

Infection status of COVID-19 in Japan and utilization of vaccine passport for overseas travel

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Abstract

In Japan, people infected with the new corona-virus were recognized for the first time in January 2020, the number of infected people increased, and a state of emergency was issued in April. Event-holding was limited and business hours were also shortened due to the state, and restaurant opening hours were also restricted at the same time. Economic activity was greatly affected focusing on the service industry. This infectious disease pandemic is a kind of disaster and tourism related companies, including transportation and restaurants, are being mostly affected. The number of foreign tourists visiting Japan (inbound tourists) decreased drastically after the outbreak of the infectious disease and domestic tourists were also on the decline. The following measures are required to turn the economy around as soon as possible as a game change, namely: deregulating overseas travel, participation in an event, and eating out for vaccinated persons while avoiding the risk of infection. In this paper, the decrease of inbound tourists and economic conditions due to the COVID-19 pandemic are verified, and a travel process combined with PCR tests for vaccinated persons is proposed to relax overseas travel regulations.

Keywords

COVID-19, overseas travel, inbound, PCR test, vaccine passport

1. Introduction

In Japan, people infected with the new corona-virus (COVID-19; corona-virus disease 2019) were identified for the first time in January 2020. The sense of crisis in Japan was not high at that point, and there was an easy prediction that it would disappear to some extent in the warmer summer. It rapidly spread all over the country in April after that, and the pandemic of COVID-19 was recognized as a first wave and the medical system became stretched. The government issued the first “state of emergency” at that time. The characteristics of COVID-19 were not known, and the public tended to comply with the declaration to avoid infection as they had some kind of anxiety. The fifth wave began from around July 2021, and the fourth state of emergency was issued in Tokyo. Tokyo citizens became too familiar with the declaration and they developed a low sense of anxiety for the crisis. The number of infected people reached about 1460,000, and the death toll reached 16,000 within Japan at the end of August.

Private consumption is declining every time an emergency declaration is issued. The real gross domestic product (GDP) fell into negative growth (about -4.6 % compared with the previous year) in 2020. Private consumption accounts for about 60 % of GDP in Japan and the decline is large [Kinoshita et al., 2021]. In particular, the service industry has fallen sharply due to refraining from eating out and traveling. Railroad and aviation companies are in a difficult situation due to traveling restrictions and have officially announced a large deficit [NHK,

2021]. Those companies are a kind of service industry and relate to tourism. If the government of Japan cannot propose an individual outing plan (including overseas travel and visitors to Japan), the reconstruction of the economy will be significantly delayed compared with other countries. Regulating going out, eating out, and watching sports, etc. is to prevent infection due to contact with humans. If there is a way to reduce the infection, going out restrictions will be relaxed and economic activities will also recover. The keys to the recovery are diagnostics, vaccines and remedies. Vaccination is a key measure at the present stage. When vaccination progresses and the number of newly infected people decreases, the medical system will be relieved and the economy will turn around rapidly.

Some industries are achieving some profit under the COVID-19 pandemic. They are companies such as home appliances, video distribution and home delivery. Exports of automobile-related companies are increasing and profits are also generated, and those help the GDP to recover. However the performance of many companies, including passenger transport and theme parks, have deteriorated according to the decrease in personal consumption. It is desired that people go out to events such as watching sports and eating out as the same as before COVID-19 occurred. Especially, the resumption of global exchange needs to be considered immediately, which also contributes to the recovery of the world economy. Building an ‘overseas travel system’ becomes a key point at this time, which can be accepted by countries around the world. The foundation of the system is the ‘vaccine passport’ which is a certificate that a person who has been vaccinated can receive [Kohsaka, 2021]. A passport holder can travel abroad and participate in an event under relaxed restrictions, in addition the person can eat out

and socialize freely.

The transition of infected people in Japan and inbound trends are indicated in this paper to understand the impact of COVID-19. An overseas travel process is proposed to resume and promote international exchange for vaccine passport holders.

2. Transition of infected persons in Japan

A person infected with COVID-19 was identified for the first time on January 16, 2020 in Japan (Announced by the Ministry of Health, Labor and Welfare). The number of infected people increased after that, and people experienced the following increase and decrease as a wave, namely the 1st wave (from around the end of April), 2nd wave (July), 3rd wave (November), 4th wave (around March 2021) and 5th wave (July). The number of severely infected people increased and the medical system was under severe conditions in each wave. The cumulative number of COVID-19 infected people is shown in Figure 1

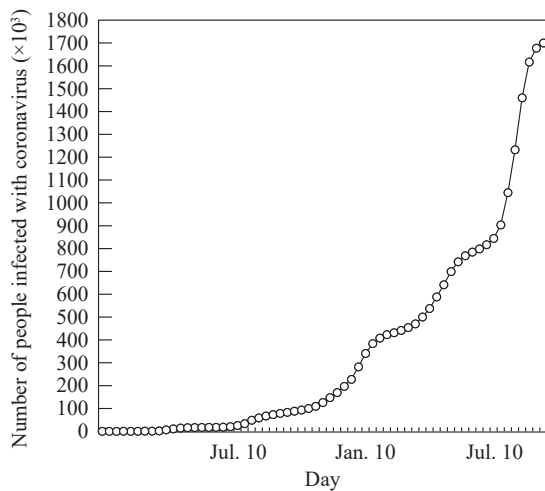


Figure 1: Cumulative number of COVID-19 infected people in Japan

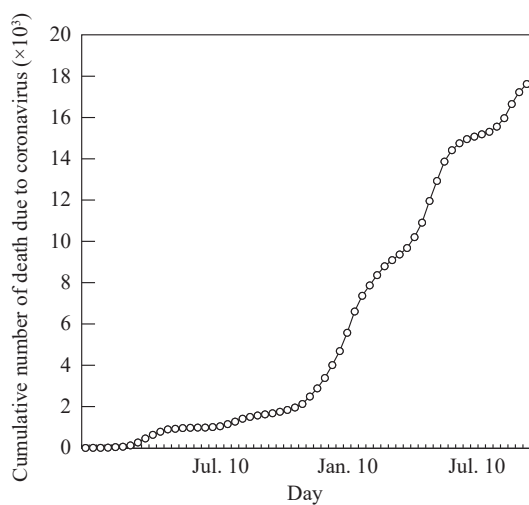


Figure 2: Cumulative number of death toll in Japan due to COVID-19

1 based on the data released by the Ministry of Health, Labor and Welfare [Ministry of Health, Labour and Welfare, 2021], and the cumulative death toll is indicated in Figure 2 which is plotted almost every 10 days. These figures show similar trends and the correlation coefficient is about 0.90. Although the characteristic for infected people increases after July 2021, the one for death toll has a tendency to saturate due to the progress of vaccination for the elderly. The characteristic of death toll is about 10 days behind the one for the number of infected people. Detailed trends should be calculated for each wave. The percentage of infected people summarized by age group indicated the following trends (aggregated by the Ministry of Health, Labor and Welfare), namely most is their 20s (25 %), the next are 30s (15 %) and 40s (15 %). The younger generation, who are active, has a high infection rate. When an infectious disease occurs, it is essential to develop a therapeutic drug, vaccination and diagnostic drug under the guidance of the country from the point of view of security. The development process should be systematized.

For countries of the world to overcome COVID-19, regaining daily life and economic activity must be resumed urgently. The following policies have been adopted as an infection control measure in Japan, namely: ventilation, avoid the Three Cs (closed spaces, crowded places and close-contact settings), hand sanitizer, and keeping a physical distance from people (1.5 to 2 m). Although many people have been wearing a mask and acting in compliance with these measures, the spread of the infection has not been stopped. They experienced the 5th wave as of the end of July 2021. Although the theory ‘The Hammer and the Dance’, which was advocated by Mr. Tomas Pueyo living in the U.S.A. was adopted, there is no prospect of an end to COVID-19 [Kunii, 2020]. Therapeutic medication specialized for COVID-19 is not yet approved and there are three types of approved vaccines in Japan (as of August 2021). A fever or anaphylaxis may develop as side reactions from vaccination [Imai *et al.*, 2013].

3. Impact on GDP

Private consumption in each country is sluggish and the world economy has been severely damaged due to the global pandemic of COVID-19. Economic recovery is depending on the vaccine development corresponding to the mutant strain and its vaccination rate in the present circumstances. In Japan, private consumption accounts for about 60 % of the real gross domestic product (GDP). The consumption for various services, such as eating out and travel, has dropped significantly due to the decrease. There are some signs of a recovery in some digital and manufacturing industries related to the lifestyle of refraining from going out (ex. nesting). A change for a better human life is required to improve productivity with DX (digital transformation) and maintain economic growth. Now is the chance to make DX [Financial System, 2021].

The UN DESA (Department of Economic and Social Affairs) announced that the global economic growth rate (real

Table 1: Real GDP growth rate of each country in 2021

| Country | Growth rate (%) |
|---------|-----------------|
| U.S.A. | 6.2 |
| China | 8.2 |
| EU | 4.1 |
| India | 7.5 |
| Japan | 3.3 |
| Russia | 3.0 |

GDP growth rate) for the previous year in 2021 will be 5.4 % (on May 11th). The value for 2022 is forecast to be 4.1 %. The reason can be said as follows: COVID-19 vaccination rate rapidly increases in many countries including the United States, China and the United Kingdom, and the economic activity becomes more active. The forecast of the real GDP growth rate of each country is explained in Table 1. China’s growth is remarkable. China’s economic scale has reached about 70 % of the United States and it is estimated to overtake the United States in 2028 (announced by the Centre for Economics and Business Research: an organization in the U.K. that studies business, economics, and politics). It is considered that various national power enhancement measures are adopted with an eye to the future in China, for example structural reforms and excessive debt reduction after COVID-19.

4. Foreign tourists to Japan

Foreign tourists to Japan (inbounds) have dramatically decreased due to the global COVID-19 pandemic. Most Olympic Games events were postponed to 2021 due to the pandemic, though Japan had been preparing for the events. Japan had some goals in 2020. One of them was 40 million foreign tourists to Japan. However the number remained at about 4.116 million (87.1 % decrease from the previous year) due to the postponement. The number of foreign visitors to Japan by country/region in 2020 is indicated in Figure 3. Greater China

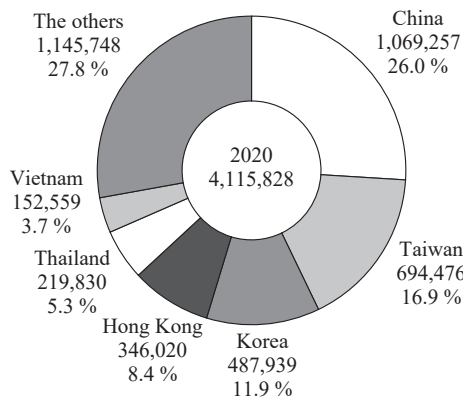


Figure 3: Number of foreign visitors to Japan by country/region in 2020

Note: Mainland China, Taiwan and Hong Kong are statistically distinguished in the paper.

(China, Taiwan, Hong Kong etc.) occupies more than 50 %. It is necessary to continue to consider the exchanging measures with Greater China.

Although the Olympic Games were held in 2021, foreign visitors were restricted and the number of foreign participants was small. The number of inbounds until 2020 is shown in Figure 4. It shows a steadily increasing trend after 2010 and decreases significantly in 2020. The characteristics for the top three countries/regions (China, South Korea and Taiwan), which have many visitors to Japan, is shown in Figure 5. Though the number of visitors from China was growing steadily in recent years, it also decreased in 2020. The monthly characteristic for inbound tourists in 2020 is indicated in Figure 6. It decreases significantly after January in which COVID-19 infected persons were recognized for the first time, and a slight upward trend is observed in the second half. Inbound travel spending in 2019 is estimated at about 4.8 trillion yen (production spillover effect is about 7.8 trillion yen) and it occupies less than 1 % of Japan’s GDP. A significant drop in inbounds is becoming a big damage for tourism-related companies. The number of tourists visiting Japan and their travel consumption in 2019 and 2020 are explained in Table 2, which data was announced by JNTO

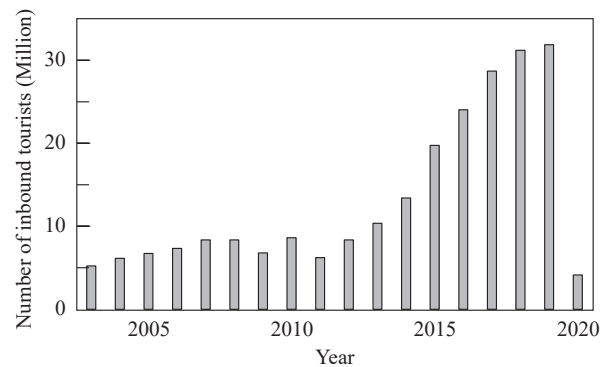


Figure 4: Transition of inbound tourists to Japan

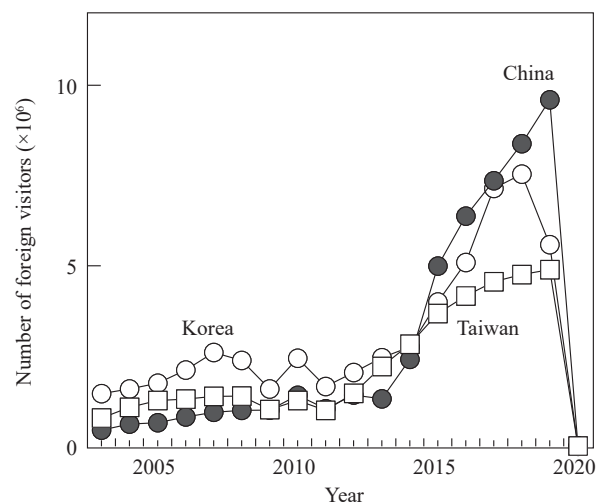


Figure 5: Characteristics of visitors from China, South Korea and Taiwan

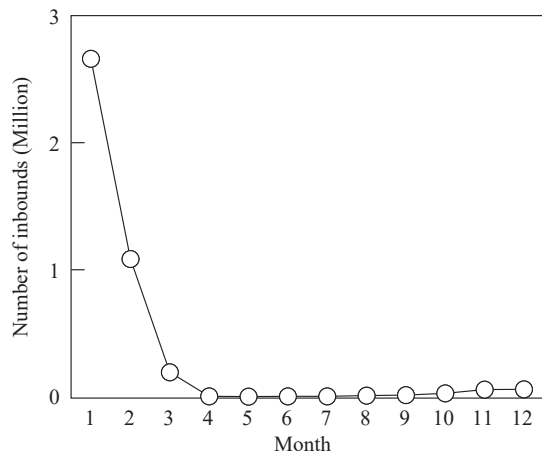


Figure 6: Transition of inbound number in 2020

Table 2: Comparison of travel spending and number of visitors to Japan in 2019 and 2020

| | 2019 | 2020 |
|-----------------------------------------------------|-------|-------|
| Number of tourists visiting Japan ($\times 10^6$) | 31.88 | 4.16 |
| Travel consumption ($\times 10^6$) | 4.8 | 0.745 |

(Japan National Tourism Organization). Per capita consumption in 2019 was about 150,000 yen and the one in 2020 was 181,000 which increased by about 21 %.

The country having the most visitors to Japan is China, and the trend for the visitors must be watched. China is a neighbor of Japan and these countries have strong ties, especially in the business field. Private exchanges including travel are also active. It is necessary to construct some new exchanging strategies by understanding the characteristics in advance when the COVID-19 situation has calmed down. The percentage of visitors from mainland China is about 26 % of the total, the one for Taiwan is 17 %, and 12 % for South Korea. These three countries/regions occupied 55 % of the total. The percentages for sightseeing, business and others are explained by countries and regions in Figure 7. There are many tourists (93 %) from Tai-

wan and the percentages from mainland China and South Korea are about 80%. There are many visitors from South Korea who wish business ties, that is, the financial ties are strong between the countries. The number of citizen visitors from China is increasing in recent years. It is thought that the percentage of citizen visitors will increase when the relationship between the nations is good. On the other hand, citizen travelers will decrease when there are political issues between the nations. The ratio of travelers maintained a value above 80 % in recent years and it reached 80 % in 2019, namely it can be said that the relationship between Japan and China is in a mature stage. Many citizens will take tourism action when the economic situation improves and they have leisure time and enough money, and they show an interest in the culture and nature of other countries. The percentage of citizen tourists can be regarded as a kind of relationship degree. It increases by solving international problems (issues between two countries). Citizen exchange is a basic element to know and understand two countries (especially neighbor countries).

5. Vaccination

Japan gave the first COVID-19 vaccines to health care workers in May 2021 and then to the elderly, and then to general citizens. Baseball-fields and large commercial facilities as mass vaccination venues are provided by the Japanese government, of course, medical institutions are also venues. This measure gives the people more options to receive the vaccine and group vaccination speeds up. However, a problem remains, namely it is difficult to understand the names of vaccinated persons, the venue (including date and time), and vaccine type. It is efficient when a system can identify the individual and vaccinated record using an ‘identity card’ (My Number Card which is issued by the Japanese government). The card penetration is still less than 40% in Japan, therefore it is difficult to manage vaccination using the card. There is a ‘vaccination record system’ (VRS) in which the record is managed by municipalities, however it takes time to register (sometimes 2-3 months). Moreover, it is difficult to understand the record when the person has moved location.

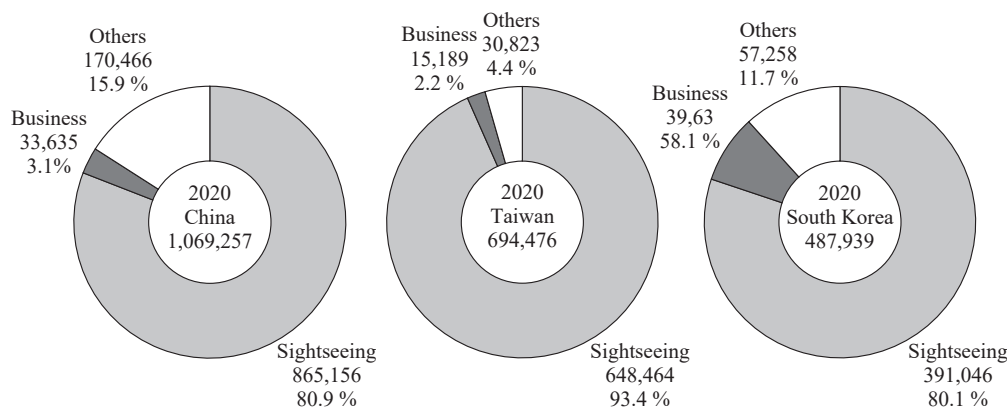


Figure 7: Percentage by field for inbounds from top three country/region in 2020

It is essential to centralize the management of the vaccination status and personal identification when an infectious disease occurs, while paying sufficient attention to leakage of personal information. It is an urgent problem to construct the system in managing vaccination records using a My Number Card from the view point of security. It can expand the range of card utilization when the card issuance rate becomes high. The card can also be used as a health insurance card and administrative service when the card issuance rate improves. Naturally it is easy to issue a vaccination passport. The card forms the basis of the Japanese version DX.

6. Vaccine passport and overseas travel

Although the world economy suffered great damage due to COVID-19, it has been gradually recovering due to improving vaccination. It is important to accelerate the recovery immediately. Economic recovery is slow and feared because vaccinations are slow in Japan. It is also a worry that the relative economic power will continue declining internationally from now on. It is necessary to introduce a new certificate (Vaccine Passport) which can be used for overseas travel and event participation, and the economy can be recovered by the movement of people. It is given to vaccinated persons by the resident municipality. It started to be issued for overseas travel from July 2021. The valid countries of the passport were as follows at that time: Italy, Australia, Turkey, Bulgaria, and Poland (only five countries). Each country's passport should be standardized in the future. Japan will lag behind international exchange if it cannot increase the valid countries, and it will become isolated.

Some variants for COVID-19 have been detected [National Institute of Infectious Diseases, 2021]. The effectiveness of the adopted vaccines to the variants has been published and vaccination is most effective for infection control at present. It is strongly urged to resume international exchange due to introducing the passport globally. Although the risk of infection could not become zero even if most persons are vaccinated, there is an announcement that the risk can be reduced by 90 % or more by vaccination, and it is also considerably effective for mutant strains (Yokohama City University) [Ryo et al., 2021]. Therefore it is desirable for passport holders to visit each other by using the following tests appropriately.

- PCR test
- Antigen test
- Antibody test

An example of a relatively strict test system for overseas travel is proposed in Figure 8. Although the PCR (Polymerase Chain Reaction) test is adopted in steps (2) to (5), the steps can be replaced with the antigen test or simply omitted [Ikuse et al., 2021]. The process may be partially changed depending on the situation. It is required to inspect twice within 96 hours without isolation before leaving a country in step (2). One inspection is required in steps (3) and (4). Two inspections are

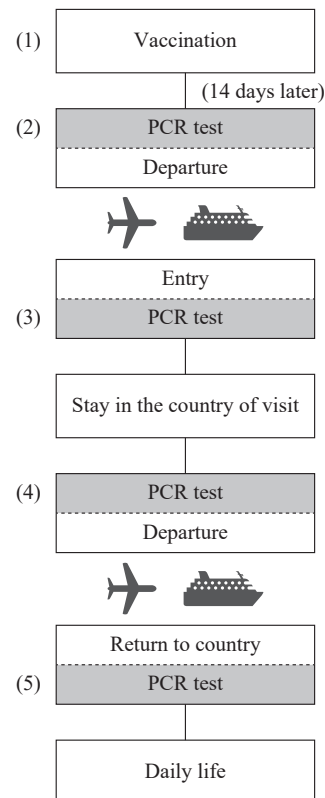


Figure 8: Overseas travel by issuing the vaccine passport

adopted in step (5). In any case, there is not an inspection with 100 % accuracy or zero risk test. It is better to arrange the process as needed (outbreak of mutant strain and epidemic situation). Basically, the process does not require quarantine at the time of departure/return by mutually approving the effective inspection system.

7. Conclusion

Not only the Japanese economy but also the world economy is suffering great damage by COVID-19 infection. Prevention of infection spread depends on whether the herd immunity is established. Although vaccination is most effective for herd immunity at present, the infection risk does not become zero. An inspection system should be established after vaccination to the public. When herd immunity is established, the lifestyle before COVID-19 will be constructed again. Naturally, overseas travel will be relaxed and the world economy will also recover. This recovery cannot be achieved by one country alone. The certification of the vaccine produced in each country and the issuance of a vaccine passport due to international cooperation is essential. COVAX (COVID-19 Vaccine Global Access Facility) will play an important role.

In this paper the necessity of a vaccine passport is described from the view point of the economic situation in Japan. Some effective measures to improve economic loss are expected immediately and a relative rate of economic recovery must be increased. New systems and processes must be developed for this reason and it is necessary to rebuild the domestic economy,

naturally it is also necessary to establish infectious disease control and promote international exchange.

Acknowledgments

We received useful comments from Prof. Hiroshi Ichimura (Kanazawa University, Graduate School of Medicine) in creating the overseas travel process. He is an advisor of the Infectious Disease Control Headquarters Meeting in Ishikawa Prefecture. We deeply appreciate Prof. Ichimura for his comments.

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(Received September 15, 2021; accepted October 7, 2021)