

On the development of Mobility-as-a-Service systems and sightseeing applications

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Abstract

This paper introduces the basic concept of Mobility-as-a-Service (MaaS) and discusses issues related to its development, and potential use in the tourism industry in Japan. The principal objective of MaaS systems, pioneered in Finland, is to reduce the dependence on automobiles and seamlessly link means of public transportation through micro-mobility and vehicle sharing so that, with a single smartphone, virtually all within-city transportation can be accessed. It is noted that MaaS is attracting attention in Japan as a viable solution to the new challenges posed by new lifestyles that reflect the new normal ensuing from the new coronavirus crisis. Together with the digitalization of transportation systems, increased convenience of mobility, and effective utilization of existing public transportation means, MaaS creates also new opportunities for the future development of domestic travel, revitalization of local communities, and realization of super cities and smart cities.

Keywords

MaaS
Public transport
ITS
Open data
Seamless tourism

Introduction

Mobility-as-a-Service (MaaS) can be defined, according to the MaaS Alliance, “as the integration of a wide range of transportation services into a single service that facilitates free access and selection by service users” (MaaS Alliance, 2017, p. 2). In Japan, the Ministry of Land, Infrastructure, Transport and Tourism (MLIT) (2019) considers MaaS as a single service that integrates essential operations including search, reservation, and payment, inter alia, by optimally combining multiple public transportation means with the objective of meeting the individual trip-based transportation needs for residents and travelers. As shown in Figure 1, by linking with non-transportation services at the destination points, MaaS constitutes an important means to improve the convenience level of transportation and to contribute toward sustainable regional development (Fig. 1).

Thus, it is clear that tourism cannot be conceived without tourism resources, without tourists, and without an effective transportation system that facilitates the connection between tourist destinations (Japan Transport and Tourism Research Institute, 2020). In this sense, transportation constitutes one of the three major components of tourism, and the effectiveness with which MaaS can be used will define the extent to which the tourism industry can be further developed. Thus, the principal objective of this paper is to introduce the main features of MaaS and to examine how it can be potentially used to develop the tourism industry. At the same time, this paper will also hope to build on the findings described in this paper to establish a future MaaS in the region.

Definition of MaaS Functional Levels

It is possible to define MaaS systems in terms of the nature and number of functions provided to facilitate tourism activities. The functional definition recognizes the notion that MaaS services constitute a means to achieve particular policy goals. Following Sochor et al. (2018), a hierarchical classification of MaaS functions can be represented in Figure 2.

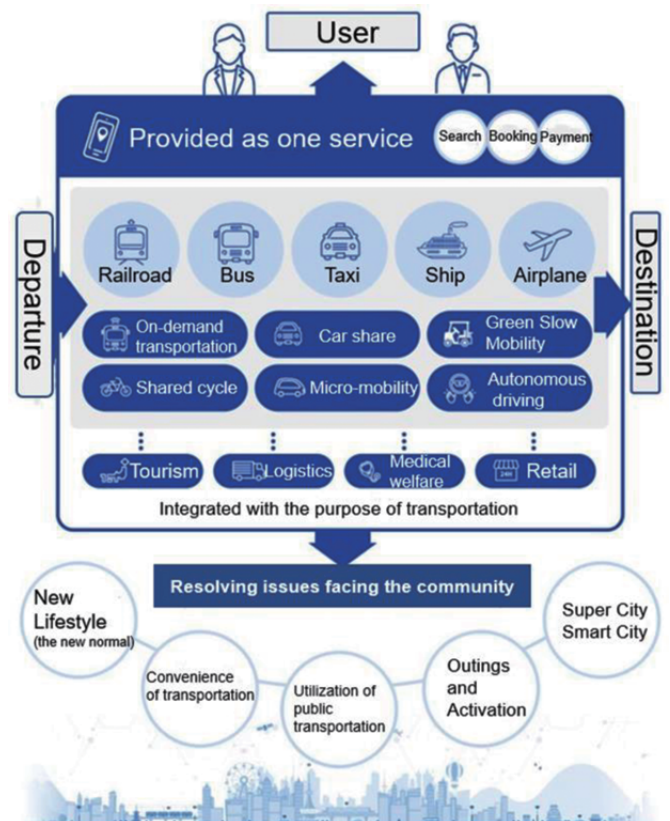


Figure 1. Concept of MaaS

Note: The author's translation is based on a concept drawing by the Ministry of Land, Infrastructure, Transport, and Tourism (MLIT)

Source: MLIT (2019)

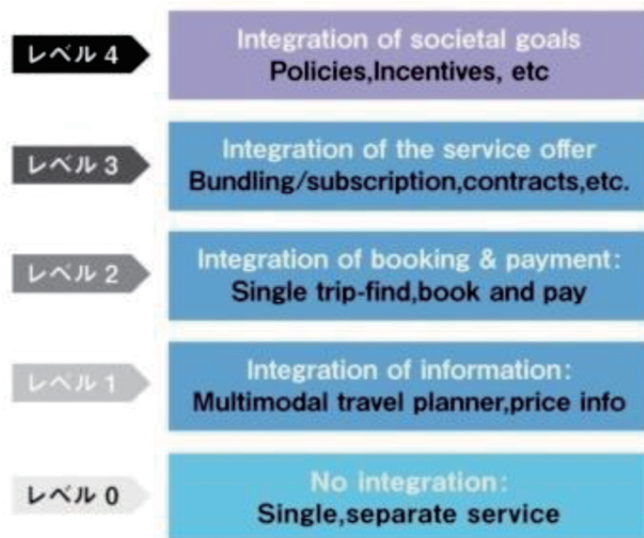


Figure 2. MaaS Functional Levels
Source: Sochor et al. (2018)

The MaaS functions range from the lowest level of no integration to the highest one of fully integrated policies.

- Level-0. No Integration
- Level-1. Integration of information provision
- Level-2. Integration of booking and payments
- Level-3. Integration of services, proxy sales, and subscriptions
- Level-4. Integration of policies, public-private partnership (PPP)

The absence of integration at Level-0 refers to the conditions where individual mobility services are deployed separately and are not integrated with each other. It is noted that most of the current transportation systems fall into this lower category.

In contrast, a higher MaaS Level-1 is identified with “Information Integration,” which refers to the sharing, on the same platform, of various types of relevant information such as fares, travel times, timetables, transportation areas, and distances for each transportation service. This primary level of integration is represented by the essential services of route search and transfer guides provided by companies such as Jorudan and Navitime Japan, among others.

The subsequent MaaS Level-2 is related to a system of “Integrated Reservations and Payments”, which allows users to not only search for multiple mobility services on the same platform, but to make reservations and payments as well. Thus, when searching for a route from point A to point B for instance, MaaS applications would suggest possible routes including a variety of transportation services, and when users select the preferred or optimal routes, reservations and payments based on a combination of transportation services are also facilitated. This level of MaaS applications improves convenience as it enables one-stop reservations and payments for multiple transportation services.

A higher degree of integration can be achieved with MaaS Level-3, which refers to the “Integration of Services Provision” including proxy sales, and subscriptions. To travel from point A to point B, the possibility to select a route from a combination of different mobility services, but the same fare is applied regardless of individual preferences and choices. Instead of individual mobility service pricing, a pre-determined fixed price is invariably applied for each route. It is at this stage that subscription services can be introduced, allowing

unlimited rides to various mobile services within specific geographical areas for fixed monthly fee payments, such as with the integrated services provided by Whim. Thus, this level of MaaS functionality is provided in an increasingly integrated manner as if all services were provided by a single operator.

Finally, the highest level-4 of MaaS functionality is represented as “Policy Integration.” This is the ultimate stage where the national government, local governments, and business operators cooperate to integrate transportation systems at the urban planning and policy levels. The implementation of MaaS services at this level would include, for instance, the relocation of transportation nodes and terminals necessary for connecting various transportation services may be made to enhance convenience. Also, new commercial and residential areas may be created in conjunction with urban development, in an effort to link the local transportation policies to the public policies of the entire area.

Potential MaaS Applications for Sightseeing Purposes

The environment surrounding transportation planning is in an unprecedented state of upheaval and constant flux. The significant challenges stemming from an aging population, declining birthrates, severe financial and fiscal conditions, disease outbreaks, healthcare, and economic crisis, and decarbonization efforts have devastating effects on the transportation industry and business conditions of tourism operators (Okabe et al., 2020). A major priority is to upgrade to new types of transportation services and city planning based on digital transformation (DX) (Vito et al., 2018). It is noted that ICT and data analysis has been instrumental in the development and implementation of MaaS services, and there are continuous efforts to use advances in information technologies to solve various regional and business issues (Yale Z. & David A., 2020).

More challenges derive from the need for greater efficiency in the provision of services to visiting tourist spots. Indeed, many regional tourist destinations are still associated with inefficiencies related to secondary transportation and sightseeing tours. MaaS-based measures are expected to contribute toward the solution of current mobility problems and increase tourist satisfaction. Tourism-oriented solutions are also expected to boost consumption and revitalize local economies.

With reference to the Kansai region, seven major railroad companies formed the “Kansai MaaS Study Group” in 2019 to examine the long-term future of MaaS and its potential implementation in preparation for the Osaka-Kansai Expo to be held in 2025 (West Japan Railway Company, 2019). The overriding objective is to explore the optimal ways to establish an integrated system that provides a seamless means of transportation from any point of origin to any destination point in the Kansai region. In November 2021, the Kansai MaaS Promotion Liaison Conference was established by the Kinki District Transport Bureau and there is a strong commitment by the seven Kansai railroad companies to develop a fluid MaaS system by promoting collaboration and implementing various initiatives within and across a wide range of related industries, including the transportation and tourism sectors (Kinki District Transport Bureau, MLIT, 2021).

It can be argued that the decline of local public transportation systems and the financial difficulties of local train lines are challenges faced not just in the Kansai area but in many parts of Japan. With the observed trends in population aging, there are growing concerns that people are more inclined to travel using their own cars. With the spread of private cars,

the natural question arises as to whether the existing means of transportation remain viable parts of an integrated MaaS system of services, reservations, payments, and subscriptions.

Because an effective system can be more valuable than its integral parts, potential social and economic benefits can be drawn from an effective MaaS system based on the existing means of transportation. The MaaS system is no substitute for the traditional role played by the existing set of transportation means in the past. The immediate and long-term benefits of MaaS derive from the system synergies that can potentially flow from an optimal combination of the existing transportation assets. Thus, an efficient and effective combination of vehicles related to transportation through MaaS will enable simplified and optimal travel behavior, and contribute toward a solution to common regional problems.

It should be noted finally, that the development of MaaS systems in rural areas poses particular challenges. As noted by Hidaka et al. (2018), MaaS systems can be implemented in three different areas. Whereas the “Basic MaaS Construction Area” provides opportunities for potential applications, the “Deep MaaS Area” includes service evolution, efficiency improvement, and value creation in the transportation field. It is the “Beyond MaaS Area” that links to cross-industry collaboration, community development, and social problem-solving. Thus, in addressing the challenges of developing MaaS in rural areas, the improvement of living conditions and tourism destinations should take precedence over the design and building of MaaS applications. It is important to identify a wide range of local issues to be addressed, ranging from the creation of towns that are easy to live in to the creation of towns that are easy to visit.

Conclusions

The creation of new tourism experiences through the fusion of tourism and MaaS systems will undoubtedly become one of the principal challenges for the Japanese tourism industry in the future. Whereas MaaS efforts in Europe and the U.S. are aimed at reducing the ratio of private car ownership, the Japanese MaaS initiatives are also tourism-oriented as the principal objectives include also the improvement of convenience for future inbound travelers, the creation of optimal mobility conditions where users without driver licenses or private cars can freely travel throughout Japan by combining public transportation and mobility services. Thus, insofar as the optimal implementation of MaaS systems in rural areas is concerned, it is necessary to address the challenges of local communities in terms of improving life convenience and creating consistent tourism destinations. This would draw interest to new tourism destination points and facilitate the linkage with existing public transportation and mobility services. By providing an integrated network of safe, secure, and convenient means of transportation and sightseeing, the tourism-oriented MaaS systems have the potential to revitalize the post-pandemic tourism industry and regional economies.

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