽培している。配合内容が異なる5種類の飼料を農場内で製造しており，牛の生育段階や搾乳牛の乳量に応じて異なる飼料を与えている。出荷先は先進的な酪農家が加入する独立系の酪農組合であり，S氏もそのメンバーである。バイパス・ファットやバイパス・プロテインの飼料への添加，ホルモン剤を使った繁殖時期の管理など，先進的な技術を活用して生産性の高い酪農経営を行っている。

(2)エジプト・クローバーは英語名Egyptian Clover，学名Trifolium alexandrinumである。

参考文献

1）Kurien, Verghese (2004), *India's Milk Revolution – Investing in Rural Producer Organisations*, World Bank; Washington, DC

2）Kurup, M. P. G. (2001), "Smallholder Dairy Production and Marketing in India: Constraints and Opportunities, " in D. Rangnekar and W. Thorpe (ED.), *Smallholder Dairy Production and Marketing –Opportunities and Constraints* (Proceedings of a South-South workshop held at National Dairy Development Board (NDDB), Anand, India, 13 – 16 March, 2001), NDDB, Australian Centre for International Agricultural Research, International Livestock Research Institute, Birthal P.S., P.K. Joshi, and Ashok Gulati (2005), *Vertical Coordination in High-Value Food Commodities: Implications for Smallholders*, MTID Discussion Paper No. 85, International Food Policy Research Institute; Washington, DC, Birthal, P.S. and D.S. Negi (2012), "Livestock for Higher, Sustainable and Inclusive Agricultural Growth, " *Economic and Political Weekly*, Vol. 47, Nos. 26 and 27, June 30, pp. 89-98.

3）Department of Animal Husbandry, Dairying and Fisheries, Ministry of Agriculture, Government of India (2014), *Basic Animal Husbandry & Fisheries Statistics*, Various Issues.

4）Department of Animal Husbandry, Dairying and

Fisheries, Ministry of Agriculture, Government of India (2014), *19th Livestock Census - 2012, All India Report*.

5) National Sample Survey Organisation, Ministry of Statistics and Programme Implementation, Government of India, Unit-Level NSS Data provided in the form of CD-ROM: 70th National Sample Survey (2013/14), Schedule 18.1, Land Holding.

6) Department of Animal Husbandry, Dairying and Fisheries, Ministry of Agriculture, Government of India (2014), *Basic Animal Husbandry & Fisheries Statistics*, p.4.

7) 杉本大三 (2015)「食料消費パターンの地域的特徴とその変化」押川文子・宇佐美好文編著『激動のインド5　暮らしの変化と社会変動』日本経済評論社。

8) Kurup, M. P. G. (2001), "Smallholder Dairy Production and Marketing in India: Constraints and Opportunities, " in D. Rangnekar and W. Thorpe (ED.), *Smallholder Dairy Production and Marketing –Opportunities and Constraints* (Proceedings of a South-South workshop held at National Dairy Development Board (NDDB), Anand, India, 13 – 16 March, 2001), NDDB, Australian Centre for International Agricultural Research, International Livestock Research Institute, pp.70-71.

9) Department of Animal Husbandry, Dairying and Fisheries, Ministry of Agriculture, Government of India (2003), *16th Livestock Census, Summary Report, All India, Vol. IA, Livestock and Poultry 1997*, p.7, Department of Animal Husbandry, Dairying and Fisheries, Ministry of Agriculture, Government of India (2014), *19th Livestock Census - 2012, All India Report,* p.13.

10) National Sample Survey Organisation, Ministry of Statistics and Programme Implementation, Government of India, Unit-Level NSS Data provided in the form of CD-ROM: 70th National Sample Survey (2013/14), Schedule 18.1, Land Holding. を筆者が集計した結果で，役用牛と役用水牛の合計頭数である。役用牛のみの頭数は順に 0.5 頭, 0.8 頭であった。

11) Thornton, P.K., R.L. Krushka, N. Henninger, et al. (2002), *Mapping Poverty and Livestock in the Developing World,* International Livestock Research Institute; Nairobi, Kenya, p.19.

12) 岡通太郎 (2004),「インドにおける改良牛普及格差の要因分析―グジャラート州中部村落内の社会経済関係からの考察―」『アジア経済』第 45 巻，第 4 号において，岡氏は，グジャラート州での村落調査に基づいて，酪農の経営規模が，所有農地面積に規定されることと，農地貸借市場や農村労働市場の不完全性のために，そうした状況が固定化されていることを明らかにしている。

13) National Sample Survey Organisation, Ministry of Statistics and Programme Implementation, Government of India (2015), Household Ownership and Operational Holdings in India, NSS 70th Round (January – December 2013), NSS Report No. 571, p. 17.

14) Diksit A.K. and P.S. Birthal (2010), India's Livestock Feed Demand: Estimates and Projections, *Agricultural Economics Research Review,* Vol. 23, January-June 2010, p. 20.

15) Birthal P.S. and V.K. Taneja (2006), Livestock sector in India: Opportunities and Challenges for Smallholders, in P.S. Birthal, V.K.Taneja and W. Thorpe (ED.), *Smallholder Livestock Production in India: Opportunities and Challenges* (Proceedings of an ICAR-ILRI international workshop), NCAP (National Centre for Agricultural Economics and Policy Research) – ICAR (Indian Council of Agricultural Research), New Delhi, India and ILRI (International Livestock Research Institute), Nairobi, Kenya. また，岡通太郎 (2004),「インドにおける改良牛普及格差の要因分析―グジャラート州中部村落内の社会経済関係からの考察―」『アジア経済』第 45 巻，第 4 号では，エサが不足する背景が農家の家畜飼養の実態に即して紹介されている。

16) FAOSTAT ウェブサイト http://www.fao.org/faostat/en/ (2018 年 9 月 11 日閲覧)

17) 2011 年人口センサスの結果による。http://www.censusindia.gov.in/2011census/C-01.html (2018 年 9 月 21 日閲覧)。

18) Birthal P.S. and V.K. Taneja (2006), Livestock Sector in India: Opportunities and Challenges for Smallholders, in P.S. Birthal, V.K.Taneja and W. Thorpe (ED.), *Smallholder Livestock Production in India: Opportunities and Challenges* (Proceedings of an ICAR-ILRI international workshop), NCAP (National Centre for Agricultural Economics and Policy Research) – ICAR (Indian Council of Agricultural Research), New Delhi, India and ILRI (International Livestock Research Institute), Nairobi, Kenya, p.29.

19) Birthal P.S. and V.K. Taneja (2006), Livestock Sector in India: Opportunities and Challenges for Smallholders, in P.S. Birthal, V.K.Taneja and W. Thorpe (ED.), *Smallholder Livestock Production in India: Opportunities and Challenges* (Proceedings of an ICAR-ILRI international workshop), NCAP

(National Centre for Agricultural Economics and Policy Research) – ICAR (Indian Council of Agricultural Research), New Delhi, India and ILRI (International Livestock Research Institute), Nairobi, Kenya, p.29.

20) 篠田隆(2015年)『インド農村の家畜経済長期変動分析：グジャラート州調査村の家畜飼養と農業経営』日本評論社，79ページ。

21) Dandekar, V. M. (1988), "Bovine Economics: Review of Bovine Economy in India by A. Vaidyanathan; Oxford and IBH, Bombay, and Center for Development Studies, Trivandrum, 1988", *Economic and Political Weekly*, Vol. 23, No. 50, Decemder 10.

22) Kurup, M.P.G. (2001), "Smallholder Dariy Production and Marketing in India: Constraints and Opportunities, " in D. Rangnekar and W. Thorpe (ED.), *Smallholder Dairy Production and Marketing –Opportunities and Constraints* (Proceedings of a South-South workshop held at National Dairy Development Board (NDDB), Anand, India, 13 – 16 March 2001), NDDB, Australian Centre for International Agricultural Research, International Livestock Research Institute, p. 78, Birthal P.S. and V.K. Taneja (2006), Livestock Sector in India: Opportunities and Challenges for Smallholders, in P.S. Birthal, V.K.Taneja and W. Thorpe (ED.), *Smallholder Livestock Production in India: Opportunities and Challenges* (Proceedings of an ICAR-ILRI international workshop), NCAP (National Centre for Agricultural Economics and Policy Research) – ICAR (Indian Council of Agricultural Research), New Delhi, India and ILRI (International Livestock Research Institure), Nairobi, Kenya, p.29.

23) 杉本大三 (2018年),「乳製品」杉本良男編集委員長･インド文化事典編集委員会編『インド文化事典』丸善出版。

24) 杉本大三 (2017年),「経済成長下のインドにおける低所得層の食料消費」『現代インドの消費変動と社会システム』(日本学術振興会・科学研究費補助金・基盤研究 (B) 2013-16年度「インドにおける都市生活消費市場の構造と農村・都市間の物的人的循環―生活文化の視点から―」(課題番号：25285109　研究代表：杉本大三) 研究成果報告書), 29ページ。数値は2009年に実施されたNSS消費調査の結果を，筆者が集計して得たものである。

25) Kurup, M. P. G. (2001), "Smallholder Dairy Production and Marketing in India: Constraints and Opportunities, " in D. Rangnekar and W. Thorpe (ED.), *Smallholder Dairy Production and Marketing –Opportunities and Constraints* (Proceedings of a South-South workshop held at National Dairy Development Board (NDDB), Anand, India, 13 – 16 March 2001), NDDB, Australian Centre for International Agricultural Research, International Livestock Research Institute, p. 78.

26) National Dairy Development Board (2017), *Annual Report 2016/17*, pp.72-75.

27) Birthal P. S., P. K. Joshi, and Ashok Gulati (2005), *Vertical Coordination in High-Value Food Commodities: Implications for Smallholders,* MTID Discussion Paper No. 85, International Food Policy Research Institute; Washington, DC はインドにおける乳業の契約生産を検討している。

28) 杉本大三 (2018),「乳製品」杉本良男編集委員長・インド文化事典編集委員会編『インド文化事典』丸善出版。

29) 在来種の繁殖用オスの減少が大きかったのは，在来種に外国種を交配させて交雑種を得ようとする農家が増えた結果であると推察される。

30) 篠田隆(2015年)『インド農村の家畜経済長期変動分析：グジャラート州調査村の家畜飼養と農業経営』日本評論社，viページ。

31) 杉本大三 (2011),「農業」石上悦郎，佐藤隆広編『現代インド・南アジア経済論』ミネルヴァ書房。

Causes of Rise in India's Milk Production

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Abstract

Since the inception of 21st century, we have been witnessing a significant rise in milk production in India. This study examines the background of it through the analysis on number of animals, productivity of milk production, and scale of individual dairy farmings. The author noted that most Indian farmers are engaged in small mixed farming consisting of crop production and animal husbandry in which small size of the farm land tends to constrain the availability of fodder for animals. The result of the investigation indicates that the substantial increase in milk production in recent India was brought about by increased number of cow and she-buffalo as well as improvement in milk productivity. It is also suggested that the increase in the number of female bovines under the condition of limited supply of fodder could be attributable to decline in that of male bovines against the background of agricultural mechanization.

KEY WORDS : India, mixed farming, dairy farming, cattle, buffalo

セミナー報告

Report

名城大学農学部・農学研究科のキングモンクット工科大学トンブリ校 生物資源工学研究科（タイ）との 2017 年度国際交流を振り返って
International Exchange Activities in 2017 of Faculty and Graduate School of Agriculture,Meijo University with School of Bioresources and Technology,King Mongkut's University of Technology Thonburi,Thailand

奥村裕紀 by Hiroki Okumura
名城大学農学部 , Faculty of Agriculture

要旨
名城大学農学部・農学研究科は，タイのキングモンクット工科大学トンブリ校（King Mongkut's University of Technology Thonburi; KMUTT）生物資源工学研究科（School of Bioresources and Technology）との間に学術交流協定を締結している。当協定に基づき，2017 年 8 月，第 4 回目となる国際共同シンポジウムを名城大学天白キャンパスにおいて開催した。当シンポジウムでは，名城大学と KMUTT，および KMUTT 生物資源工学研究科と関係の深いタイのタクシン大学（Thaksin University）から教員と大学院生が，また同じく名城大学農学部と学術交流協定を締結しているオーストラリアのボンド大学（Bond University）から教員が講演者として参加し，英語で研究発表を行った。シンポジウム終了後の日程では，タイとオーストラリアからの講演者とともに近隣の農学関連施設や名城大学農学部附属農場などを訪問し，名古屋市と名古屋市近郊の農畜産業や生物資源利用などに関する知見を深めた。本報告書では，当国際交流の活動内容を紹介し，その成果，および名城大学農学部と KMUTT 生物資源工学研究科との学術交流の将来について考察する。
キーワード：生物資源科学，ポストハーベスト

1. はじめに

タイの首都バンコクに位置するキングモンクット工科大学トンブリ校（King Mongkut's University of Technology Thonburi; KMUTT，以下 KMUTT と記す）は，1960 年に設立されたタイ国立トンブリ技術大学（Thonburi Technology Institute）を母体とする，タイ有数の工科大学である[1)]。KMUTT 生物資源工学研究科（School of Bioresources and Technology）と名城大学（以下本学と記す）農学部・農学研究科は，KMUTT 生物資源工学研究科ポストハーベストテクノロジー部門（Division of Postharvest Technology）の Sirichai Kanlaynarat 教授から本学農学部の道山弘康教授への打診を発端にして，当時の農学部国際交流委員会（村山重俊教授（当時），平児慎太郎准教授，奥村裕紀准教授）および本学国際交流センター（当時）による入念な準備のもと，2010 年 6 月に学術交流協定を締結した。

当協定に基づく学術交流が初めて実地に移されたのは，2012 年 3 月，本学農学部の奥村准教授と指導大学院生が KMUTT を訪問して実施した，研究発表会であった。この KMUTT 訪問で得られた経験を踏まえ，本学農学部・農学研究科は，当学術交流協定に基づく国際シンポジウムを 1 ～ 3 年間隔で KMUTT 生物資源工学研究科と共同開催している。当シンポジウムの一貫したテーマは，両校の学術交流の今後の発展を見据えて "Bioresource Sciences for Sustainable Development of Japan and Thailand（日本とタイの持続的発展に向けた生物資源科学)" とした。当シンポジウムの第 1 回は 2012 年 8 月に KMUTT にて，第 2 回は 2013 年 8 月に名城大学にて，第 3 回は 2014 年 8 月にタクシン大学（Thaksin University）にて，第 4 回は 2017 年 8 月に再び名城大学にて開催された。

次項では，最近開催された第 4 回シンポジウム，および講演者との交流活動を取り上げ，その内容の概要を報告する。

2. 活動報告

シンポジウムの開催

2017 年 8 月 28 日，本学天白キャンパス共通講義棟北の N202 講義室を会場として，本学農学部・農学研究科と KMUTT 生物資源工学研究科 との学術交流協定に基づく第 4 回国際シンポジウム "Bioresource Sciences for Sustainable Development of Japan and Thailand" が開催された（図 1）。本学農学部の奥村准教授と鈴木康生 准教授が交代で座長を務めた。小原章裕 農学部・農学研究科長による開会の挨拶（図 2）に続けて，農学部の学部生 2 名により名城大学の概要が英語で紹介された。

図 1.　第 4 回シンポジウム集合写真

図 2.　小原農学部長による開会の挨拶

その後，KMUTT 生物資源工学研究科，助教（Assistant Professor）の Panida Boonyaritthongchai 博士と Nutthachai Pongprasert 博士，および博士課程在学中の Surisa Phornvillay さんと Chalida Chimvaree さん，タクシン大学，助教（Assistant Professor）の Samak Kaewsuksaeng 博士，および修士課程在学中の Nurainee Salaemae さん，ボンド大学（Bond University），助教（Assistant Professor）の Anna Lohning 博士，本学農学部・農学研究科，湊健一郎准教授，近藤歩准教授，森田裕将准教授，および修士課程在学中の糀谷紗季さんと松村直哉さんの計 12 名により，研究テーマの紹介と研究成果の報告が英語で行われた（図 3）。

図 3.　シンポジウムでの発表の様子

当シンポジウムでは，日本，タイやオーストラリアにおける農産物の品質管理や鮮度保持に関する最新の研究動向について，活発な意見交換がなされた。会場に訪れた聴衆の延べ人数は，56 名（教職員 12 名，学生 44 名）であった。なお，昼食の時間を利用して，タイから講演者として参加した大学院生と本学の学生とが交流する場を設けたところ，会場に訪れた学生のほとんどが参加し，互いに交流を深めた（図 4）。

図 4.　学生交流会の様子

本学近隣の農学関連施設などの見学

当シンポジウム終了後，タイとオーストラリアからの講演者が日本を出国するまでの日程を利用して，名古屋市と名古屋市近郊の農畜産業や生物資源利用などに関する知見を深める目的で，本学近隣の農学関連施設などを見学した。8 月 29 日には，名古屋市天白区の名古屋市農業センター <http://www.city.nagoya.jp/kurashi/category/19-8-4-2-2-0-0-0-0-0.html> および中川区の飯田農園 <https://iida-farm.jimdo.com/>，8 月 30 日には，守山区の東谷山フルーツパーク <http://www.fruitpark.org/> を訪問した。

名古屋市農業センターでは，センターの職員から直接説明を受け，名古屋市の農業や名古屋コーチンに代表される養鶏業の実態，および名古屋市農業センターが市民の農業学習の場として果たしている役割などについて，詳細な説明を受けた。飯田農園は，個人が経営しているミニトマト農園であるが，糖度を高めるために独自に開発した肥料や栽培法を用いており，収穫したミニトマトを使用した加工食品を自ら開発するなど，ブランド力を高めることで独自の販路を開拓している。その他にも，経営の理念など，経営者から直接貴重なお話を伺うことができ，都市部における農業のあり方を模索していく上で重要な知見を得た。東谷山フルーツパークでは，タイでも馴染みの深い熱帯果樹の数々が温室内で栽培され，市民が自由に見学できるように展示されており，日本国内における熱帯果実の普及に貢献するユニークな施設であることを紹介した。

なお，8 月 29 日には名古屋城本丸御殿も訪問し，重要

な生物資源のひとつである木材を主な資材として用いる日本の伝統的な建築技法と伝統文化，および名古屋地域の歴史を学んだ。

本学農学部附属農場の見学

8 月 30 日には，さらに本学春日井キャンパスの農学部附属農場を訪問した。今回の訪問では，特に 2016 年に新設された教育研究館を中心に見学し，リニューアルされた食品加工実習施設や農学部フィールドサイエンス研究室の充実した研究環境など，本学農学部における教育・研究活動の一端を紹介した（図 5）。

図 5.　附属農場の食品加工実習施設にて

本学国際化推進センターの訪問

同じく 8 月 30 日，本学天白キャンパスの国際化推進センターを訪問した。センターの職員から，本学の概要と国際交流に関する取り組みの詳細が紹介され，留学生に対する支援など，今後本学との国際交流を発展させるために必要な情報が交換された（図 6）。

図 6.　国際化推進センター訪問にて

3.　考察とまとめ

当シンポジウムおよび施設訪問は，日本とタイの持続的発展にとって生物資源科学がいかに重要であるかを再確認するとともに，参加校の教員と研究者が生物資源科学の進歩に協力して取り組むための研究基盤を形成する足がかりを得ることが主な目的である。また，本学農学部･農学研究科の学生に対しては，英語でのプレゼンテーション，質疑応答や協定校の教員，研究者との交流を経験させることによって，国際的に通用する研究活動に対する意欲を芽生えさせ，科学研究における異文化間コミュニケーションの重要性を実感させる狙いがある。以上の目的や狙いを達成するため，今後も当国際交流を地道に継続することが重要であると考えられる。また，当シンポジウムは，生物資源科学やポストハーベストといった，農学部の 3 学科，すなわち生物資源学科，応用生物化学科，生物環境科学科および附属農場に属する全ての研究室が遂行しているほとんどの研究に関係があると考えられるテーマを掲げていることから，本学農学部・農学研究科が一丸となって取り組む国際交流活動として相応しいと思われる。

当シンポジウムが，本学農学部・農学研究科の国際交流をさらに進展させるための端緒のひとつとなることを願い，本報告書を終了する。

謝辞：本紀要に記した 2017 年度の農学部国際交流は，名城大学アジア研究センターのアジア研究公募型プロジェクト経費を使用して実施されたものであり，ここに深く感謝いたします。
当国際交流を実施するにあたり，本学農学部山口秀明教授から多大なご支援をいただきました。ここに深く感謝いたします。

参考文献

1）キングモンクット工科大学トンブリ校パンフレット（英語版）

書評
Book Review

Samurai Revolution

Romulus Hillsborough
Tuttle Publishing
ISBN:9784805312353
Hardcover, 608 pages
Published: 2014

2018 marks the 150th anniversary of the Meiji Restoration so it is timely to review a fairly recent book on the subject in English. The Meiji Restoration and World War II are arguably the two most important events in what could be classed as Japan's "modern period" with some scholars seeing a direct link between the two events.

Samurai Revolution: The Dawn of Modern Japan Seen Through the Eyes of the Shogun's Last Samurai by the American scholar of Japanese history, Romulus Hillsborough, is the story of the Meiji Restoration seen through the eyes of one of its major protagonists, Katsu Kaishu.

Kaishu was a leading samurai official in the Tokugawa shogunate at the time but was also close to several of the men trying to overthrow the shogun and "restore" the Emperor to a central place in Japanese politics. Kaishu's closeness to and often sympathy for men such as Saigo Takamori and Sakamoto Ryoma give his insights into the events a balanced perspective.

Hillsborough has painstakingly translated Kaishu's memoirs and uses them as the basis for his book. Born in Edo (now Tokyo) Kaishu rose to become commissioner in the Tokugawa navy after studying under Dutch naval engineers in Nagasaki. He was the captain of a Japanese warship (built by the Dutch) that sailed to the USA in 1860. He later became a negotiator between the shogunate and opposition forces and is credited with the relatively smooth transfer of power to the new Meiji government in 1868. He was later to serve in that government as a minister in the new Imperial Japanese Navy.

The book traces the complex and labyrinthine twists and turns of the end of the Tokugawa shogunate from the arrival of Perry's "Black Ships" in 1853 to the final defeat of Tokugawa diehards in Hokkaido in 1868. Kaishu's journal and memoirs (translated by the author) are quoted at length describing his thoughts and actions during this tumultuous period in Japanese history. The opening few chapters detail Kaishu's early life and upbringing in Edo, the son of a minor and poor retainer of the shogun. Kaishu spends his early youth frequenting both the fencing school and the pleasure quarters, before experiencing something of an epiphany to become a dedicated of rangaku (Dutch studies) and western military technology. His abilities in these fields led to him being afford a job in the Tokugawa civil service and later at the new Naval Academy opened in Nagasaki.

Samurai Revolution is divided into two main parts: the fall of the Tokugawa Bakufu and the Rise of Imperial Japan. Of the 37 chapters in the book, Katsu is directly and personally involved in just less than a third of them. In the other chapters he is describing the events that occurred but was not personally active in. These include the making of the alliance of Choshu, Satsuma and Tosa that would go on to defeat the Tokugawa, the actual "Restoration" of Imperial Rule in 1868 in Kyoto when the shogun Yoshinobu stood down and the Battle of Toba-Fushimi (a few kilometres outside central Kyoto) when the Tokugawa forces were decisively defeated.

Katsu comes more to the fore in the events following defeat at Toba-Fushimi when he is appointed minister of the Tokugawa army in Edo. He uses this position to basically capitulate to the advancing Imperial forces under the command of Saigo thus avoiding much unnecessary bloodshed. Ever the loyal samurai, Katsu also ensures through clever negotiation that his lord, Yoshinobu, is spared his life and honor.

Katsu's two meetings with Saigo - the so-called "Meetings of the Two Heroes" - to reach a general agreement between the two sides before Imperial forces entered Edo, are seen as Katsu's greatest achievement.

Katsu's surrender of the majority of Tokugawa forces and military material to

Saigo meant the last shogun was able to avoid execution and retire with his dignity and some of his wealth intact. Katsu had thus fulfilled his duty as a loyal samurai retainer to his master.

The book, overall, can be enjoyed by both the general leader and the specialist, though the literally hundreds of

participants in the events may become confusing after a while. Notes on sources are given on every page and there is a glossary at the end to help the reader.

Some caveats are in order, however. The title Samurai Revolution may be slightly misleading.

The Meiji Restoration was not a revolution in the way the Russian and French revolutions were in terms of class struggle. The ruling family was not slaughtered. Katsu's clever diplomacy saw to that. Tokugawa rule was ended but by men of the same social class as they overthrew – namely the samurai. Japanese historian Kawashima Shin sees the events as an "internal power struggle" as one conservative regime was overthrown by another.

All in all, though, Samurai Revolution is an excellent work of high scholarship. For those wishing to understand the Japan of today, we need to look back and reappraise those dramatic events that came to a head 150 years ago.

講演録
Lecture

北東アジアの中の日本
Japan in Northeast Asia

明石　康
名城大学アジア研究センター　名誉センター長，
Honorary Directon of MARC

名城大学アジア研究センターは名誉センター長の明石康氏（元国連事務次長）をお招きして１１月１４日、天白キャンパス共通講義棟北Ｎ１０６講義室で講演会を開催しました。今回のテーマは「北東アジアの中の日本」で、学内外から約１５０人が受講しました。講演内容の要約は次の通り。※文中の注釈は、「連続シンポジウム　日本の立ち位置を考える」（２０１３年、明石康編、株式会社岩波書店）、「カンボジアＰＫＯ日記」（２０１７年、明石康著、株式会社岩波書店）他を参照。

私は秋田県の出身で、よく言うのですが自分にとって最初の外国語は“標準語”でした。東京で大学に通っているときに下宿のおばさんに寒いので「おばさん“火”をください」と言ったつもりが、おばさんが笑い出しました。どうも私の発音では「おばさん“へ”をください」と言ったらしく非常に恥ずかしい思いをしました。とはいえ東北弁は非常に豊かな発音があり、東北弁の”い“と”え“の中間音で英語をしゃべると“It　is….”がやわらかい発音になる。また、鼻にかかった音もあるのでフランス語も話せる。しかし、“標準語”だけは話せないという。

今日は、「北東アジアの中の日本」という題をつけました。アジアは非常に広大な地域で、たとえば、中東地域とアジア地域の境界線はどこか、アフガニスタンをアジアに含めるなら隣国のパキスタンはどうか、といった問題が起こりがちです。アジアの一角である北東アジアとは、我が国をはじめ中国、韓国、北朝鮮、この４か国の他に、ロシア、モンゴリア（モンゴル）、国ではありませんが台湾、香港を含む地域と“だいたい”定義できるかと思います。“だいたい”といいますのは、本当に地理的な区別で線を引くと、この“線を引く”行為自体が一つの大きな政治問題、外交問題に発展することもあるため、慎重である必要があります。

今から 25 年前の 1993 年、ここにおられる学生の皆さんの大半が生まれる前、第二次大戦後の世界を二分した米ソ冷戦の終結（1988-1989 年）からソビエト連邦の崩壊（1991 年）、ポスト冷戦期（1991 年 ~）へと世界情勢が向かう中、カンボジアでも 20 数年続いた国内紛争が終結しました。当時、カンボジアでは４つの党派が武力に訴える、血なまぐさい内紛を続けていました。このカンボジア紛争の終結という難問が国連の安全保障理事会に持ち込まれ、国連が停戦のアンパイヤを務めることとなりました。1991 年に、フランスのパリで停戦協定（カンボジア和平パリ国際会議）がまとまり、これを機に、1992 年から 93 年にかけて、国連を代表して軍隊と警察官と民間人が約２万２千人、カンボジアへ派遣されました。私はそのトップとして（国際連合カンボジア暫定統治機構 UNTAC の国連事務総長特別代表）派遣され、1993 年に国連の監視のもとで総選挙を実施しました。一年間で準備してすべてを終えるのは無理である、明石は現地の情勢を見つつ安定した時期に選挙をすべきという慎重な声もありました。日本を含め世界中の新聞社は、国連が無理にやり通そうとしている選挙はうまくいかない、ポルポト派が武力行使でもって失敗に終わらせるだろうと予言しました。

実際にポルポト派は不気味な存在でした。ポルポト派の実勢力を推測し、諸説がたてられましたが、本当のことは誰も知らない。そういう状況の下で、国連は選挙のみならず、選挙の前提である自由な雰囲気を作り上げることに尽力しました。日本国内からトランジスターラジオを寄付してもらい、国連初の試みであった“国連放送局”が、カンボジアの津々浦々に届くよう環境を整えました。放送では、「民主主義とは何か」「自由選挙とは何か」「一票を投じるとはどういう意味があるか」を、カンボジアの人々に理解してもらうことに努めました。投票所の数も、はじめは２万ほど設置する計画でしたが、ポルポト派の攻撃の危険性があることから、最終段階では１万３千くらいに数を絞り防御に努めつつ、1993 年５月に総選挙を行いました。蓋を開けてみるまで、カンボジアの有権者の動向は誰もわかりませんでした。ともかく我々はカンボジアの人たちが、自分の一票をきちんと投票してくれることを信じながら投票所を守っておりました。

93 年５月 23 日、幸いにもカンボジアの至る所で、ポルポト派の勢力が強い村でさえも、人々が嬉々として投票

所に向かいました。女性は一番の晴れ着を着て出かけており、私はそれを見て本当に感動しました。5日間の投票日を終えて、有権者の投票率は約90%となりました。選挙の結果は、カンボジアの国王シアヌーク殿下も私もカンボジア人民党と予測していましたが、カンボジアの人たちは、王党派のフンシンペック党を第一党にしました。

民主主義の国では、一番投票数を得た政党が政権を担当します。しかし、当時のカンボジアで、軍隊と行政機関と警察を掌握する人民党の存在を無視するわけにはいきませんでした。そこで、得票数で第一党のフンシンペック党と第二党の人民党による連立政権を立ち上げることとなりました。アメリカや国連本部からは得票数で第一党になった政党が政権を取るべきという意見もありましたが、現地に駐在している各国大使たちはこぞって、名目上の第一党と実力の第二党の連立政権という考えに賛同してくれました。こうして、国連の平和維持活動（PKO:Peacekeeping Operations）の下、民主主義の新生カンボジアが誕生しました。日本も戦後、国連に加盟してから、自衛隊にとって初のPKOとなりました。このとき、日本は高田晴行警部補（文民警察官）と中田厚仁さん（国連ボランティア）という2人の殉職者を出しました。近年、カンボジアのPKO活動から25年という節目にあたって、NHKなどで（NHKスペシャル「ある文民警察官の死～カンボジアPKO　23年目の告白」2016年放送など）2人の死の意味を検証するTV番組が制作されましたので、ご覧になった方もおられるかと思います。

今年は日中平和友好条約締結の40周年に当たります。1972年に日本と中国の国交正常化が図られ、1978年に平和友好条約が結ばれました。このとき、共産党ナンバー2、実力は第一人者の鄧小平副首相が平和友好条約の批准書をもって来日しました。小柄で地味ではありますが、非常に頭の切れる、中国の将来を懸命に考えた人でした。

1978年の鄧副首相の来日は、日本にとっても非常に意味のあるものでした。この時、鄧副首相は中国の指導者としては初めて昭和天皇と会見しました。2人はお互いの政府が準備したシナリオを離れて、自分の本当の気持ちを語り合ったそうです。

日本と中国の間の困難な課題の一つとして、東シナ海の尖閣列島領有権問題があります。鄧副首相の来日中にも、記者会見でこの問題が質問されました。このとき鄧副首相は「非常に難しい。お互いが権利を主張している。ただし、これからの若い人たちが知恵を出し合えば解決できるかもしれない。我々の世代で無理やり解決しようとすると戦争になってしまうかもしれなので、これをいったん棚上げにしようではないか」と言いました。残念ながら鄧副首相の言った未来はまだ実現しておりませんが、このように妥協の可能性を考えるのは大事なことだと思います。

また、平和友好条約の覇権条項を巡って日本国内で反対する意見がありました。“覇権”英語では“hegemony”という表現が、当時、中国とソ連の対立があったことと、この条約を締結することにより日本のソ連外交に悪影響が出ることが懸念されたためです。これに対し、鄧副首相は「この覇権条項は、対ロシア、対アメリカを想定したものではない。今後、中国が日本よりも強い覇権を持ちうる国になった時、日本はこの条項を逆手にとって中国を批判することもできる。中国に対して使われる可能性もあると考えてほしい。だから、この条項は日本にとって守りになる」という趣旨の発言をしました。このように言ってのける、大した人物でした。

2010年には、中国は日本を追い越してアメリカに次ぐ世界第2位の経済大国となりました。日本と中国は2番目と3番目と順序が翻って今後、日中の関係はどうなっていくでしょうか。今年の10月に東京で、民間の立場から日中間の相互理解を深めることを目的としたフォーラムが開催されました。このフォーラムは、過去14年間にわたって北京と東京で交互に実施しているもので、政治外交、経済、安全保障、メディア、それから新たに環境とITその他のテクノロジーといった5つの分野で意見を交わしました（東京-北京フォーラム http://tokyo-beijingforum.net/）。このフォーラムで我々は率直でありながらも冷静に討議し、まだまだ語り続ける必要があるという共通の認識で別れました。このフォーラムで得た感触は、日中関係はよい方向に向かいつつあるが油断してはならないというものです。

これから北東アジア全体はどうなっていくべきか。まず、北東アジアの経済を考えてみますと、日本、中国、韓国、北朝鮮、ロシア、モンゴルが経済的な協力を現在よりも一段と高いレベルへとひき上げることができれば、この地域の平和と繁栄につながると考えます。国際競争力の点では、日本、中国、韓国がほぼトップラインに並んでおります。

2010年には、日本はGDP（Growth Domestic Product）で中国に抜かれ、2番手となりました。さらに貿易、直接投資額をみると日本の順位はもっと下ります。OECD（経済協力開発機構、Organization for Economic Co-operation and Development）加盟の36カ国中、日本とアメリカは経済力では上位にあるにもかかわらず、貿易額では日本は最下位から2番目、最下位はアメリカです。貿易・直接投資では、日本は自分のもっている総力以下の力しか示しておりません。しかし、うれしいことに旅行収支は最近、事態が改善しています。観光で来日する外国人旅行者の数は、第一位が中国、次いで韓国、台湾、香港、その後にアメリカとなります。中国での世論調査では、日本を訪ねた中国人の大半が日本によい印象、治安がよく、清潔で人が親切といった好印象をもっ

て帰国する結果が出ています。しかし、残念なことに、日本から中国や韓国に観光にいく人は昔と比べると増えてはいるものの、大きく増加傾向にはありません。日本に比べて、中国や韓国は清潔度、安全度でやや劣る印象があり、若い日本人が興味をもたないのは残念です。例えば貧しい国であっても、それぞれの国でさまざまな生き方があり、そこに自分にとって興味のあること、楽しいことを発見するのは不可能でありません。特に若い人には、たくさんの発見があると思います。

わたしは大学、高校の若者を対象とした国際交流に関わっており、毎年7月末から8月初めにかけて2週間ほど、泊まり込みで国内外の高校生と一緒に過ごします。共通言語は英語ですが、日本人学生が日本訛りの英語を使い、元気に交流する様を見てとてもうれしく思います。使う単語の数は少なくとも、一生懸命話せばお互いにかなり分かり合うことができます。マレーシアからは毎回、マハティール首相が参加しています。

ところで、彼は何歳かご存知ですか。93歳です。同じ93歳で、現役裁判官である奥さんと一緒に日本に来るのを無常の楽しみにしています。今年、彼は首相に再選されたので忙しいだろうと思っていましたが、40人以上の随員を引率して来日し、日本政府も驚いていました。

日本を訪れる外国人が増えていることは、日本経済のみならず、日本人にとってもよい刺激を与え、アジアの一員であるという意識を高める結果につながると思います。しかし、観光収入は政治や外交問題が絡むと急激に落ちることもあるため、これればかりに依存しないよう気を付ける必要があります。

日本では、高齢化と少子化が進行しています。韓国や中国でも同じ問題がおこっています。日本の場合、幸いにして今のところ仕事に従事する労働者の数はだいたい安定しています。これは一つに女性の就業者数が増えていること、次に日本人の健康寿命が長くなり働きたいというシニアが労働人口を支えていることに因ります。しかし、いずれは減っていくのは明らかで、私はできれば、日本はもっと子供を産むような社会になる必要があると思います。現在の合計特殊出生率、女性が一生の間に産む子供の数ですが、1.43%、これが2.07%、2人弱まで増えると一定した人口を保てるようになります。とはいえ、すでに出生率は減少しており、日本の人口が一億二千万まで回復するには、おおよそ50年くらいかかるだろうということです。一度減少した人口を再び元に戻すというのは極めて難しく、長い時間がかかります。フランスやスウェーデンのように人口を減らさない努力をしている先進国を参考にしつつ、自然な形で人口が少しずつ増えてほしいと思います。

最近、新聞やテレビで取り上げられる移民の問題です。日本で不足する労働力を外から補うという意見です。韓国では積極的に受け入れているが、日本は消極的、へっぴり腰の慎重さがみられます。国会では、与党と野党の間で論戦を繰り広げているが、私は長い目で見ると日本は優秀な労働力を外からも求める必要があると思います。例えば、ドイツは、名古屋市のように自動車製造業が有名ですが、フォルクスワーゲンやメルセデスベンツでは、トルコから来た移民が50~60年かけてドイツに根付き、優秀な労働者となってモノづくりに励んでいます。日本もこういった経験から学び、日本的なきめの細かさを生かしながら、外国からの移民が無理のない形で日本社会に溶け込ませ、また、移民が日本のために尽力してくれるような方策を今から考えるべきではないかと思います。

海外からの技能実習生の受入れ体制をきちんとすべきという意見はもっともだと思いますが、3~5年程度で実習を終えて自国にお帰りくださいというのは、人間的にも、社会の安定からいってもどうかという感じがします。例えば5年間、日本で働いてもらってうまく機能したのであれば更に5年延長する、ないしはもっと進めて日本国籍の取得まで考慮するなど、より外向きでダイナミックな日本を作っていかなくては、外国との対比で競争力を失ってしまうことになりかねません。将来的には移民庁のような機関も作る必要があるのではないかと思います。いつまでも現状に少し色を変えただけの弥縫策（びほうさく）でもってやっていくのは、大国日本らしくないと思います。

日本、中国、韓国、その他の北東アジアの国々はこれからもバラバラに生きていくのではなく協力し合うことが求められると思います。日中韓の3か国は北東アジア地域でも比較的発展しているグループになりますので、この日中韓が先導者になってロシア、北朝鮮、モンゴルをけん引し、地域全体をより活性化していく。具体的には、日中韓を中心としたFTA（広域自由貿易協定）、これはすでに懸案として出されており締結に向けて一層の努力をすべきだと思います。それからRCEP（Regional Comprehensive Economic Partnership 東アジア地域包括的経済連携）、これはアセアン諸国（10か国）に日本、中国、韓国、オーストラリア、ニュージーランド、インドの6か国が入る自由貿易協定として進められています。現時点でインドが少し難色を示しているようで、時間はかかりそうですが実現にむかって努力する価値は十分にあると思います。

それから地域全体のインフラ整備、アジア全体ないしは北東アジア諸国間での共同作業という課題が目の前にあります。インフラビジネスは、非常に長期的で、関係国同士の努力がいるものです。日本と中国との対立が報道されておりましたが、最近はお互いに一生懸命話し合うように雰囲気が変わってきていると思います。中国は、

アジアインフラ投資銀行 “AIIB”（Asia Infrastructure Investment Bank　2013 年中国が提唱、2015 年発足）を推進していますが、すでに日本、アメリカその他先進国が参加しているアジア開発銀行 “ADB”（Asian Development Bank）がフィリピンのマニラにあります。“ADB” の総裁は中尾さんという日本人です（中尾武彦　2013 年 ~）。中尾さんは、数十年の実績と経験・ノウハウをもった ADB と、規模は大きいが発足して 2~3 年の AIIB とが互いに補い合うような協力すれば、本当に力のある活動ができるはずだと言っています。競争ではなく協力することがアジア全体にとって有益なのは明らかで、すでにそういう方向に向かって進み始めている気配があります。私はこの動きがもっと進んでいけばと思います。

北朝鮮は北東アジアの大きな不確定要素として、我々の前に立ちふさがっております。ご承知の通り、北朝鮮は今や核戦力と長距離ミサイルを持つに至りました。北朝鮮をきちんとした国際協力の枠組みの中にいれないと、とんでもないことになるのは火を見るより明らかです。しかし、北朝鮮は、自分たちは核戦力を捨てる用意があるといい、また、アメリカを攻撃しうる長距離ミサイルも破壊する用意があると言っていますが、これを信じてよいものか。今までのところ、北朝鮮は一度した約束を翻すことが何回もありました。

トランプ米大統領と北朝鮮の若い国家主席とがお互いに美しい言葉で同意できると言っても、アメリカの専門家たちは信用していませんし、アジアの人たちも信用していないと思います。アメリカをはじめとした専門家が一番疑問視するのは査察の問題です。ほんとうに核戦力とミサイルを言葉通り破壊するかどうか、これを確認する必要があります。核戦力を全部ゼロにするというのはどういうことか。核戦力を作った科学者は存在しますから、この人たちを外国に移住させるか、殺してしまうことがなければ武器を破壊しても、彼らの頭脳が残っていれば再生産が可能です。このような悩ましい問題に我々はどう対処すればよいでしょうか。完璧な、可逆性のない検証可能な査察制度を作るという大きな宿題があります。同時にまったくできないとあきらめることも時期早尚だと思います。

北朝鮮、アメリカ、そのほか関係各国が言い争うのではなく、まずはお互いの主張のタイムテーブルを提示し、そこからどの程度シンクロナイズできるか。お互いの主張が 100% 到達する地点を共同作業で決めるのは難しいことではありますが、不可能ではないと思います。中国、ロシア、韓国からよいアドバイスが提供されるかもしれません。中国を議長とする六者協議（2003~2007 年）もかなりよい仕事をしましたが道半ばです。日本の貢献も期待もされます。日本の査察技術という点では、オーストリアのウィーンにある国際原子力機関 IAEA（International Atomic Energy Agency）の長は今、日本人が務めており、IAEA の専門家からも有益な意見が出せると思います。

また、日本の経済力も北朝鮮が貧困から脱却する上で大変重要な役割を果たしうると思います。おそらく北朝鮮も本心を明かせば日本の経済協力に対する期待は大きいと思います。しかし、日本と北朝鮮の間には、拉致その他、人権に関連する問題が横たわっております。日本は、経済支援のための現実的な要件を提示し、北朝鮮がそれをクリアしなければ日本からの経済支援は困難であると知らしめる必要があります。

日本は今後、政治力、外交力が問われる局面もあるでしょう。日本、アメリカ、中国、韓国など、関連する国々の皆が満足する形で、複雑なパズルのような課題を一つひとつ解決していくことで、北東アジアが本当の平和を築くことができ、繁栄するアジア地域へと向かうことができます。名城大学で学んでおられる皆さんの一人ひとりが、より幅広く大事な仕事に従事できるような、そういうアジア地域が創生される日が来ると思います。決して夢物語ではない一方で、かならずやそういう世界が実現される確信もありません。対国家、対国内、対個人、いずれの関係も長い時間をかけて築きあげた信頼の上に成り立ちます。しかし、信頼は脆く壊れやすいものです。これを少しくらいでは壊せないものにするには、気の遠くなるようなプロセスを経る必要がありますが、それは、一足飛びに戦争に訴えて全ての問題解決を図るよりも、より現実的な、地味ではあるがやりがいのある仕事だと考えます。

質疑応答

Q 明石先生は長く国連の事務次長を務められましたが、事務次長とはどのようなものでしょうか。

1979 年に広報担当の事務次長になりまして、それから 18 年間、事務次長の資格で様々な仕事をやりました。国際公務員の資格で仕事をしますので、日本国籍はずっと持ち続けておりますが、日本の政治に関わることはできません。しかも私はニューヨークの国連本部を中心に仕事をしてきましたので、日本で選挙権を行使することもしておりませんでした。帰国してから日本国市民として行動しております。

Q 日本は国際社会の一員として、国連と今後どのような関わり方をすべきでしょうか。

ご承知のとおり、国連の安保理の常任理事国は 5 か国

あります。アメリカ、中国、ロシア、イギリスとフランスです。日本よりもGDPが低く、通常の軍事力においても日本ほどでないイギリスとフランスが常任理事国であるのは納得がいかないという人もおりますが、17~18世紀にかけて、フランスはアフリカ大陸で、イギリスはアジア大陸において巨大な植民地帝国を築きました。そのときに蓄えた知識と見識が安保理事会で物を言っていると思います。2005年に日本とインドとドイツ、ブラジル4か国が共同で、安保理の新しい常任理事国になるべく強烈な運動をしました。支持してくれる国もありましたが、とくに中国とアメリカが反対にまわり実現しませんでした。

近年、日本にとって一番大事なことは常任理事国入りよりも、途切れず安保理事会の審議に参加できることですので、それが実現できれば拒否権は不要と考える向きもあります。そういう新しいカテゴリーのメンバーを安保理に作るという動きもあり、このアイデアに賛同する国は、先の日本・インド・ブラジルの共同提案国よりも多いかもしれません。こういった新しい発想で提案し続け、日本らしい真面目で建設的な国連参加の仕方を続けていけば、事態は変化するかもしれません。私は率直に申し上げて、日本が南スーダンの国連平和維持活動に参加しつつも事態が深刻になったからと撤収してしまったのは非常に残念だと思います。日本には憲法9条がありますが、国連のPKOに参加することと戦争に参加することは違います。むしろ、戦争にならないように平和を確保し、紛争地帯で困窮する人たちをさまざまな形で助けることがPKOです。自衛隊が国連のためにする活動と戦争とを混同するのではなく、国民の一人ひとりがPKO活動に対する正しい理解をもって行動してほしいと思います。私は、自衛隊を軍と認めて、国連旗のもとにPKOへ参加するのがなぜ悪いのかという感じがします。これについては、国民全体が議論しあい、日本にとってもアジアにとっても、また、世界の国々にも祝福される形を見つける必要があります。

Q ヒトの仕事がAIに置き換えられ雇用の在り方も多様化しています。この現状をどのように考えますか。

おっしゃる通り、日本には終身雇用と年功序列という、世界に注目される制度があったわけですが、いろんな形で崩れつつあると言えます。今の若い人たち、これから学校を卒業していく人たちは本当に一生同じ職場で働き続けるのか、みなさんの意思と意向は分かれてくると思います。今の若い人たちは、インターンシップ等で、学生でありながらも、よりダイナミックで複雑な社会経験、経済活動に参加する機会が今後ますます増えていくと思います。

最近、AIについて研究している科学者と哲学者から話を聞く機会がありました。結論から申し上げますと、私は哲学者の話に興味を持ちました。AIがいかに複雑になり、人間の処理能力をはるかに超えていこうとも、それを作り、使うのは人間であると思います。AIを新しい可能性をもたらすものとして前向きにとらえ、より豊かな生活を送るための一つの手段として活用していくことが肝要と思います。

「名城アジア研究」
投稿規則

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名城大学アジア研究センター

発行日／2019年3月31日
編集・発行／名城大学アジア研究センター

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Meijo Asian Research Center

Meijo University, JAPAN

Date of issue / March 31, 2019
Edit / Meijo Asian Research Center

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Meijo Asian Research Journal

2019.03
VOL.9 NO.1

名城大学