

# Transforming Rural Mobility with MaaS

WHITE PAPER  
APRIL 2021



# Contents

Executive summary	3
1 The growing importance of ensuring sustainable mobility	4
1.1 Trends in rural mobility around the world	4
1.2 MaaS trends around the world	5
1.3 MaaS in Japan	6
2 Challenges in rural areas of Japan and regional archetypes	7
2.1 Regional archetypes and research examples	7
2.2 Common issues and KSF from case studies	10
3 Challenges and successes in implementing MaaS in the region	13
3.1 Overview of the model being deployed nationwide	13
3.2 The key to implementing MaaS in the region	14
3.3 Methodology and usefulness of multiregional deployment	15
4 Future developments in MaaS – more than just mobility	16
4.1 Trends in Japan	16
4.2 Global trends	17
4.3 COVID-19 and the effect on people's lifestyles	18
Conclusion: MaaS and the transformation of rural mobility	20
Contributors	21
Acknowledgements	22
Endnotes	23

# Executive summary

Reforming the existing model of rural mobility will improve older people's quality of life and energize rural economies.

## MaaS as a solution to difficulties in rural mobility

In rural areas, securing access to modes of transport other than private cars is a common challenge. Part of the issue is profitability, with 85% of rural bus operators running below break-even point. This is further compounded by a population that is both declining in numbers and ageing. As the difference between healthy life expectancy and average life expectancy increases worldwide, it is time to reform the existing model of rural mobility, which is predominantly based on private cars. The MaaS (mobility as a service) businesses that have emerged in Europe and the US over the past few years were born out of this necessity – and have achieved a certain level of success with public transport users.

On the other hand, the relatively low numbers of users and thus the sustainability of the business model are issues that MaaS needs to overcome.

In Japan, there are more than 80 MaaS businesses, with some services showing signs of improvement in terms of their number of users and profitability. In addition, 80% of Japanese MaaS businesses operate in rural areas. This means that the lessons learned and techniques adopted in Japan can act as guidelines for other countries considering the implementation of similar rural-based MaaS projects in the future.

## Common challenges and key success factors for MaaS

The World Economic Forum has identified common challenges and success factors for MaaS in each regional category with the aim of supporting local government and related enterprises to transform local mobility. Through the use of case studies and interviews with MaaS providers, the Forum has also identified how these key success factors (KSFs) are implemented. The findings will serve as a checklist for future MaaS providers to build a business model customized to their region, as well as helping those

already operating MaaS businesses to identify areas for improvement. Cooperation with existing transport companies and local governments is vital in implementing the appropriate business model in the respective regions. Furthermore, an analysis was conducted of the challenges and success factors for implementation based on case studies of companies that have introduced the same model in more than 10 regions.

## Future rural mobility development in light of recent trends

In the last section of the report, the impact of the COVID-19 pandemic on mobility services is discussed and mobility trends in Japan and elsewhere are reviewed. For example, some

countries have begun to look at mobility services as a means of tackling gender disparities, which suggests the need to incorporate these trends in future regional mobility services.

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# The growing importance of ensuring sustainable mobility

Providing a sustainable transport system can reduce the gap between healthy life expectancy and average life expectancy.

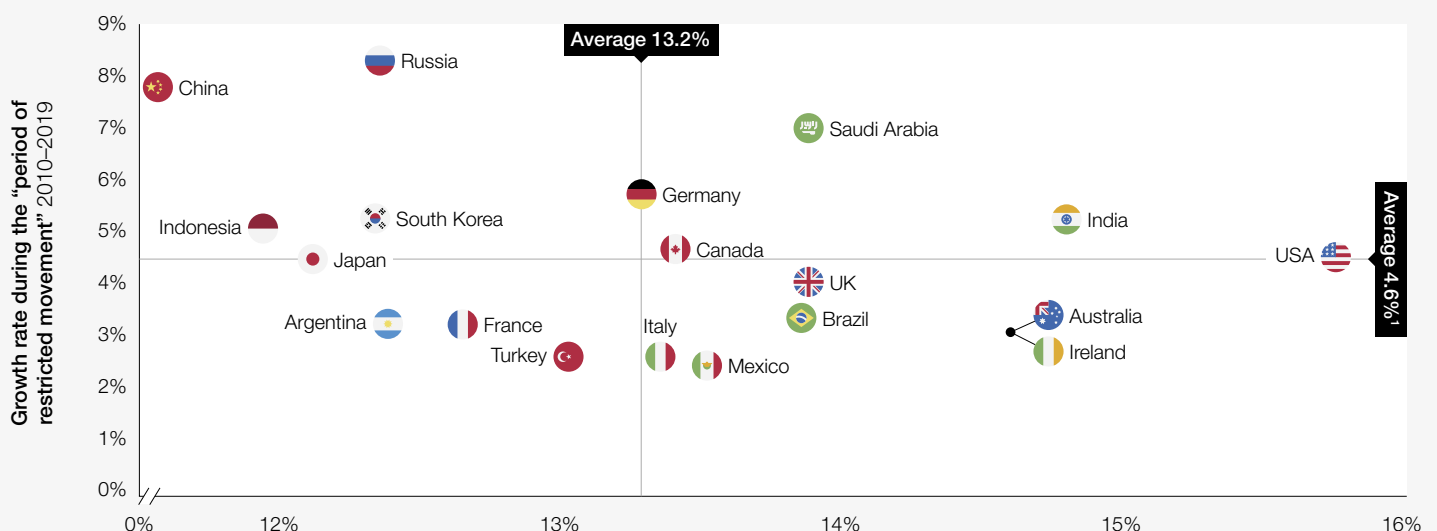
## 1.1 Trends in rural mobility around the world

Ensuring access to public transport in rural areas is an important issue. According to the International Bank for Reconstruction and Development (IBRD), the world's urban population increased from 47% to 56% over the 20 years up to 2019.<sup>1</sup> But in spite of this trend towards urbanization, many people continue to live in rural areas, including a quarter of people in OECD countries.<sup>2</sup>

The increasingly ageing population is a common issue in developed countries. For example, from 2010 to 2020, the ageing population in Japan increased by 5.9% in rural areas, compared to

4.7% in the country's three principal metropolises.<sup>3</sup> As the percentage of people aged over 65 continues to grow in rural areas, access to healthcare for these people is a major challenge. The difference between healthy life expectancy and life expectancy in general – that is, the amount of time following the end of healthy life expectancy when movement is restricted<sup>4</sup> – is increasing as populations age and is referred to here as the “period of restricted movement”. The growth rate in average life expectancy during the period of restricted movement is generally 13.2% in the G20 countries. The average duration of this restricted-

FIGURE 1 “Period of restricted movement” – the difference between healthy life expectancy and average life expectancy increased in G20 countries in the 10 years through to 2019



<sup>1</sup> Except in South Africa, where life expectancy has fluctuated significantly due to the widespread use of the AIDS vaccine

Source: WHO



“ People living in rural areas have fewer options for mobility and the transport gap is increasing. In this vicious cycle, rural people experience difficulty maintaining their quality of life.

movement period increased by about 4.6% between 2010 and 2019 (excluding South Africa, where life expectancy has fluctuated significantly due to AIDS)<sup>5</sup> (see Figure 1). It is assumed that elderly people who have exceeded their healthy life expectancy will not be able to drive due to cognitive decline.<sup>6</sup> This is especially critical in rural areas, where an inability to drive can be severely limiting, resulting in a decline in quality of life (QoL). The gap between healthy life expectancy and average life expectancy is increasing year by year, and it will become even more important to provide a sustainable transport system for elderly people to preserve their quality of life.

Populations are declining more rapidly in rural areas. From 2010 to 2019, the population of Japan's three largest metropolitan areas grew by 1.2%, while that of rural areas declined by 4.3%.<sup>7</sup> As a result, abandoned public transport infrastructure has become an issue. Between 2006 and 2012, 11,160 km (2.7% of the total distance) of bus routes and 674 km (2.4% of the total distance) of railways have been abandoned. If the transport gap can be defined as “no access to buses within 300 metres and no access to railways within 500 metres”, then about half of Japan's land transport gap affects 20% of its population.<sup>8</sup>

In many developed countries, public transport is supported by public expenditure. For example, in the US, profit margins for all public transport systems are negative on average nationwide; the cost-collection rate for buses and commuter trains barely exceeds 50%.<sup>9</sup> In rural areas in both the US and Japan, with population rates predicted to continue to decline, the number of people using public transport is also expected to decrease. The profitability of public transport, already suffering low returns, will continue to worsen, increasing the burden on the government to sustain the transport system. In other words, people living in rural areas have fewer options for mobility and the transport gap is increasing. In this vicious cycle, rural people experience difficulty maintaining their quality of life.

Public transport is also important for people travelling to rural areas from elsewhere. For example, in Japan, the rate of private car use by tourists decreased by 3.5% from 2014 to 2018,<sup>10</sup> reflecting a decline in the number of driving licence acquisitions for that period.<sup>11</sup> In fact, in a survey of tourist destinations in the Kanto region, about one in four respondents chose the availability of public transport as a factor in their choice of destination. Therefore, sustaining public transport in rural areas is vital to local economies, too.<sup>12</sup>

## 1.2 MaaS trends around the world

As a means of pursuing sustainable public transport, mobility as a service (MaaS) has emerged in recent years, mainly in Europe and the US. Although there are multiple definitions of MaaS, it is commonly defined as “a service that integrates and seamlessly provides multiple existing mobility services”.<sup>13</sup> Whim, an app launched in Finland by MaaS Global in 2016, is considered to be the conceptual pioneer, allowing users to search, book and pay for multiple modes of transport such as trains, buses, cabs and rental cars. The goal is to enhance the convenience of public transport and other forms of mobility, reducing the use of private cars and the related environmental impact. In fact, according to a 2019 survey,<sup>14</sup> while 48% of the population in Helsinki uses public transport, for Whim users the figure is 63%, suggesting that MaaS may be effective in promoting the use of public transport over private vehicles.

However, in recent years, doubts about the user capture and business models of MaaS have been raised. For example, in Helsinki, the number of Whim subscription members is still less than 1% of the population; increasing the number of users remains a vital factor in enhancing impact. Also, from a business perspective, some citizens are reluctant to use the service unless the cost is about 30% less than that of maintaining their private vehicles. Hence, providing the service at a lower cost in a sustainable way is becoming more and more important.<sup>15</sup> In addition, although MaaS might work well in small-scale demonstrations, it has become clear that many issues need to be addressed to realize full-scale implementation, such as coordinating with existing transport companies to establish a seamless system based on MaaS.

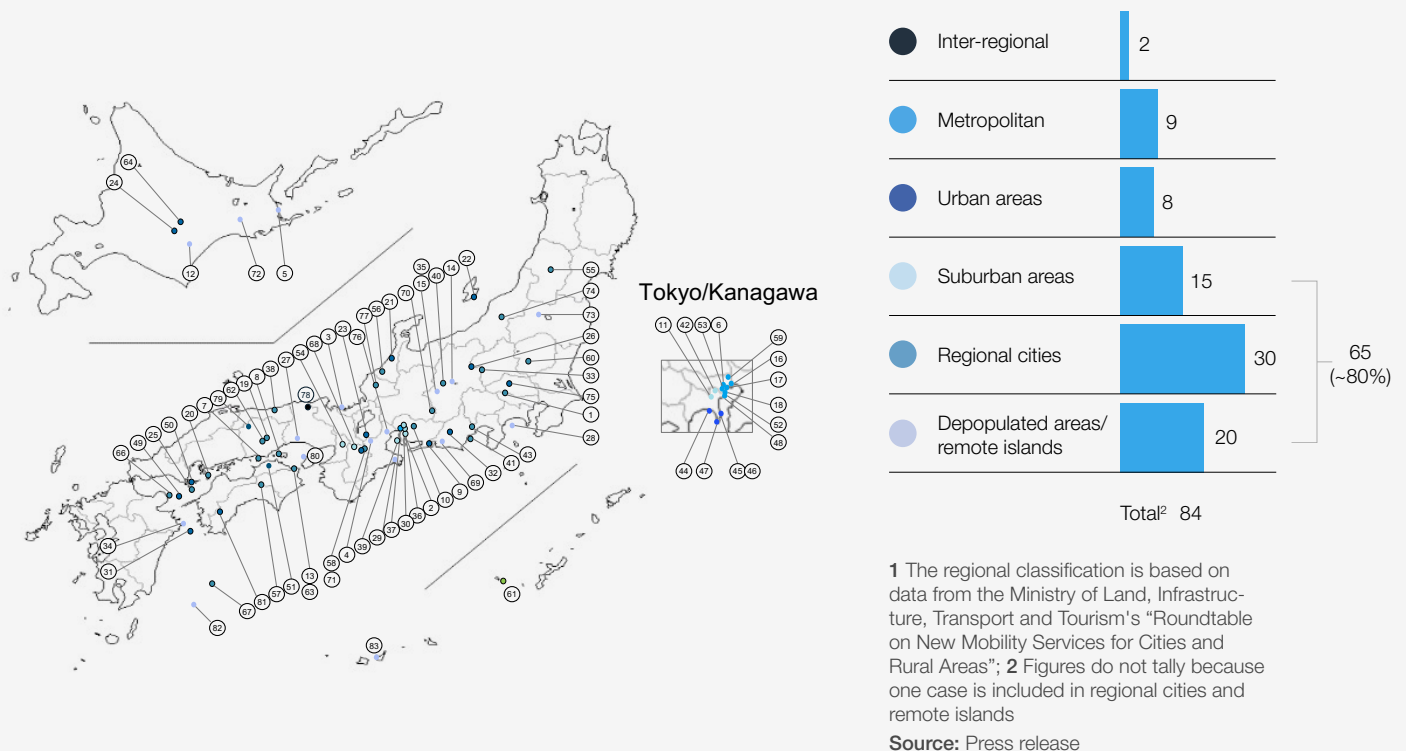
## 1.3 MaaS in Japan

In Japan, the trend towards MaaS was accelerated with the 2018 launch of the government's Future Investment Strategy. More than 80 MaaS services

are now being implemented in Japan, more than 80% of which are in rural areas where mobility issues increasingly need to be addressed (Figure 2).

FIGURE 2 More than 80 MaaS businesses exist in Japan, 80% of them in rural areas

### MaaS businesses in Japan by area type<sup>1</sup>



In this context, MaaS innovations not only include services that integrate existing transport options, but also new approaches to bringing in income. For example, as well as charging fares and fees, some services in Japan are collaborating with local businesses to establish transport stops in their immediate vicinity in exchange for subscription fees. Others have introduced subscription schemes for buses to increase stable revenue. Also, in the course of these operations, some services have shown remarkable flexibility, achieving usage rates of about 10% share among target customers by adapting their services to users' preferences. Some operators have deployed the same service in more than 10 regions, based on insights accumulated through early iterations.

In this report, we categorize MaaS cases in Japan into four archetypes (see section 2), taking local circumstances into account. Through interviews and analysis of the most effective methodologies, common issues and KSFs are identified for each type, particularly user acquisition and profitability. Through a case study of the Choisoko shared shuttle bus system, which has deployed the same model in more than 10 Japanese locations, we identify potential issues, and how to deal with them, whenever these services are actually implemented in the community (see section 3). Finally, we discuss the future state of MaaS based on current trends in Japan and overseas, including those caused by COVID-19 (see section 4).

# Challenges in rural areas of Japan and regional archetypes

Identifying four regional archetypes and the objectives of various types of MaaS highlights potential issues and the key success factors (KSFs).

## 2.1 Regional archetypes and research examples

In section 1, we discussed the importance of maintaining local transport infrastructure, including its impact on health and the economy. Although the transport demands of rural areas can differ significantly by region, analysis shows that target users can be categorized into two types: local residents (e.g. elderly people and other residents)

and visitors (e.g. tourists and business travellers). The objectives of MaaS can also be classified into two types: maintaining local transport (e.g. supporting travel in areas with transport gaps) and harnessing the market potential of transport and commerce (e.g. capturing tourist demand). (Figure 3)

FIGURE 3 MaaS in Japan can be divided into two categories in terms of target users and objectives

MaaS classification by target users

Outside the region	Tourists	30
	Businesspeople	13
Inside the region	Elderly people	26
	Residents	20
	Students	8
	People with disabilities	4
	Pregnant women/ women with children	1
	Adults without driving licences (immigrants)	1

Target users can be divided into external users such as tourists and businesspeople, and internal users, including local elderly people and other residents

MaaS classification by objectives

Maintain local transport	Mobility support for areas with limited transport	23
	Support for people with mobility difficulties	22
	Social expenditure reduction (medical and health)	8
	Modal shift (suppression of private cars)	6
	Others	6
	Capturing tourism demand	31
Harness the market potential of transport and commerce	Community revitalization	7
	QoL improvement	3
	Resilience (disaster prevention and mitigation, disease prevention)	1
	Others	13

MaaS's objectives can be divided in two: 1) maintaining local transport (e.g. supporting the movement of people in areas with transport gaps); and 2) harnessing the market potential of transport and commerce (e.g. capturing tourism demand)

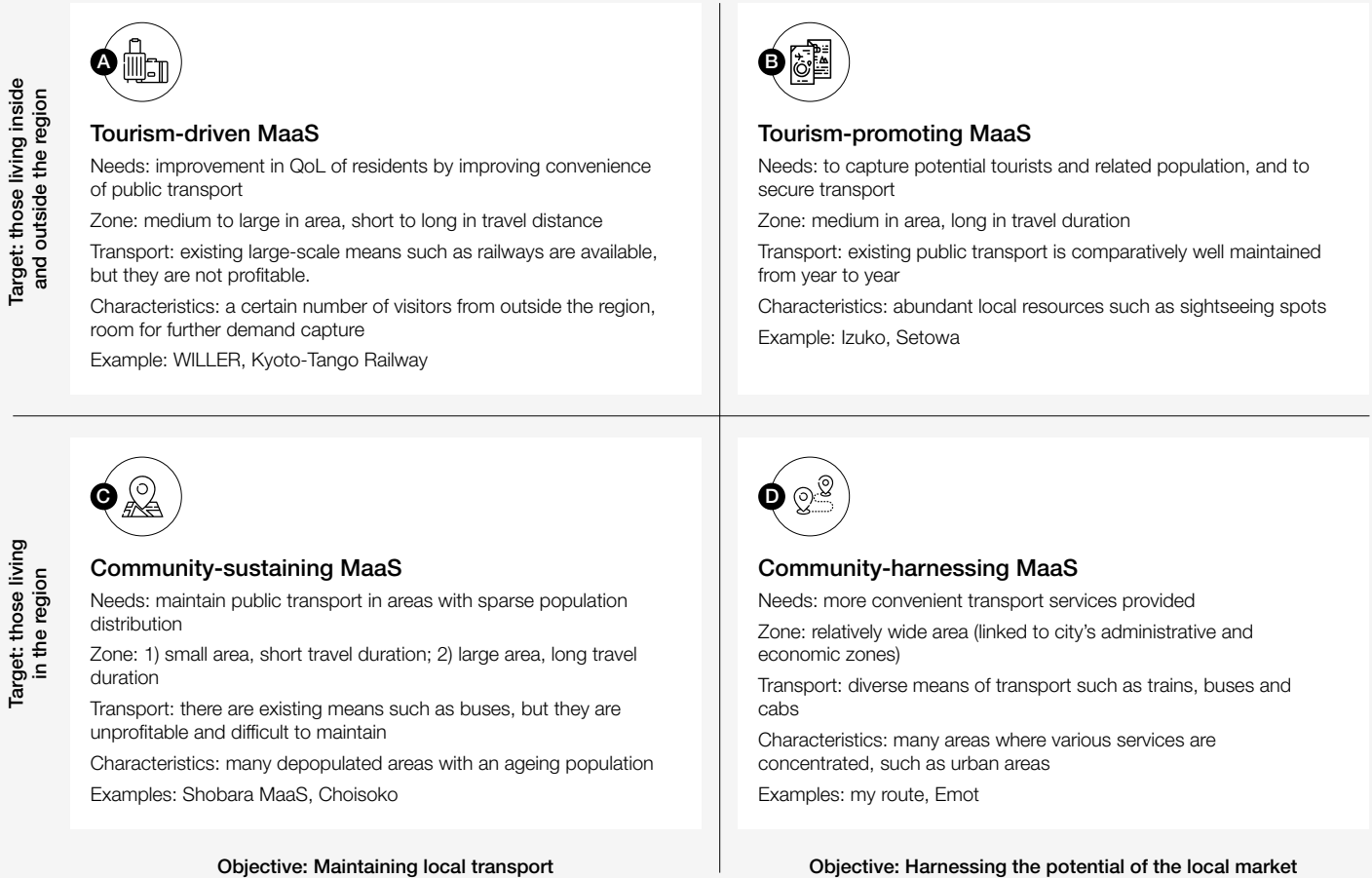
Source: Mobility team at Centre for the Fourth Industrial Revolution Japan

Based on this, we created regional archetypes according to target users and the transport objectives of the respective regions. In other words, is the region mainly trying to preserve its

public transport system or leverage its transport infrastructure to achieve other goals, such as promoting tourism? And are the target users mainly residents or visitors? (Figure 4)

FIGURE 4

## Regional cities can be categorized into four archetypes according to MaaS target users and objectives



Source: Mobility team at Centre for the Fourth Industrial Revolution Japan

The regional archetypes and the type of MaaS needed, as defined in Figure 4, are:

### A. Tourism-driven MaaS: target users include people living outside the region (as well as locals) – the goal is to maintain local transport

This region is assumed to be one where the number of local residents is decreasing and there is a problem maintaining local transport infrastructure, but there are tourist attractions and a certain number of tourists are expected to visit the region. Typically, in order to maintain the transport network by increasing its use by tourists while promoting its use by local residents, the key is to attract tourists who do not have private means of transport, such as overseas visitors, by collaborating with tourist attractions to improve transport services.

### B. Tourism-promoting MaaS: target users include people living outside the region (as well as locals) – the goal is to harness the potential of the local tourism market

It is assumed that the region has sufficient tourism and commercial resources, but that the means of transport within the region are limited, so the region's tourist attractions are not fully used. Typically, the key is to improve transport and services within the region, and to make it easier for visitors to travel around and extend their stays by linking such improvements with the promotion of tourist attractions and accommodation.



**C. Community-sustaining MaaS: target users are those living in the region – the goal is to of maintain local transport**

This region is assumed to be one where maintaining local transport infrastructure is an issue due to a decrease in the number of local residents, and where visitor numbers, e.g. tourists, are limited and economically unfeasible. Typically, the key is to create and provide transport services and destinations that make it easy for local residents to travel, and to increase the demand for, and volume of, available transport through tailored programmes that motivate people to travel within the local area.

**D. Community-harnessing MaaS: target users are those living in the region – the goal is to harness the potential of the local market**

Although the region has urban functions such as commercial and cultural resources (such as shops, museums and sightseeing spots), it is assumed that residents and visitors are not engaging with

them fully due to limited unfamiliar means of transport. Typically, the key is to increase the volume of travel within the region by improving links to destinations, such as introducing new services and making existing travel links more convenient, and by creating demand for travel infrastructure by promoting those destinations.

We conducted discussions with a number of providers and academics to identify common challenges in starting a MaaS business, such as monetization and user acquisition, and the KSFs to overcome them. Some were specific to certain archetypes, and some were common obstacles regardless of archetype. This section shares the most effective methodologies used in Japan and shows how KSFs were implemented to address these common challenges. This will provide a reference for designing business models at launch as well as creating improvement strategies for existing businesses. (Figure 5)

FIGURE 5 Challenges and key success factors (KSF) identified from case studies of MaaS in Japan

	Common challenges	KSF	Case
Common KSF	The service is not being used because it does not lead to changes in user behaviour	<b>User-oriented service:</b> provide services from the user's perspective that will change their daily behaviour and motivate them to use the service	Shobara MaaS Izuko
	Information dissemination and service specifications are not tailored to the preferences of target customers	<b>Customization:</b> customize specifications to suit target-customer preferences (e.g. communicate by phone with elderly customers)	Choisoko
	Pay-per-ride model does not lead to repeated use because users are discouraged from using multiple times	<b>Repeated use:</b> make it less burdensome for users to use the service repeatedly (e.g. flexible settlement models such as subscriptions)	Shobara MaaS my route
	Local transport is dependent on subsidies, resulting in poor economic sustainability	<b>Revenue improvement:</b> secure sources of revenue other than fares (e.g. income from destinations, etc.)	Choisoko
A. Tourism-driven MaaS	Although tourists visit the area, there are hurdles to using local transport	<b>Seamless use:</b> optimize services for smooth use of local transport by tourists (e.g. QR code settlement, multi-language support, etc.)	WILLER
B. Tourism-promoting MaaS	Means of transport within the region are limited; difficult to get to sightseeing spots	<b>Improvement of transport within the region:</b> provide on-demand transport that is easier to use than existing transport	Izuko
C. Community-sustaining MaaS	There are few places/communities that people want to visit on a regular basis	<b>Motivating people to move by providing destinations ("kotozukurī"):</b> encourage people to go out by creating places where local residents can gather	Choisoko
D. Community-harnessing MaaS	Although destinations exist in the region, awareness is low and visits are limited	<b>Collaboration with other sectors:</b> improve destination coverage and strengthen customer promotion through collaboration with businesses	my route

Source: Mobility team at Centre for the Fourth Industrial Revolution Japan

## 2.2 Common issues and KSF from case studies

### Case 1. Shobara MaaS

#### 1. Service overview

Operator: Shobara MaaS Study Council

Date of service launch: October and November 2019; November and December 2020

Target users and market size: Elderly people; Shobara City; approximately 30,000 residents

Status of service: Pilot

Services provided: An on-demand bus service on a fixed route, mainly for elderly people, is operated for the purpose of securing daily transport. In addition to the fixed-price bus service, an app/bus service is provided for tourists.

#### 2. Examples of KSF

##### KSF 1: “Services from the user’s perspective” – expansion of bus stop numbers

The city of Shobara in Hiroshima Prefecture is located in a mountainous area and has one of the highest rates of depopulation as well as one of the most elderly populations in Japan. Over the past 30 years, the population has declined by about 30%, and elderly people (aged 65 years and above) account for more than 40% of residents.<sup>16,17</sup> In an area such as this, the distance between homes and public transport links is critical in terms of mobility access. In fact, one survey found that about 40% of the elderly population in Japan can walk to a station or bus stop in less than 5–10 minutes.<sup>18</sup> In rural areas, where the use of private cars is common and daily walking distances are shorter due to a culture of walking less, the installation of bus stops and other transport links that take into consideration the walking abilities of elderly people are essential.

In Shobara, the number of bus stops was increased so that they are generally located within 100–200 metres (a walk of around 5 minutes for elderly people) from people’s homes. Although it was necessary to install more bus stops on narrow roads, the city was able to get round this by using easy-to-manoeuvre minibuses and by having buses respond only to advance booking requests, and thus avoid any unnecessary stops. As a result of the increased number of bus stops, about 65% of users responded to a questionnaire survey that “it is convenient to get on and off the bus near my house”.<sup>19</sup> In addition, the number of connections to other bus services in the city also increased.

##### KSF 2: “Repeated use” – subscription systems

In order for MaaS to be used repeatedly, it is important to remove any hurdles that may hinder daily use. One way to achieve this is to provide unlimited ride services such as subscriptions instead of having pay-per-journey options only.

According to the same survey mentioned above, more than 70% of users answered that the subscription system was “good or very good”,<sup>20</sup> and there was large support for using the system for transit that would normally be reduced due to increased costs. In general, the number of people using public transport in rural areas is small, so a certain level of increase in ridership can be handled with little additional expense to the provider. This benefits businesses because they can potentially expect a steady increase in income for very little outlay.

### Case 2. Choisoko

#### 1. Service overview

Operator: Aisin

Date of service launch: July 2018

Target users and market size: City residents, mainly elderly people; Toyoake City, Aichi Prefecture; approximately 1.6 million people

Status of service: In progress

Service provided: In a community with a lack of amenities, this service is designed to encourage people to get out of their homes by providing information on transport and recreation options, planning health promotion events etc., mainly for elderly people, in addition to providing on-demand transport services for them.

#### 2. Examples of KSF

##### KSF 1: “Customize” – information transmission and provision of services from the user’s perspective

When providing and deploying MaaS, offering information and services via computer and smartphone apps is an obvious solution. However, a significant part of the population is disconnected or is not tech-savvy, particularly the elderly population. As a result, this can create obstacles in terms of both user acquisition and retention. Toyoake City’s Choisoko scheme, a service targeted mainly at elderly people, initially faced a similar problem, but it has resolved this by holding in-person explanatory meetings for residents, placing a board in the lobby of the city hall to introduce sponsors, and establishing telephone-based bus reservations. Traditional media, such as postal

“ One of most important factors for a community-harnessing MaaS is building a comprehensive database, which allows customers to access as much information as possible.

advertising, was used to distribute information on services and events, as these are efficient means of communicating with elderly people.

#### **KSF 2: “Securing revenue sources that do not rely solely on subsidies and fare income” – introduction of an area sponsor system**

Currently, there are two main revenue models for mobility services in Japan: 1) subsidies from national and local governments; and 2) fare revenue for transport companies. However, as mentioned in section 1, there are many cases where it is not possible to secure business viability from these two sources alone.

Choisoko, however, managed to improve its profitability by obtaining funding through an area sponsorship scheme, which allows businesses to request the placement of bus stops next to their shopfronts etc. in exchange for a funding outlay. Since installing these bus stops is expected to increase customer traffic, businesses often regard it as an advertising expenditure. In this way, Choisoko can secure an income stream that does not rely solely on subsidies from local governments or fares.

#### **KSF 3: “Motivating people to go out by providing destinations (kotozukuri)” – planning health promotion events and promoting travel through marketing**

Although the health benefits of getting out of the house are tangible, there are many regions in Japan where people remain at home because their choices of destination are severely limited. Therefore, in order to increase the uptake of mobility schemes, it is important not only to improve transport infrastructure but also to provide motivation for residents to leave their homes.

Toyoake's Choisoko scheme offers a prime example. Toyoake was one of the first municipalities to address the increased medical and nursing care costs associated with ageing populations by promoting the health benefits of regular outings. In addition to providing a mechanism to increase transport options, the Choisoko programme established physical activity events to encourage residents to leave their homes, increasing the viability of the associated transport scheme.

### **Case 3. my route**

#### **1. Service Overview**

Operator: Toyota Financial Services

Date of service launch: 1 November 2018 (pilot); 28 November 2019 (full launch)

Target users and market size: City residents; Fukuoka City, Kitakyushu City, Minamata City, Yokohama City, Miyazaki City, Nichinan City; approximately 7 million people

Status of service: In progress

Service provided: Provision of: 1) multimodal route search services; 2) reservation and payment system; and 3) app-based search services providing route and location information to city residents, with the aim of increasing transport demand while revitalizing community life in cities.

#### **2. Specific examples of KSF**

##### **KSF 1: “Repeated use” – introduction of multimodal route search and digital free-ride tickets**

Although MaaS services are designed to make it easier to travel more regularly, leveraging a wide range of apps, their full potential has not been realized because the services apply to only a limited number of mobility methods.

To increase frequency of use, my route offered multimodal route searches for the first time in Japan as a MaaS service, including micromobility (e.g. shared bicycles), something that is not covered by other companies. Moreover, app-only fixed-price tickets reduced the financial hurdle to

repeated use, since there are no extra charges for additional use, in addition to incorporating contactless services to reflect customer demand during the COVID-19 crisis, resulting in increased use. In particular, the number of customers using the six-hour free ride ticket, a product exclusive to my route, has been increasing, while the need for commuter passes has declined significantly due to people working from home and refraining from going out during the pandemic.

##### **KSF 2: “Business collaboration” – customize business collaboration in each development region to provide various services**

One of most important factors for a community-harnessing MaaS is building a comprehensive database, which allows customers to access as much information as possible. But many services struggle to do so because the service providers are often transport companies, with limited information on, for example, local events.

my route, which was launched in Fukuoka, covers not only transport companies, but event and location information from tourist guide websites such as Yoka Navi and Nasse, providing information about local businesses, events and attractions. In fact, this is one of the leading reasons why people choose my route.<sup>21</sup> Furthermore, my route does not just apply the best practices of Fukuoka and Kitakyushu, where they started their services, to other regions, but promotes business collaboration by customizing the system to meet the specific needs of local governments and partner companies in each area, modifying parts of the system accordingly.

## Case 4. WILLER

### 1. Service overview

Operator: WILLER Trains

Date of service launch: February 2020

Target users and market size: Residents; Kyoto-Tango railway line; approximately 2 million people

Status of service: In progress

Service provided: Designed to meet the daily transport needs of both non-residents and residents through apps offering tourist destination reservations, QR code payments and multilingual services (English and Chinese, in addition to Japanese). This service has been temporarily halted due to COVID-19.

### 2. Specific examples of KSF

#### KSF 1: “Seamless capture of tourists” – introduction of QR codes

In Japan, the number of foreign tourists is on the rise, tripling to about 30 million in the five years up to

2018.<sup>22</sup> However, about 30% of tourists responded to a government survey saying that purchasing rail tickets can present a challenge to non-Japanese speakers. Therefore, it is essential to provide an easy-to-use ticket service in order to attract tourists and bolster demand for public transport.<sup>23</sup>

WILLER dealt with this issue in the Kyoto-Tango region by implementing electronic ticketing and QR code payments. Current metrics of the scheme's effectiveness are not available due to the COVID-19 pandemic, but it is now possible to buy and then present tickets as proof of purchase for travel all in one app. Plans are in place to expand this payment method to connected modes of transport such as cabs and buses, as well as to buy tickets for tourist destinations. The data obtained from these purchases will be used to update timetables in live time, offer information about possible transport connections, and to provide travel suggestions in advance.

## Case 5. Izuko

### 1. Service overview

Operator: East Japan Railway Company and Tokyu Corporation

Date of service launch:

[Phase 1] 1 April 2019 to 30 June 2019

[Phase 2] 1 September 2019 to 30 November 2019

[Phase 3] 16 November 2020 to 31 March 2021

Target users and market size: Tourists; Izu/Shizuoka area; approximately 45 million people (10 million overnight guests)

Status of service: Pilot

Service provided: Designed to promote the Izu/Shizuoka area, which – despite being an attractive region with many tourist attractions – struggles to entice tourists to the region because of poor transport. As such, the company provides services such as the ability to reserve and pay for transport and tourist attractions, with bonus offers of free digital passes and on-demand transport facilities, through a tourist-oriented MaaS smartphone app.

### 2. Specific examples of KSF

#### KSF 1: “Services from the user's perspective” – deeper customer understanding through data

In MaaS, using the PDCA cycle of plan-do-check-act to analyse customer data is vital to providing better services and promotions.

Izuko introduced a real-time data-monitoring system to visualize customer demographics and purchasing behaviours by region and time in order to revise its promotion and product strategy. This data has also been provided to other enterprises such as shops joining Izuko to promote their respective endeavours.

#### KSF 2: “Development and promotion of local transport” – provision of on-demand buses connecting sightseeing areas and expansion of bus stops

With MaaS, in terms of promoting tourism, it is important to improve transport infrastructure between tourist attractions to increase: a) visitors' length of stay; and b) the number of places they visit. In the Izu/Shizuoka area, private vehicles are the sole means of transport between major tourist attractions, thus excluding a large swathe of potential tourist income.

As a solution to this problem, Izuko launched an on-demand transport service to improve the convenience of travelling within the region. By setting up 27 bus stops, located mainly around tourist spots, it was able to increase traffic to those respective attractions. In the latter stages of the experiment (Phase 3) in particular, additional bus stops were installed at hotels, hostels etc., offering an on-demand bus service to tourists with a similar goal of increasing footfall to the region's tourist hotspots.

3

# Challenges and successes in implementing MaaS in the region

Examining the implementation and expansion of a MaaS raises several key issues and offers opportunities to find solutions.

In section 2, we analysed MaaS case studies from around Japan by type to identify the challenges and success factors for each

iteration. This section will focus on Choisoko, which started in Toyoake City, Aichi Prefecture, and has expanded rapidly nationwide.

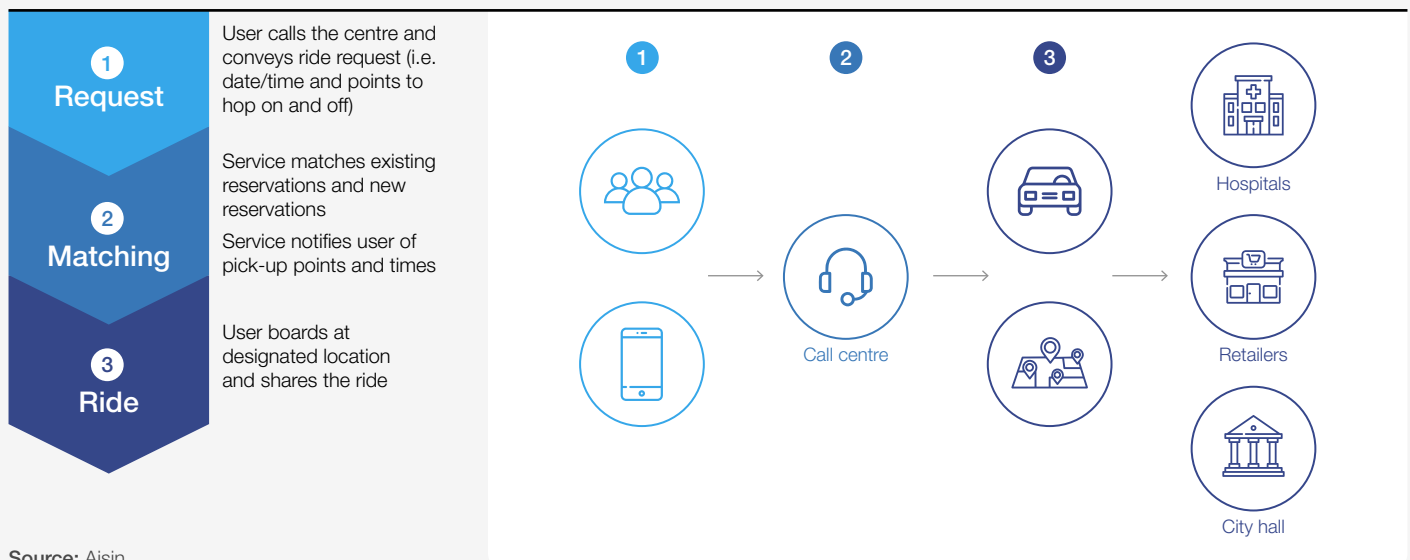
## 3.1 Overview of the model being deployed nationwide

Choisoko provides services using a demand-based model. In other words, it is a shared-ride pick-up and drop-off service with a transport system that allows users to change the location and route of their ride according to their reservation. Specifically, users inform the Choisoko interface of their choice

of destination and desired time of arrival by phoning a dedicated call centre, which then calculates the optimal timing and route, taking into consideration multiple users and their ride requests in order to send them to their respective destinations in the most efficient way possible. (Figure 6)

FIGURE 6 How shared ride services work

### How to use the service



Source: Aisin



In Toyoake City, the fare is roughly \$2 per ride, and reservations can be made from two weeks to 15 minutes in advance. Currently, the scheme has more than 1,800 members<sup>24</sup> (2.6% of the

total population of Toyoake City and 10.1% of the city's population aged over 65 as of January 2021), and the rate of active users compared to all registered members exceeds 45%.

## 3.2 The key to implementing MaaS in the region

“ It is essential to involve a wide range of stakeholders to maximize the impact of MaaS. In particular, it is important to include health, welfare and other relevant local government departments.

Although fares vary depending on the municipality, the Toyoake model is currently being deployed in 10 locations nationwide. In rolling out the model, the main challenges encountered involved “mutual collaboration with existing transport providers” and “involvement of a wide range of stakeholders, including non-transport sectors”. In this section, we discuss these issues in detail and describe the corresponding success factors that have become apparent in the multiregional deployment of Choisoko.

### 1. Mutual collaboration with existing transport providers

Collaboration with existing operators is a challenge for any type of MaaS operator because, without such interactions, it is difficult to design services that are optimized at a local level, due to the unique requirements of each company involved.

In the case of Choisoko, it was necessary to create a service format that would be mutually viable. This was due to the overlap of service areas with existing transport providers (established bus operators and taxi companies) and the consequent impact on their profitability.

In order to solve these issues, a Regional Public Transport Conference was held once a month, which included local transport operators and local government welfare and transport departments. As a result, Choisoko decided to operate separately from the other established transport operators, and instead focused on “welfare transport” in order to help elderly residents secure easy access to transport facilities as part of a health-based strategy. Specifically, accommodations were made with bus companies based on the principle that Choisoko would not operate in areas that were profitable for those companies. Instead, Choisoko set out to operate in areas that lacked

public transport, outside of the main bus routes and traditionally served by the local government's regional bus service. At the same time, Choisoko decided to outsource some transport operations to taxi firms as a way to coexist in the same space.

### 2. Involvement of a wide range of stakeholders, including non-transport sectors

It is essential to involve a wide range of stakeholders to maximize the impact of MaaS. In particular, it is important to include health, welfare and other relevant local government departments in order to collaborate with other businesses and solve the social issues associated with ageing populations, as described in section 2.

In the case of Choisoko, it was important to involve a wide range of stakeholders from both the public and private sectors, not only to mitigate limited access to transport options, but also to implement measures to promote outings and healthy living through social projects targeting elderly people.

In order to involve the private non-transport sector, some MaaS operators used area sponsors, as mentioned in section 2. Through sponsorship money, operators were able to help shops attract more customers. The number of area sponsors in Toyoake City has increased from 18 to 51 since the programme started, and now companies from various industries and types of businesses act as area sponsors (e.g. medical institutions, banks, car showrooms, shopping centres etc.).

In terms of the public sector, Choisoko used the Regional Public Transport Conference to optimize services in the region from a social services viewpoint. For example, in Toyoake City, the expansion of the Choisoko service made it possible for community bus services to reduce their reliance on public social expenditures.

### 3.3 Methodology and usefulness of multiregional deployment

As of December 2020, Choisoko has expanded its service to 13 locations in Japan. The service is available in Toyoake City, Aichi Prefecture; Meiwa Town, Ora-gun, Gunma Prefecture; Inagawa Town, Hyogo Prefecture; Shibushi City, Kagoshima Prefecture; Kakamigahara City, Gifu Prefecture; Okazaki City, Aichi Prefecture; Ryuoh Town, Shiga Prefecture; Goto City (Fukuejima), Nagasaki Prefecture; Unzen City, Nagasaki Prefecture; Koda Town, Aichi Prefecture; Kakogawa City, Hyogo Prefecture; Matsuyama City, Ehime Prefecture; and Tatebayashi City and three surrounding towns in Gunma Prefecture.

As well as solving problems related to an ageing population, and the lack of transport choices for necessities such as grocery shopping or hospital visits, such services can serve as channels for regional development. For example, there are cases of Toyota car dealerships helping to operate Choisoko services to broaden their contribution to the local community beyond just selling cars. The scope of services is expanding to include not only mobility, but also the development of “mobility bases” that combine shared office spaces and school transport, thus addressing the need for shared transport services, improved work environments and childcare.

# Future developments in MaaS – more than just mobility

MaaS can be expanded to improve tourist facilities, provide useful facilities and reduce gender disparity.

The previous sections summarized the issues and KSFs of MaaS for each archetype and outlined important points for implementation by observing successful cases in Japan. In this chapter, the focus

is the future prospects for MaaS and other forms of mobility, based on trends in Japan and around the world, as well as the impact of the COVID-19 pandemic on MaaS services.

## 4.1 Trends in Japan

To consider some important perspectives for MaaS's future development, a deeper exploration of the two cases already detailed is required.

### 1. Promotion of mobility in cooperation with tourist facilities

Tokachi Bus has been operating route buses, sightseeing buses and other services in the Tokachi region of Hokkaido since 1926. The company had been facing a financial crisis following a steady decline in passenger numbers year on year since its peak in 1969. In 2012, however, it became the first local bus company in Japan to increase passenger numbers. The key to this achievement was understanding the needs and issues of local residents through direct dialogue, tailoring transport services to resolve any bottlenecks. Tokachi Bus started the process by sending representatives to each household along its bus routes to find out why residents no longer used the service. The results showed that a lack of crucial information – such as how to board the bus, ticket prices, bus stop locations and route destinations – was off-putting to potential travellers.

To increase accessibility, Tokachi Bus compiled this information in booklets and distributed them directly to residents. It also created timetables for each destination and bus stop. Furthermore, it launched a product that combined a round-trip bus ticket with admission to tourist sites. As a result, the company managed to successfully develop a transport service that was easy to use for both residents and tourists, resulting in increased usage.

Currently, Tokachi Bus has continued to build on its ongoing dialogues with residents, while also accelerating digitalization through the development of route guidance and bus location smartphone apps. The important lesson to be drawn here is that any digitalization did not take place until the company had first gained the trust of residents on a person-to-person basis. In today's rapidly digitizing world, it is common to start with the digital solutions first. However, the Tokachi Bus example suggests that digitalization should not be viewed as a silver bullet; organizations need to understand customers' needs in the first place to provide better solutions.

### 2. Promotion of mobility through the provision of places and purposes to “create experiences”

Choisoko, introduced in sections 2 and 3, provides not only transport services but also places for elderly people to visit and activities to encourage them to get out of their houses on a regular basis. This is based on the concept of “shared-ride transport services to promote health for elderly people who have problems securing transport in their communities”. Recently, Choisoko also introduced the Tsunagari Station concept, which integrates work, childcare and learning. The aim is to produce an integrated service for child-rearing. A trial is underway for a scheme that provides transport support for those using Tsunagari Station, such as picking up children from school and taking them to after-school lessons or childcare.<sup>25</sup> Tsunagari Station is equipped with working spaces for telecommuting, childcare facilities for parents at work, and a study space where children can

complete homework after school. In addition, a trial programme is being conducted for the use of Choisoko vehicles, which are constantly on the move, to aid road-maintenance support services. The vehicles are equipped with sensors and cameras to detect vibrations and capture images of road surfaces. By collecting road surface data,

local transport administrators can remotely, and more efficiently, determine the need for road repairs. There are also plans to equip Choisoko vehicles with sensors to monitor air pollution. If implemented, this could be used to chart environmental impacts and study traffic congestion.

## 4.2 Global trends

“ There are plans to equip Choisoko vehicles with sensors to monitor air pollution. If implemented, this could be used to chart environmental impacts and study traffic congestion.

Globally, there are examples of mobility schemes being adopted to solve community problems not yet addressed by Japanese MaaS programmes. In this section, two such examples are highlighted: wealth disparity and the gender gap. Although the examples covered here pertain to urban situations, these general trends also apply in rural areas.

### 1. Reducing disparities by supporting the use of mobility for pregnant women in low-income areas

In September 2015, former US President Barack Obama announced the Smart Cities Initiative, a two-year scheme totalling \$240 million that created a number of cross-departmental programmes and promoted collaborative efforts among industry, government and academia to support the development of smart city technologies aimed at solving local issues. In conjunction with this initiative, the US Department of Transportation (DOT) held the Smart City Challenge, inviting small- and medium-sized cities to trial a smart transport system using data, smartphone apps and technologies to “help people and goods move more quickly, cheaply and efficiently”. Seventy-eight cities across the US applied for the competition. Seven cities were selected as finalists in April 2016 and the city of Columbus, Ohio, won the competition.<sup>26,27,28</sup>

One of the most important elements of the Smart Columbus system was the enhancement of transport infrastructure to address infant mortality among low-income families. In Franklin County, Ohio (home to Columbus, the state capital), 150 children under the age of 12 months die per year, and the death rate for African American babies is three times that of white babies (14.8 vs. 4.9/1,000, 2017; 5.9/1,000 for the country as a whole).<sup>29</sup> Infant mortality rates are particularly high in low-income areas of Franklin County, where access to social services such as education, healthcare, employment and transport is a challenge.

To solve this issue, Smart Columbus focused on improving access to transport by developing a smartphone app for pregnant women and new mothers, with the goal of reducing infant mortality by 40% and halving the healthcare gap by 2020. The app links medical check-up appointments with timetables and routes, as well as real-time transport system information

so that infants can be seen immediately at medical facilities in case of emergencies.

Here, MaaS is not just being used to provide mobility as a means of transport for local residents, but also as a tool to ensure the health of pregnant women and infants through appropriate coordination with medical institutions. This is a perfect example of MaaS being used as a tool to solve societal problems.

### 2. Breaking away from male-centric urban transport

In addition to the employment gender gap, there also exists a gender gap in the area of mobility. According to a survey conducted by the World Economic Forum, two-thirds of public-transport users worldwide are women.<sup>30</sup> It has been theorized that men tend to follow a simple pattern of commuting between home and work, while women travel more frequently, with a higher number of destinations due to numerous roles, including raising and nursing children, housework, shopping and school runs, in addition to work commutes. Some cities have already begun to take action, not just in terms of a mobility gender gap, but to address this inequality as a whole

For example, Vienna, Austria, has adopted the concept of “gender mainstreaming”, which takes gender balance into consideration when forming governmental plans and policies and deciding budget allocations. There are currently more than 60 projects underway.<sup>31</sup> For instance, based on data that women are more likely to walk and/or take public transport while men travel by car, the pedestrian perspective has been given a higher priority in terms of city planning. Pavements and walkways have been widened to make it easier for people using pushchairs and prams, and the number of streetlights and benches has been increased to make the city more pedestrian-friendly.

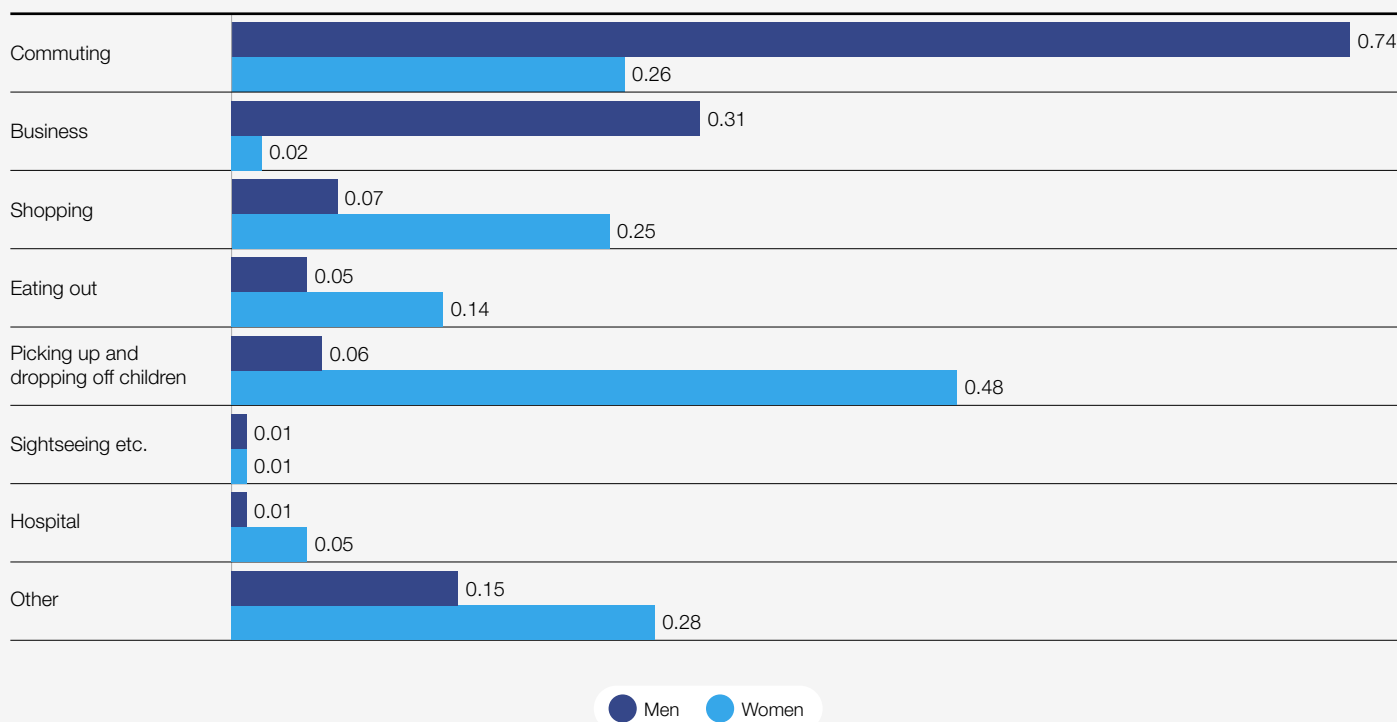
This mobility gender gap also exists in Japan. While there was no significant difference in the frequency of travel between men and women, men tended to make more trips for “commuting” and “business reasons” than women, while women tended to make more trips to shops or schools to pick up and drop off children and shopping than men.<sup>32</sup> In particular, women in households with children

made eight times more “pick-up and drop-off” trips than men did (0.06 trips vs. 0.48 trips/day – as shown in Figure 7). Since women’s work schedules seems to be limited by the necessity of transporting their children to and from school, there may be a need for services to reduce that burden, such as providing mobility options to aid in getting children from school to their home or after-school care, or –

indeed – increase the mobility options for children themselves. In France, in order to reduce the transport burden on parents, the driver’s licensing system was changed in 2014, allowing young people aged 14 or older to drive a quadricycle, or microcar, without a licence, thus allowing students to use them for their school commute.<sup>33</sup>

**FIGURE 7** Women in their 30s who have children are roughly eight times more likely than men to use transport for pick-up and drop-off

**Number of trips/day (weekdays only) by purpose for households with children (parents aged 30–39)**



**Source:** “2015 National Person Trip Survey”, Ministry of Land, Infrastructure, Transport and Tourism

Japan also needs to explore overhauling its licensing system and mobility services based on this understanding of people’s situations and needs. For example, it is important to devise services that allow children to travel safely and securely, and to develop appropriate vehicle standards that will

facilitate such programmes. If there are a large number of women travelling with children, it is important to deploy mobility solutions that reflect their needs and perspectives, such as by arranging seats in a child-friendly way and providing services that are easy to use.

## 4.3 COVID-19 and the effect on people’s lifestyles

The radical change in people’s lifestyles caused by the global spread of COVID-19 is also having a profound impact on attitudes towards mobility. According to a survey conducted by McKinsey in May 2020, 80% of respondents regarded privately

owned cars as a “safer means of transport”, while more than 90% felt that public transport was “unsafe” (Figure 8).<sup>34,35</sup> Such viewpoints are also being observed in Japan. Telecommuting has been recommended to avoid the “3 Cs” (closed spaces,

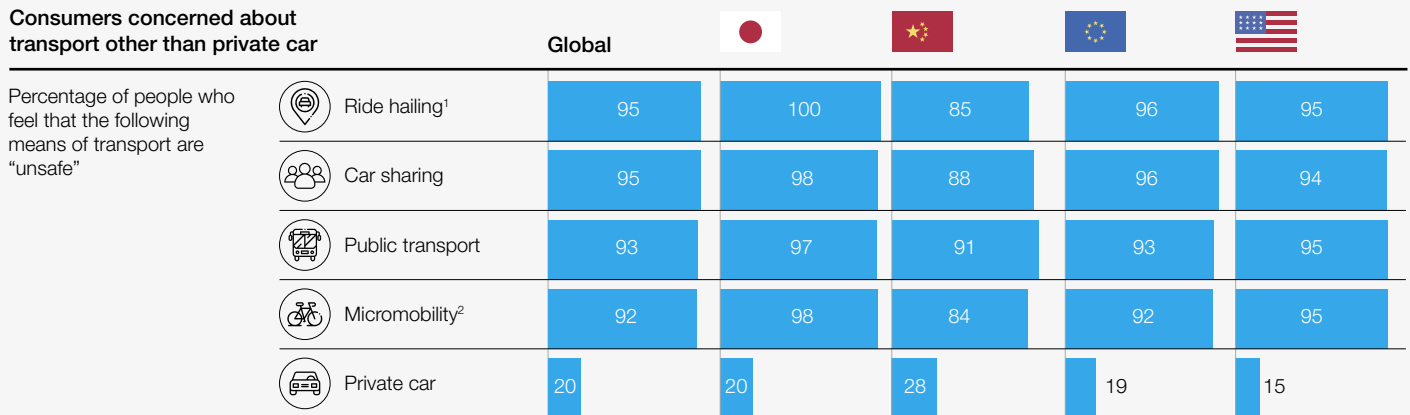


crowded places, close-contact settings), causing a decrease in the number of public transport users, and affecting transport businesses financially. In particular, transport operators in rural areas, where

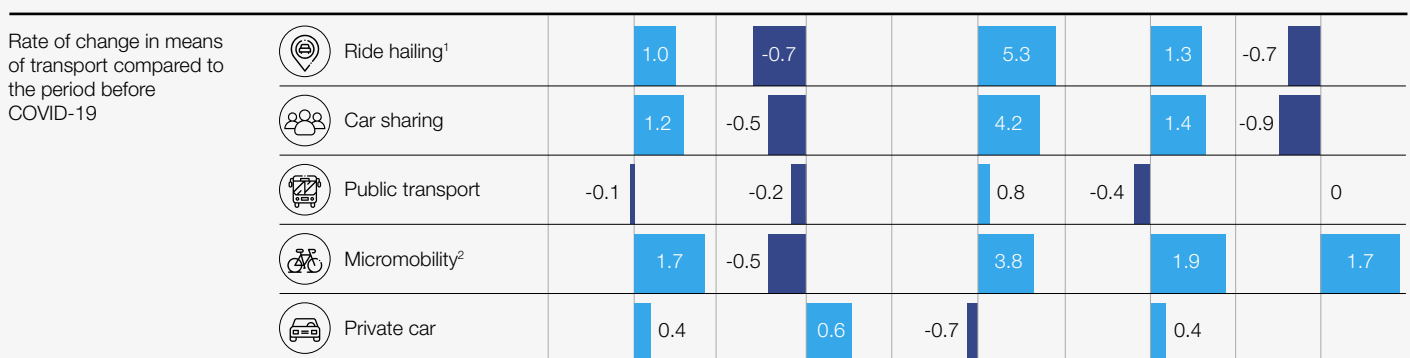
many small and medium-sized operators were already under financial pressure, are predicted to struggle in their attempts to maintain their services.

FIGURE 8 Changes in consumer attitudes caused by COVID-19

**Consumers concerned about transport other than private car**



**Signs of the rise of micromobility**



1 Taxi/dispatch service; 2 Bicycles, electric bikes, etc.

Source: McKinsey Center for Future Mobility Survey

However, given the problems of traffic congestion and the environmental impact of private car use, it is difficult to imagine a world in which public transport continues to decline and the use of privately owned cars is encouraged. In the post-COVID-19 era, it will be important to ensure public transport offers the safety and security demanded by the public, to offset reliance on cars. Promoting the use of technology to understand and predict congestion, further expanding contactless fare collection including online payments, and altering seating layouts to create socially distanced seating patterns are specific measures that can, and should, be taken. In addition, there is a possibility that alternative mobility schemes with smaller environmental impacts, such as micromobility options (e.g. bikes and scooters), will become more widespread, especially for short distances.

Furthermore, in the field of medical care, home visits and other demand-based medical services are increasingly being explored to avoid the risk of infection during hospital visits as a result of the pandemic. Schemes are being designed where in the future vehicles equipped with medical equipment could travel to patients, while doctors in a central location provide medical advice remotely.

It is difficult to imagine a complete return to the pre-COVID-19 era, even after the end of the pandemic. Societies as a whole may well seek new lifestyles based on the lessons and values learned during the pandemic. Such values must also be taken into account when deploying MaaS.

# Conclusion: MaaS and the transformation of rural mobility

Rural mobility is in a critical state around the world, requiring the implementation of urgent solutions. The MaaS approach is expected to be at the forefront of a new generation of mobility services. However, for it to be sustainable and successfully adopted by a large number of users, MaaS initiatives must fulfil their KSFs and adopt appropriate business models tailored to the regions in which they operate. Local governments looking to adopt MaaS programmes and companies seeking to develop MaaS businesses must adhere to a checklist based on these factors in order for those schemes to be successful.

MaaS is an expansive business concept that aims to update the notion of mobility from one thought of purely in terms of transport to one that is seen instead as a holistic social service. To realize this goal, not only is it necessary to combine a wide variety of mobility services and tools but also to build the infrastructure to manage and optimize the entire mobility experience. In a global sense, MaaS is still in its initial stages. It is hoped that governments, businesses and other interested parties will work together to actively engage with their customer base to create a more user-friendly and sustainable image of MaaS.

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# Acknowledgements

The World Economic Forum extends its sincere appreciation to the companies, universities and government officials who have devoted significant time to meetings and reviews in the preparation of this paper.

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