The Impact and Future of the Railways on a New Society Brought by COVID-19

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1. Introduction

In 2020, as the COVID-19 pandemic spread, people in cities and regions around the world were asked or ordered to stay at home under lockdowns. As a result, people's attitudes have changed and they now voluntarily refrain from going out when it is not essential, causing a great change in the situation for Japan's railway business. Japanese companies have been promoting teleworking and so the revenues of railway companies may fall dramatically. Development around stations, the operation of station shops, leisure, and sightseeing are based on the premise that passengers go places, and so these functions have also been severely affected. Various measures to solve these issues have been considered, such as leveling of transportation, dynamic pricing to encourage people to avoid crowding, and unattended stations.

In addition, efforts to achieve the UN's sustainable development goals (SDGs) are also important for the railway business in the future.

Mitsubishi Electric Corporation's Integrated Design Center has long been thinking about foresight and the future. Changes wrought by the COVID-19 pandemic are overturning what had been taken for granted. Therefore, we considered the future of Japan and how railway transportation should be in a new society brought about by the COVID-19 disaster, and perspectives to be taken into account.

2. Perspectives on Changes in Society

2.1 Approach to the future

Mitsubishi Electric Corporation's Integrated Design Center has been thinking about the future and the target for various stakeholders related to the business. One specific measure is foresight, which refers to creating a time line for possible actions in the future to bring new perspectives to research and development. It aims to stimulate discussion and make it constructive by sharing organized and analyzed information on the external environment in and outside companies. In this study, because common practice has been changing, a single future that was envisioned based on hypotheses from the existing perspective (inside out) is used, and was not created based on hypotheses from unexpected social changes (outside in) (Fig. 1).

2.2 Micro and macro perspectives

Changes in society are considered from both the micro and macro perspectives (Fig. 2).

From the micro perspective, changes in people's awareness and sense of values are viewed; from the macro perspective, infrastructure and other social systems are viewed. Understanding changes in society from both the micro and macro perspectives may facilitate discussion considering individuals and society.
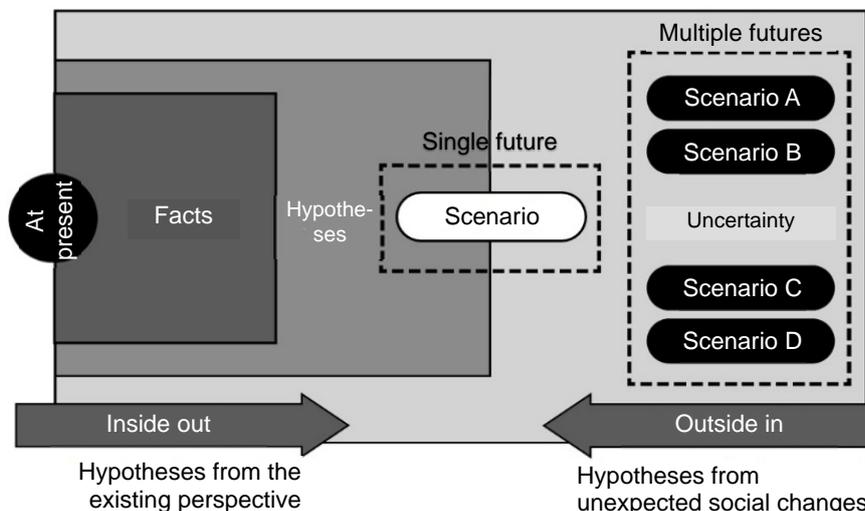

Fig. 1 Foresight and future scenarios

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3. Influence on Railways in a New Society and Perspectives to Be Considered

3.1 Recognition from foresight of mobility

Even before the COVID-19 disaster, the Integrated Design Center had been making foresight scenarios for the four sectors of life, industry, infrastructure, and mobility in Japan. The subject of the scenarios is society, and not our company. The micro and macro perspectives are plotted on the vertical axis and time on the horizontal axis.

Railways are included in the foresight scenario for mobility, which is one of the four sectors (Fig. 3). Therefore, based on recognition on the future obtained from this foresight scenario, the influence on railways in a new society and perspectives to be considered were studied.

3.1.1 Recognition when viewed from humans

Based on the foresight of mobility, we focused and considered the values of people brought about by the COVID-19 pandemic. Figure 4 summarizes what people used to take for granted before the pandemic and what people may take for granted from now on. Currently, the situation is extreme: it has suddenly become difficult for people to do what they used to take for granted (before the pandemic) (Fig. 4 (1)). In the future, people may

recognize and select what they truly need and what is not so important, and they may review their values (Fig. 4 (2)). In addition, people may try and fail to build a new lifestyle, which may lead to various new alternatives. As a result, people may naturally select various matters as they like (e.g., where they work) (Fig. 4 (3)). In such a society, conventional routine travel such as commuting and going to school may decrease, and the main purpose of travel may change to doing activities that can be experienced only at certain places.

3.1.2 Recognition when viewed from society

One factor that may have a serious influence when viewed from society is the acceleration of digital society. It may become the norm to use the Internet to do things wherever possible because people's awareness has been changing due to the pandemic. If people need to travel in the real world, it may be necessary to do so in private spaces considering the risk of infection.

3.2 Influence on railways in a new society

Figure 5 shows influences on the railways in the future based on the recognition from foresight.

In Japan, there was concern that services in cities may become unsustainable due to the decrease and aging of the population. Railway companies and
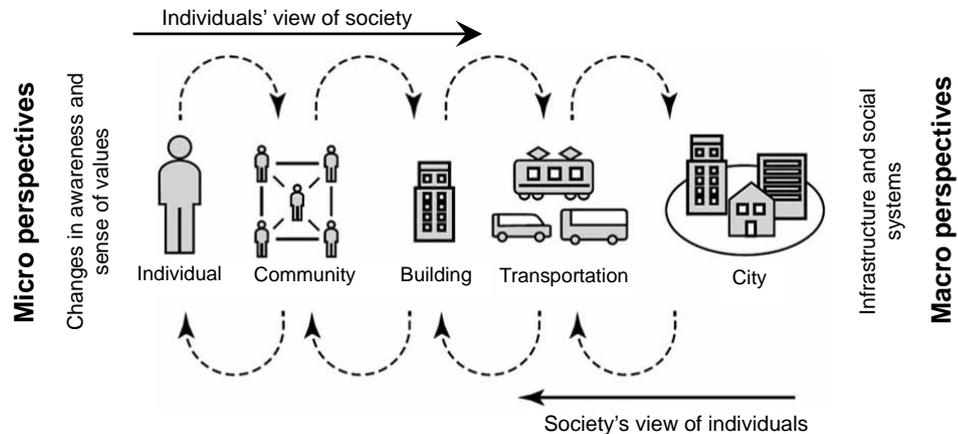

Fig. 2 Micro and macro perspectives

Fig. 3 Mobility Foresights

governments have therefore been working to create "cities along train lines" that bring together near stations as transportation hubs the functions needed for living, such as welfare, parenting support, and shopping. In view of such projects, Mitsubishi Electric has been considering stations and smart cities. Taking the various changes brought by the pandemic as an opportunity, the company focused on two perspectives: changes to the relationship with railways (Fig. 5 (1)) and reconsideration of roles in an area (Fig. 5 (2)). The term "roles in an area" refers to the roles of railways in an area as a transportation means for residents in daily life; "roles outside the area" refers to the roles of railways for exchanges with neighboring areas.

Fig. 4 The effects of COVID-19 on human lifestyles

Fig. 5 The future of railways

Till now — Station as part of transportation means

The main role of a station is to provide transportation means with the transportation hub as the central point

Transportation means

Mail services
Day nursery
Hospital
Shopping
Public office

Improvement of the efficiency as transportation means

Viewed from humans
Reduction of travel distance and cost

From now on — Station as destination

Ultra-compact city to be formed mainly by railway enterprise(s) by leveraging the location as a transportation hub

Transportation means

Mail services
Day nursery
Hospital
Shopping
Public office

Leveling of entire transportation
Efficient provision and management of various services

Rationalization of travel in the area
Viewed from society
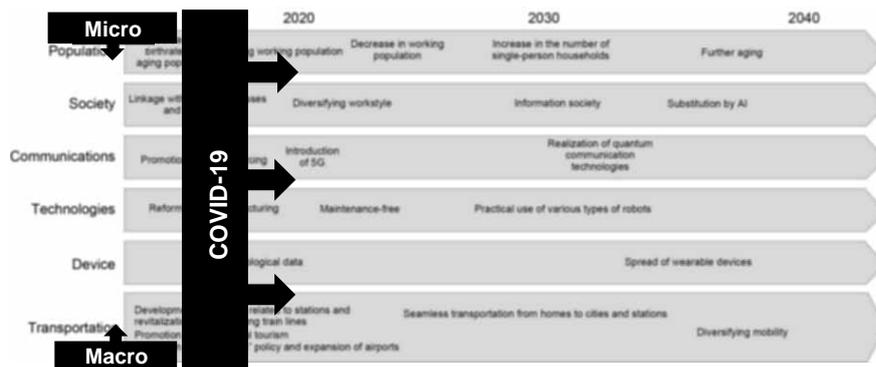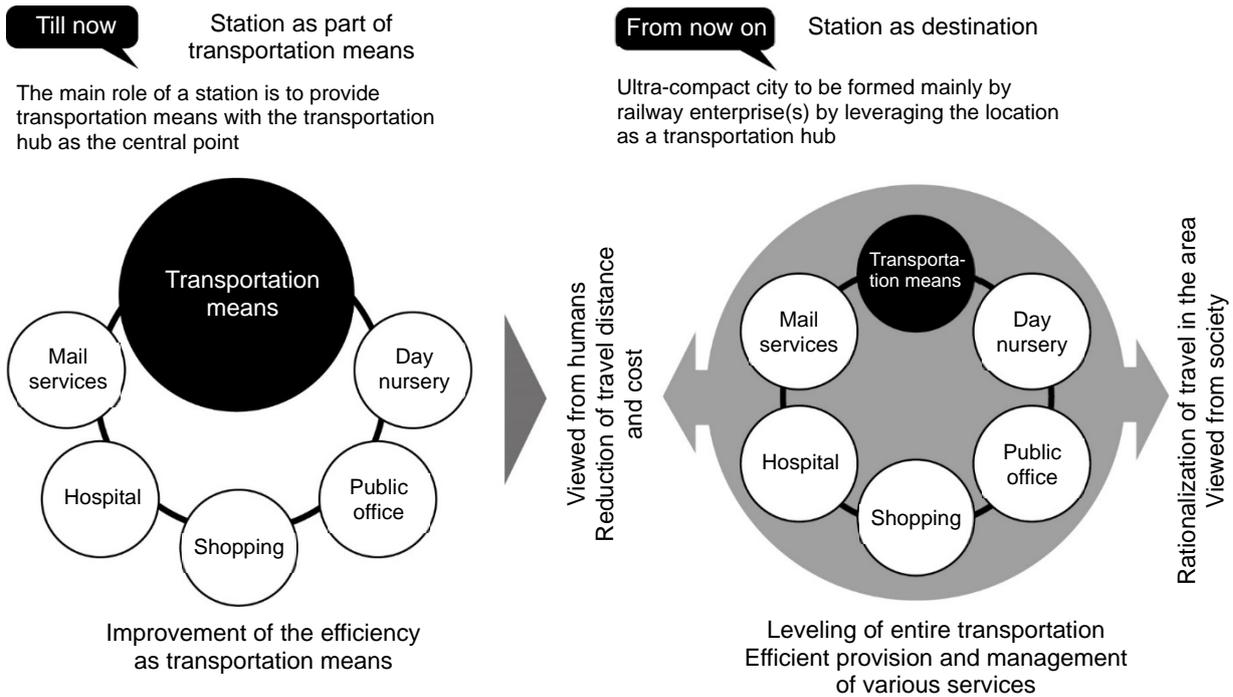
Fig. 6 The past and future of stations

Regarding the "changes to the relationship" (as a perspective), although railways in the past had strong relationships with various places (destinations), the relationship may be stronger or weaker due to a decrease in routine travel. For example, the relationship with offices may weaken due to an increase in teleworking; on the contrary, the relationship with tourist sites where people can experience the unusual may become stronger. Regarding "reconsideration of roles in an area" (as a perspective), people living along train lines and in the neighborhood may need to reconsider their values due to decreases in the purposes of travel and travel opportunities. Improving services in the area based on these perspectives and overlooking it again including the outside may reveal what the sustainable public transportation that has taken hold in the area should be.

3.2.1 Railways for a new society

As noted, strengthened or weakened relationships may accelerate various changes, such as making small stations unattended, medium-scale stations specific for sightseeing, and stations that have civic functions in an integrated way including public services, as already discussed. With advanced stations like these examples, ultra-compact cities may be formed mainly by railway enterprises by leveraging the locations as transportation hubs (Fig. 6). If stations have these roles, it turns them into places where people can access public services and various other services while serving as transportation hubs; and stations also become destinations in themselves. As a result, in addition to passengers for the

purpose of travel, people with other purposes may come to stations and the roles of station staff may also change.

3.2.2 Perspectives to focus on

Based on perspectives that railway enterprises should focus on after the pandemic, they may need to change their services from providing conventional, uniform services by regarding all passengers as groups, to providing services in consideration of the preferences, feelings, and locations of individuals. Briefly, the center of such perspectives is humans. However, it may be difficult for railway enterprises, which have focused on mass transportation, to adopt such perspectives. In a new society, unconventional demands become strong. For example, routine travel, such as commuting and going to school, may decrease, whereas demand for travel in comfortable private spaces may grow. This new society should be viewed as a chance, not as a crisis.

4. Conclusion

This study reviewed potential future scenarios, and how the COVID-19 pandemic may affect society, and what may or may not change. It also identified the course of action to aim for and the perspectives to focus on. Although they may not be exactly new perspectives, their importance may increase due to the issues facing sustainable railways in the future and the acceleration of a digital society, driven by the pandemic and new lifestyles.

Mitsubishi Electric will continue considering the future of railways that have developed in line with cities, while focusing on the SDGs.