



Research paper

Public-private MaaS: Unchallenged assumptions and issues of conflict in Sweden

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ABSTRACT

Despite an increase in Mobility-as-a-Service (MaaS) initiatives that aim to pave the way for both public and private MaaS Operators, such MaaS models have received limited scholarly attention. Uncertainties therefore remain in terms of how public-private MaaS can be realized and governed. This paper addresses this problem through an exploratory case study of an attempt to reform the business ecosystem for mobility services in Sweden, which is conceptualized as a move towards public-private MaaS. Inspired by the What-is-the-Problem-Represented-to-Be approach, the paper analyzes what problem representations and assumptions underpin the proposed reform and outlines issues of conflict across the involved actors. Drawing on these findings, the paper highlights disagreements on problems, centralization, and responsibilities as challenges to public-private MaaS developments and proposes that an inclusive and pragmatic governance strategy is key for effective and democratic governance of MaaS. Additionally, three avenues for future research are identified: development of analytical tools that better represent the complexity of MaaS governance choices, studies of how the prevailing narrative around MaaS influences developments, and analyses of governance strategies' effectiveness in relation to political objectives for MaaS developments.

1. Introduction

Mobility-as-a-Service (MaaS) – here defined as “a type of service that through a joint digital channel enables users to plan, book, and pay for multiple types of mobility services” (Smith, 2020, p. 3) – has been on the lips of transport planners, regulators, and entrepreneurs alike since the concept was first popularized during an international transport congress in Finland in 2014. The general hope is that MaaS should make it easier for people to access complementary mobility services, and that this, in turn, should increase the market share of shared mobility at the expense of private car use (e.g., MaaS Alliance, 2017). Accordingly, a wide range of MaaS development initiatives have been launched around the globe, including numerous pilots, such as Ubigo in Gothenburg, Tripi in Sydney, and Yumuv in Switzerland, and a few commercial operations, such as Whim in Helsinki, WienMobil in Vienna, and Jelbi in Berlin (see Hensher et al., 2020 for an overview of MaaS operations).¹

Yet, despite these examples, MaaS has largely proven difficult to realize. Institutional barriers for MaaS developments include: regulatory environments that are not yet adjusted for either new types of shared mobility or for MaaS; divergent interests and mistrust between involved actors regarding business models, customer relationships, and data sharing; immature and unstandardized technical systems; and the behavioral lock-in associated with private car ownership (e.g., Alonso-González et al., 2020; Karlsson et al., 2020; König et al., 2016; Kostianen & Tuominen, 2019; Meurs et al., 2020; Mladenović & Haavisto, 2021; Polydoropoulou, Pagoni, & Tsirimpas, 2020; Sochor et al., 2015; Surakka et al., 2018; Zhao et al., 2020).

Generally, it has been argued that MaaS, in addition to technology innovation and service-related developments, requires a reorganization of the business ecosystem for mobility services (Kamargianni & Matyas, 2017) – here defined as the network of organizations and individuals involved in the design, delivery, and consumption of mobility services

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¹ Additionally, multi-modal journey planners and so-called super apps that integrate payment systems for several mobility services can also be conceptualized as MaaS services (see level two of the MaaS topology in Sochor et al., 2018).

(Peltoniemi & Vuori, 2004; Pulkinen et al., 2019). MaaS introduces two new roles: MaaS Integrators that assemble information on mobility service providers' offerings, and MaaS Operators that use this information to bundle and deliver MaaS offerings to end-users (Smith et al., 2018, see also ITF, 2021; UITP, 2019). Depending on whether these two new roles are adopted by public or private actors, or both, one of three distinct MaaS models unfold: public-controlled MaaS, public-private MaaS, or market-driven MaaS, see Fig. 1.

The most frequently discussed examples of MaaS are products of either market-driven or public-controlled models. For instance, the operation of Whim in Finland was preceded by a transport legislation reform that required all mobility services in Finland to allow third parties to resell their offerings and thus enabled the company behind Whim to adopt the MaaS Integrator and MaaS Operator roles (Audouin & Finger, 2018; Hirschhorn et al., 2019; Veeneman, 2022), while the operation of Jelbi is a result of the public transport authority in Berlin adopting the two new roles (Hager & Karl, 2021). With a few notable exemptions (e.g., Smith et al., 2020), examples of public-private MaaS have, in contrast, received limited attention from researchers despite inter-sectoral collaboration frequently being hailed as an essential component in MaaS developments (e.g., Arias-Molinares & García-Palomares, 2020; Eckhardt, 2020; Jittrapirom et al., 2020; Karlsson et al., 2016; Li, 2019; Merkert et al., 2020; Polydoropoulou, Pagoni, Tsirimpa, et al., 2020; Wilson & Mason, 2020), and, more importantly, a notable increase in MaaS initiatives that aim to pave the way for both public and private MaaS Operators in recent years (van Audenhove et al., 2021).

Consequently, the MaaS research agenda is arguably somewhat misaligned with the developments in the empirical world (see Boyer & Sarasini, 2019, Maas, 2022, or Utriainen & Pöllänen, 2018 for literature reviews). How public-private MaaS developments can be organized and realized in practice remains unresolved. This is the main motivation for this paper. Additionally, the paper addresses two shortcomings of the literature on MaaS. Firstly, most studies of stakeholder perspectives on MaaS have focused on the views of the most involved actors but excluded other affected actors from the analysis. Studies encompassing a wider range of viewpoints can facilitate a more holistic understanding of tensions and conflicts (Mladenović & Haavisto, 2021). Secondly, although a few papers have reported policy document analyses (e.g., Hirschhorn et al., 2019; Mukhtar-Landgren & Smith, 2019; Pangbourne et al., 2020), the empirical evidence on MaaS developments is primarily collected through interviews, workshops, and questionnaires with stakeholder representatives. Analyses of policy documents can complement these studies by better reflecting the official rhetoric of organizations (Mladenović & Haavisto, 2021).

This paper analyzes policy documents produced as part of an attempt to reform the business ecosystem for mobility services in Sweden, which

is conceptualized as a pioneering case of public-private MaaS developments. Through this analysis, the paper explores what problem representations and assumptions underpin the reform and outlines issues of conflict across the 70+ actors that were involved. The underpinning objective is to improve the understanding of how to bring about public-private MaaS by identifying challenges to the development of such a MaaS model and by proposing ways to amend these. Yet, given that policy processes are entangled with the contexts that they are situated in (Marsden & Reardon, 2017) and that this study constitutes only one case study in one distinct policy context (Sweden in late 2010s/early 2020s), the ambition is also to present the explorative case study in such a way that it enables readers to decide the meaning of the case and to draw their own conclusions about how the findings might translate to other policy contexts (see Flyvbjerg, 2006; Peattie, 2001).

2. Material and methods

2.1. Research approach

We depart from the concept of the plural and pluralist state (Osborne, 2006; Rhodes, 1997), which suggests that policymaking is situated at the intersection between multiple interdependent political and non-political institutions. In contrast to previous MaaS studies, which repeatedly have conceptualized policymaking as an isolated and rational activity (e.g., Jittrapirom et al., 2018), we therefore understand it as a messy process that many competing organizations are involved in, and which is shaped by context and time (see for example the multiple streams framework in Kingdon, 2010). To identify the factors that permit and constrain policymaking, one should thus study the actions and interests of all actors involved in the policy process. Since policy processes are typically dominated by powerful organizations privileged by the state to the expense of less resourceful ones (Boehmke et al., 2013; Lundberg, 2014), analyses of policy processes must also be sensitive to the power dynamics at play. The study is, moreover, grounded in the notion that writing is a process by which people inscribe order into their world (Gottweis, 2003). Thus, it follows that to fully understand objects, such as policy documents, one must study the object itself as well as the various systems of knowledge and practices that informed its production.

Accordingly, we sought an analysis method that emphasizes the heterogeneity and contingency of policymaking, and which could help us work backwards from documents authored by actors involved in a policy process to understand the underpinning reasons behind their expressed views, how these have come about, how they interrelate, and how they influence the conditions for policymaking. An analytical tool called the What-is-the-Problem-Represented-to-Be approach (Bacchi,

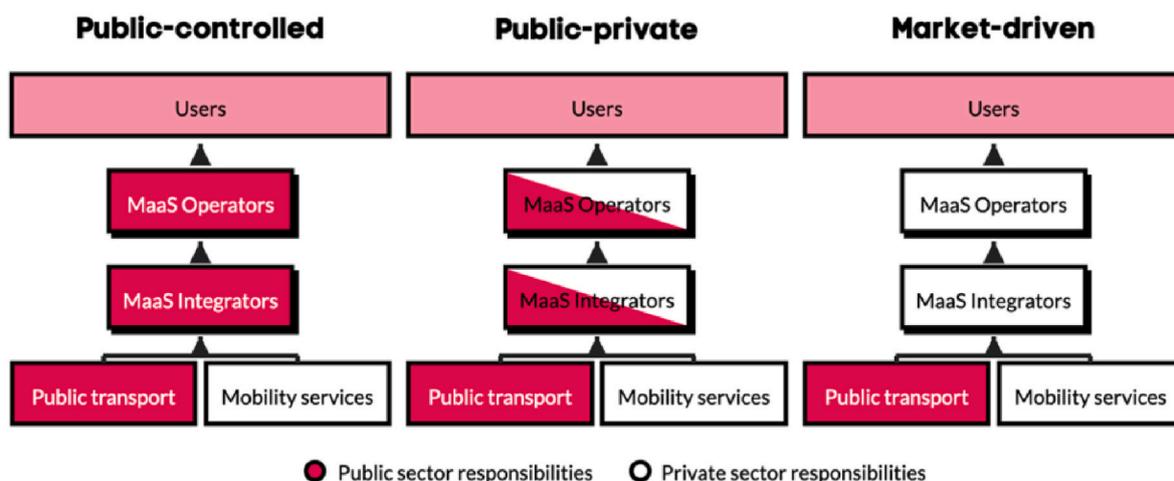


Fig. 1. MaaS models, adapted from Smith et al. (2018).

2009, 2012) was judged to meet these criteria. Fundamentally, this approach, which has been developed within the critical policy analysis research stream, challenges the conventional view that policies address existing problems. Instead, it views policies as problematizations that contain explicit and/or implicit representations of what the problem is and thereby produce problems with specific meanings. By investigating how these produced problems are constituted and represented in policies, the approach explores underlying assumptions that render them logical as well as the implications that are typically ignored when analyzing the outcomes of policies, such as how they contribute to shaping categorizations of objects, subjects, and places (Bacchi & Goodwin, 2016).

In practice, a What-is-the Problem-Represented-to-Be analysis is accomplished through asking six questions when reviewing policy texts, followed by an undertaking to apply the questions to one's own viewpoint: (i) what is the problem represented to be, (ii) what deep-seated assumptions underlie this representation of the "problem", (iii) how has this representation of the "problem" come about, (iv), what is left unproblematic in this problem representation, (v) what effects are produced by this representation of the "problem"? and (vi) how and where has this representation of the "problem" been produced, disseminated, and defended? In this case, an explorative case study of public-private MaaS developments, the policy texts in focus were official documents produced by actors involved in a government inquiry into how to develop a national ticketing system for public transport in Sweden.

2.2. Empirical context and case study

The UbiGo pilot, which often is described as the first example of MaaS, took place in Gothenburg, Sweden in 2013–2014. The promising outcome of the pilot (Karlsson et al., 2016; Sochor et al., 2015; Strömberg et al., 2018) ignited a flurry of activities across Sweden meant to transform the piloted concept into commercial MaaS services (Smith, 2020; Sørensen et al., 2020). One such activity was a collaborative initiative led by Samtrafik, a company jointly owned by public and private actors in the Swedish mobility service industry. This initiative aimed to establish a national digital platform that would mediate data and tickets from mobility service providers to public and private MaaS Operators (Smith et al., 2020). However, in the end it was judged that the benefits of the platform did not motivate the required investments. The initiative was therefore discontinued in 2017.

Still, the idea of an intermediary data platform lingered, and was eventually picked up by national-level politicians. Following parliamentary elections in 2018, a governing coalition reached an agreement on measures to implement during the coming four-year term. This included a national ticketing system for public transport, starting with an inquiry into how to set it up (Social Democrats, 2019). Although the notion of a national ticketing system arguably had been around since 2010, two aspects of the directive for the inquiry indicated that much of the inspiration came from the 2017 Samtrafik initiative. Firstly, the

directive referenced Samtrafik's ongoing attempts to "create a new infrastructure to collect, process, and distribute transport data as open data to make it easier for other actors and third-party resellers to provide booking and sales services" as a starting point (Directive, 2019:48, p. 3). Secondly, the CEO of Samtrafik was elected to perform the inquiry, which was initiated in August 2019.

The inquiry report was delivered to the government in April 2020 (SOU, 2020:25). At the core, it proposes a public-controlled digital infrastructure and platform that distributes data and tickets from mobility service providers to a competition-neutral sales channel as well as to all third-party resellers that meet basic requirements, see Table 1.

In June 2020, the inquiry report was referred for consultation and in October 2020, when the consultation period closed, 69 actors had sent in a total of 62 consultation responses. As indicated in Fig. 2, this study is limited to analyze activities up to this point. Yet, three major developments have taken place since. Firstly, the 2019 political agreement was torn up, thus creating uncertainty about the political support for a national ticketing system. Secondly, in fall 2021, the government assigned the Swedish Transport Administration to establish a national ticketing system and allocated ca 25 million Euro to fund the implementation of it between 2021 and 2024. However, a few months later, the government adjusted the mission to using the allocated funds to support an integration of the regional ticketing systems. Thirdly, following parliamentary elections in 2022, the new government reallocated these funds, but did not comment on their plans for the national ticketing system. In parallel, Samtrafik has, however, launched new initiatives that resemble proposals made in the inquiry report. As of spring 2023, how the development will continue is therefore surrounded by a high level of uncertainty.

Despite this uncertainty, the policymaking process was deemed suitable for exploring public-private MaaS developments for three reasons. Firstly, drawing on the typology presented in the Introduction (see Fig. 1), the process was conceptualized as an attempt to pave the way for public-private MaaS. The directive assigned the inquiry to highlight possibilities to advance MaaS developments, and when addressing this assignment, the inquiry report proposed a mobility service business ecosystem in which the public sector takes control of the MaaS Integrator role but leaves the MaaS Operator role open to both public and private actors. Secondly, a comparable reform meant to catalyze public-private MaaS developments has, to the best of our knowledge, only previously been undertaken in Denmark (Sørensen et al., 2020). The case can therefore be interpreted as breaking new ground, which makes it more likely to activate basic mechanisms and reveal rich information than a typical or random case, and therefore pertinent for exploratory research (see deviant cases in Flyvbjerg, 2006). Thirdly, the policy-making processes is well documented and has involved many actors, which creates conducive conditions for a well-grounded policy analysis (see dense case studies in Peattie, 2001) that covers a wide range of viewpoints.

Table 1

The proposed national ticketing system in brief.

Proposal	Description	Main purpose	Participation
Digital infrastructure	A centrally governed digital infrastructure, including a shared ticket standard and an identifier register as well as central functions for ticket exchange and financial clearing.	Enable people to travel with multiple service providers across regions with a single customer-seller relationship.	Regional public transport authorities are obligated to get onboard while commercial mobility service providers are allowed to do so.
Extended national access point	An extension of the national access point for traffic data to encompass real time data and information on tickets and prices as well as an application programming interface and a standard agreement for third-party resale of mobility services.	Improve the conditions for developing digital services that are to the benefit of mobility service users.	All mobility service providers are obligated to provide information on their products and prices. Regional public transport authorities are obligated to make all their products available for third party resale while commercial mobility service providers are allowed to do so.
Neutral sales channel	A government controlled, non-discriminatory, and neutral sales channel for all mobility services in Sweden.	Break the dominant position that a state-owned train operator has for selling inter-regional trips.	All mobility service providers are obligated to make all their products available via the neutral sales channel.

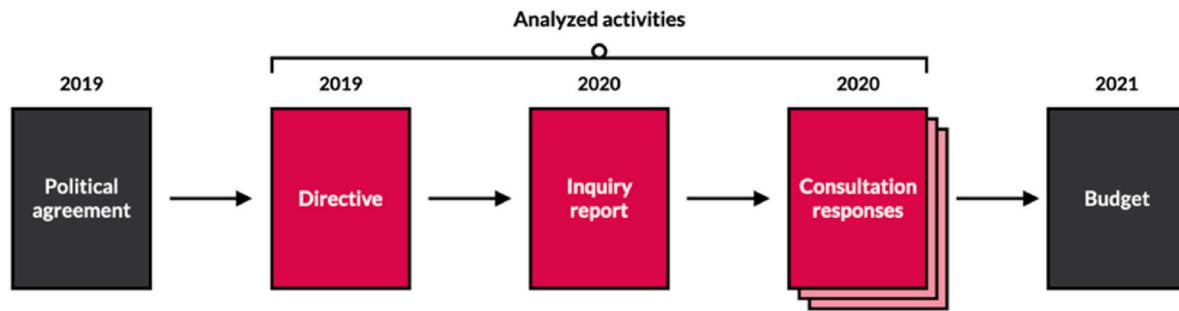


Fig. 2. Policy process and scope of analysis.

2.3. Analytical process

To initiate the analysis process, the first author read through the directive and the inquiry report and highlighted passages, sentences, and words deemed significant. Then, the same author re-read the two documents with the What-is-the Problem-Represented-to-Be approach in mind and answered the six analytical questions for each document, prior to applying the questions to his own viewpoint. Illustrative quotes were also picked out and translated to English to demonstrate the identified problem representations and the underlying assumptions.

In the second step of the analysis, the first author read the consultation responses and documented how each responded to the inquiry in general as well as to its proposals for action, recommendations, and implementation plan. Indications of assumptions in relations to innovation, mobility, people, and MaaS were also noted, and illustrative quotes were yet again picked out. Then, we jointly compared each identified problem representation and assumption in the inquiry report with the analyses of the directive and the consultation responses. If we deemed the issue as minor and neither the government nor the referral bodies commented on it, we put it aside. If several actors commented the issue though (explicitly or implicitly), we labeled the issue as either challenged or unchallenged depending on the nature of the comments. Following a few rounds of iteration and clustering, the findings from this exercise were documented in a short PM and summarized in a slide deck.

As a third step, these tentative findings were presented for, and discussed with, transport policy experts at an open lunch seminar and a transport conference in Sweden as well as at an international workshop on mobility services (see Acknowledgements). These interactions helped us pick out the most interesting results. Additionally, they improved the conformability and dependability of the study by providing plenty of opportunities for both transport researchers and practitioners to challenge the findings (Lincoln & Guba, 1985). However, no opposing interpretations were expressed.

In the final step of the analysis, the findings were written out and then compared against previous literature on MaaS and on collaborative governance, i.e., on governance approaches that strive to involve private and civil actors in policy processes (Ansell & Gash, 2008). The latter body of work contributed to the discussion on implications (Section 4.2–4.3) and was deemed relevant due to its focus on governance mechanisms in hybrid networks situated in Western policy contexts, such as the business ecosystem for mobility services in Sweden. In contrast, the discussions on challenges (Section 4.1) primarily drew on a comparison of the identified problem representations and underlying assumptions with previous findings in the MaaS literature.

3. Results

3.1. Problem representations

The main objective of introducing a national ticketing system, as stated in the directive for the inquiry, is to increase the modal share for shared modes of transport with low climate impact by making it easier to

seamlessly combine public transport trips within and between regions as well as with other modes of transport. Behind this objective lies three central problem representations, which are echoed and further expanded on in the inquiry report.

3.1.1. Users find it difficult to search and pay for public transport

First and foremost, it is, according to the directive, difficult to search and pay for public transport in Sweden, especially when a public transport leg is part of a multi-modal trip chain, crosses regional borders, and/or is situated in an area unfamiliar to the user. These difficulties create entry barriers for infrequent public transport users and demote the overall attractiveness of public transport as compared with private car use, and therefore reduce the likelihood of Sweden achieving its carbon emissions reduction targets for passenger transport.

“To achieve the [climate] goal, a larger proportion of passenger transport needs to be carried out with energy-efficient modes of transport. It should become easier to combine public transport trips within and between regions and with different traffic [sic] and modes of transport in a seamless way. This means that it needs to be easy to search for and buy tickets in an easily accessible way. The government considers that it is of particular importance to make it easier for infrequent travelers to buy tickets within public transport.” (Directive, 2019:48, pp. 2–3)

Using the success of mobile phone roaming and the coherent infrastructure for car traffic as reference cases, the inquiry report corroborates the challenges associated with finding, understanding, and paying for public transport in unfamiliar areas, for infrequent users, and when travelling multi-modally or across regional borders. Irrelevant, out of date, incomplete, incorrect, unreliable, inaccessible, and spread-out information make it difficult for people to understand what offerings are available, what they cost, and how to pay for them according to the inquiry report. For longer journeys, public transport passengers are often faced with new information and ticketing systems with different business rules and logics for use than they are used to from their home region. With this backdrop, the proposed ticketing system is described as a tool for removing barriers for public transport use. Additionally, it is presented as a means for mitigating barriers for mobility service-related innovation.

“It is clear that the national ticket system has the potential to remove barriers for travelers who find it difficult to buy tickets for public transport, and for public transport companies that find it technically difficult to integrate their systems with others to develop new travel offerings.” (SOU, 2020:25, p. 359)

3.1.2. Current systems for information sharing cannot solve the problem

This is the second central problem representation in the directive. The current national systems for information sharing and ticketing neither address the identified user problems in themselves nor provide sufficient opportunities for others to develop services that do. For instance, most public transport users do not know about the national

travel planner and ticketing service that exists (reserobot.se), and since the national access point for traffic data (trafficdata.se) does not enable third-party sale of public transport tickets, it does not facilitate for others to develop services that can outperform the existing ones.

"However, many travelers have less knowledge about the possibilities of travelling via shared modes in other regions and across regional borders, and the information channels [for inter-regional travelling] are not as well developed [as compared to regional equivalents]." (Directive, 2019:48, p. 4).

The inquiry report especially picks up on the proposition that the scarcity of easily accessible open data, the lack of a shared system for third-party resale, and the de facto monopoly position that SJ (a state-owned passenger train operator) has for selling inter-regional trips hamper digital service innovation. Even though neither innovation, nor digitalization, is in focus in the directive, leveraging the opportunities of digitalization, promoting innovation, and paving the way for future mobility are stated as a starting point for the inquiry. According to the inquiry report, the pace of innovation in the public transport sector is low, and the lack of access to the incumbents' data, tickets, and sales channels hinders others to develop and launch services that could address users' information and ticketing problems and thus to contribute to the transition towards a more sustainable transport system.

"We believe that access to open sales APIs [application programming interfaces] will increase market competition and lower barriers to innovation. With this, we believe that it will become easier for a traveler to get from door to door." (SOU, 2020:25, p. 380)

3.1.3. *The public transport sector is ill equipped to improve the situation*

Thirdly, the directive hints that the distribution of public transport responsibilities does not cater for addressing users' information and ticketing problems. Regional public transport authorities are tasked with ensuring that an adequate public transport supply is available within their region. In contrast, neither the responsibility for inter-regional public transport, nor the coordination with other modes of shared mobility, is currently well-defined.

"However, the responsibility for cross-regional public transport is not fully defined in the current legislation." (Directive, 2019:48, p. 7)

Expanding on this topic, the inquiry report argues that the decentralization of public transport responsibilities infers unnecessary investments, sub-optimization, and coordination costs, which make it difficult for the public transport sector to harness the opportunities that comes with digitalization. Going even further, the inquiry report argues that the public transport sector's proven inability to agree on technical standards, solve coordination problems, and create clear conditions for MaaS Operators, despite recurring calls to do this from the government, has confirmed that it is unfit to develop a national ticketing system on its own. State intervention is needed. Still, the national authorities that could take responsibility for the ticketing system lack the necessary skills according to the inquiry report, which is why a temporary committee that oversees the implementation is proposed.

"The public transport sector has taken important steps towards coordination by introducing the so-called BoB standard [the ticket and payment standard]. Still, the development has shown that the sector's commitment to resolving the issues on a voluntary basis has not been sufficient." (SOU, 2020:25, p. 276)

3.2. *Underlying assumptions*

The three central problem representations described in the previous section are situated within the prevailing liberal market ideology in the European Union and the mixed economic system of Sweden. They are, moreover, underpinned by assumptions about innovation, mobility,

people, and MaaS. Some of these assumptions are mostly left unchallenged by the referral bodies, while others are broadly opposed, see Table 2.

3.2.1. *Mostly unchallenged assumptions*

Digitalization is, in the inquiry report, presumed to disrupt public transport regardless of what actions are taken. The large-scale transformations that the digitalization of everyday life entails is thought to open new opportunities for improvements, such as personalization of services, but to demand adjustments to digital infrastructures, responsibilities, working methods, and skills across the public transport sector if these opportunities are to be leveraged. The national ticketing system is described as a piece in that puzzle.

"Digitalization is progressing at an incredible speed and it is important for societal functions to keep up with that development and meet the needs of all citizens." (SOU, 2020:25, p. 65)

This assumption is left unchallenged by the referral bodies. Likewise, they do not challenge the increasingly dominant position for smartphones that the inquiry report supposes when it comes to public transport information intake and ticket purchase, even though many referral bodies highlight the importance of providing alternatives for those without access to, or preference for, digital devices. Perhaps more surprisingly, the referral bodies also seem to, almost unanimously, agree with the assumption that sharing of public transport data and tickets will boost innovation, which in turn will benefit public transport users. Overall, the referral bodies seem to consider it solely positive if more actors can disseminate public transport information and sell tickets. The availability of public transport data should, from their points of view, therefore, be increased and third-party resale facilitated.

"... making open data available would significantly contribute to promoting innovation and development of mobility products and services, and thus facilitate public transport travelling." (The Swedish Association of Local Authorities and Regions, 2020, p. 1)

Even though they debate how big the demand is, the referral bodies, moreover, seem to implicitly but consistently agree with the inquiry report on that there is a market for new types of commercial mobility services that complement public transport as well as for commercial MaaS services that integrates these with public transport.

Finally, in terms of largely unchallenged assumptions, all referral bodies but SJ themselves support the notion that SJ's dominant position when it comes to selling digital tickets for inter-regional public transport trips is an underserved consequence of their previous monopoly positions, which demotes competition and therefore is negative for public transport users. Although many referral bodies sympathize with the inquiry's conclusion that replacing SJ's sales channel is an intricate issue that needs to be investigated further, some voice dissatisfaction with the inquiry's lack of a concrete proposal for immediate action.

Table 2
Underlying assumptions to the problem representations.

Mostly unchallenged assumptions	Broadly challenged assumptions
The ongoing digitalization is bound to disrupt public transport	Centralization reduces coordination costs and barriers for innovation
Most people will purchase public transport tickets via smart phones, but not everyone	Future public transport ticketing solutions will be cloud based
Open data leads to more innovation, which in turn leads to sustainability improvements	A national ticketing system could mitigate the unclear responsibilities for inter-regional travelling
There is a market for commercial MaaS services and new types of mobility services	People would use public transport more, given better information and less ticket-related hassle
The de facto monopoly of SJ demotes competition within public transport	People would use a government controlled nationwide sales channel for mobility services

“However, since the conditions regarding ticket sales are a real problem today, the Swedish Competition Authority finds it unsatisfactory that the inquiry has not fully investigated the issue ...” (The Swedish Competition Authority, 2020, p. 3)

3.2.2. Broadly challenged assumptions

In terms of broadly challenged assumptions, the introduction of a national ticketing system is in the inquiry report motivated by the efficiencies that it could create. A consolidated, centralized system means that neither mobility service providers nor resellers must develop a technical solution, partnership model, and organization for each ticketing collaboration, which according to the inquiry report, paves the way for new ticketing collaborations by lowering entry barriers and opens opportunities for making existing collaborations more efficient.

“To get public transport companies to choose to use the national ticketing system, the business is based on that it entails cost advantages, which can be achieved through large-scale and synergy gains.” (SOU, 2020:25, p. 347)

This proposition splits the referral bodies in two opposing halves: one that enthusiastically agrees with the proposed benefits and one that highlights that a centralized structure rather than promoting innovation and reducing costs might create an expensive and inflexible system that few will use if optional and which will hamper the possibilities to develop and modify tailor-made solutions for bilateral collaborations if mandatory.

“A centralized organization risks to bring inertia to the administrative and technical development, which would risk delaying and increasing the cost of establishing both combined mobility services and third-party resale.” (Region Stockholm, 2020, p. 5)

As further discussed in the next section, this is one of the central conflicts that the inquiry report elicits. Another major tension concerns the implementation plan, and especially the costs associated with it. The lion's share of the calculated implementation cost is linked to the proposed digital infrastructure, which implies that public transport tickets will be managed in a shared digital cloud. Instead of carrying an actual ticket, passengers will carry personal identifiers, which are linked to information on purchases and rights stored in the cloud. This structure is grounded in the belief that the next evolution for public transport ticketing is to replace smartphone centered solutions with cloud centered ones. Many referral bodies do not agree with this prediction, instead arguing that public transport companies and public transport users alike will continue to prefer solutions in which all the information needed to plan, execute, and follow up on public transport trips is available through the same smartphone app.

“Unfortunately, it is obvious that the user perspective has not been the starting point for the investigator, who to a large degree assumes that the ticketing system will be a cloud-based system, but completely lacks a knowledge base about what users demand”. (The Swedish Organization for Public Transport Consumers, 2020, p. 2)

The referral bodies, moreover, generally oppose many of the effects that the inquiry report envisions. For instance, the national ticketing system is meant to mitigate the ambiguity regarding responsibilities in relation to promoting inter-regional and multi-modal public transport travelling. While some referral bodies believe that it could, others believe that its low value offering would hinder it from making such a mark. More generally, the referral bodies debate whether people would use public transport more, given better access to information and less ticket-related hassle. Are information and ticketing the main problems or is it rather factors such as departure times, frequency, travel time, reliability, and price that are most important to travelers? If so, can the budget for the national ticketing system not be spent more wisely? Likewise, many actors question if the proposed neutral sales channel for

mobility services would be able to compete with the flexibility and usability of commercial alternatives.

“Additionally, a government sales channel risks to, in terms of innovation and usability, quickly fall hopelessly behind the public transport companies' own [sales channels] and the independent third-party solutions that can be expected to emerge through a full opening of third-party resale of public transport tickets.” (Kirei & Unicon Konsult, 2020, p. 4)

4. Discussion

Based on the identified problem representations and assumptions, this section first discusses challenges to the development of public-private MaaS. Then, it proposes implications for MaaS governance practice and research.

4.1. Challenges to public-private MaaS developments

The referral bodies' critique of the underpinning assumptions in the directive and inquiry report presented in the previous paragraph illustrates three principal disagreements in relation to the proposed national ticketing system. As discussed next, these can be interpreted more broadly as challenges to public-private MaaS developments provided that the MaaS concept is in a comparable development phase (i.e., largely unproven) and that the developments are situated in policy contexts that are fairly similar to the one discussed in this paper.

4.1.1. Disagreement on problems

The high level of uncertainty surrounding MaaS has previously been identified as a barrier to MaaS developments. Conflicting views on what the introduction of MaaS might lead to and who should do what (Smith et al., 2018) make it difficult to establish inter-organizational trust (Serafimova, 2020) and to rally all needed actors behind shared visions and action plans (Jittrapirom et al., 2020), which in turn, make it hard to coordinate the envisioned business ecosystem transformation (Smith, 2020). This study illustrates that the uncertainty goes beyond how the business ecosystem should be organized and governed. On a more fundamental level, many actors question the significance of the problems that MaaS is positioned to address (see also Mladenović & Haavisto, 2021).

MaaS is often depicted as a revolutionary concept that will turn mobility as we know it upside down and make the experience of using mobility services customizable, seamless, and user friendly (e.g., Hietanen, 2014). When more soberly examining the potential short- and mid-term effects, such as the investigator and the referral bodies have done in this case, MaaS comes across more narrowly as an incremental improvement to how the information about, and payment of, mobility services is organized (see Lyons et al., 2019). This actualizes the question of whether information and ticketing problems significantly decrease the attractiveness of using mobility services.

Quite a few referral bodies criticize the limited evidence provided for this problem representation. While some agree with the inquiry report in that the national ticketing system is a necessary investment to prepare for the future digital, seamless, and multi-modal mobility landscape, others highlight that public transport apps are broadly adopted and appreciated by public transport travelers and/or the minor role that inter-regional travel and shared mobility services play in the total transport work. Several referral bodies also suggest alternative investments in public transport that would contribute more to achieving the carbon dioxide emission targets for transport. Overall, many referral bodies conclude that the cost of implementing the proposed national ticketing system is disproportional to the estimated societal benefits.

4.1.2. Disagreement on centralization

What actors should take what operative roles in the business

ecosystem is an ongoing discussion among researchers and practitioners, and one of the main questions concerns whether the scale of the ecosystem should be local, regional, national, or international. Inspired by the structural changes in the telecommunication industry, some MaaS proponents argue that a harmonized approach is needed to make sure that MaaS subscriptions can be used across regional and national borders (e.g., Nykänen et al., 2017). In contrast, others argue that mobility mostly is local and that a unique approach to MaaS therefore will need to be taken by any city or region engaging with the concept (e.g., POLIS, 2017). This conflict has led to inconsistent approaches to MaaS across different strands of government (Mukhtar-Landgren & Smith, 2019) as well as to proposals of decentralized business ecosystems inspired by blockchain technology (e.g., de Wilde, 2019; ITF, 2021; Karinsalo & Halunen, 2018).

The analysis reported in this paper provide empirical backing to the notion that actors involved in MaaS disagree on whether a centralized structure is an appropriate means to address information and ticketing problems. One of the most frequently debated topics among the referral bodies is the centralization of technology, data, know-how, and decision power that the proposed ticketing system entails. Is a central database for all use of shared modes of transport in line with personal integrity? Can collaborations via a national actor be as quick footed as bilateral collaborations? Is it cost-efficient to develop a shared system that can handle all local variants? Will regional public transport authorities be able to steer the development towards contributing to their goals? Should a public-controlled sales channel compete with commercial alternatives? While some actors do not believe so, and propose a more decentralized business ecosystem, others argue that a centralized structure is key for reducing double work, to enable smaller actors to participate, and to pave the way for nationwide coverage of MaaS services.

4.1.3. Disagreement on responsibilities

Closely linked to the question of centralization is the division of responsibilities during the development of MaaS. In particular, the discussion has focused on what the public sector must do to pave the way for MaaS (e.g., Lajas & Macário, 2020; Li & Voegelé, 2017; Mulley et al., 2018; Surakka et al., 2018; Wilson & Mason, 2020). Should public transport authorities just open their data and ticketing interfaces to external actors (e.g., Heikkilä, 2014), or should the public sector take a broader and more active role (e.g., Docherty et al. 2018; Veeneman, 2019)?

One part of this discussion concerns what public transport is, or should be, and therefore what types of mobility services the public sector should take responsibility for. A key question that referral bodies debate is what services should be included in the national ticketing system, either obligatorily or voluntarily. The referral bodies are first and foremost confused over what the inquiry report suggests. Yet, they also voice contradictory opinions, ranging from that the ticketing system only should focus on regional public transport to that it should be compulsory for all shared mobility services in Sweden to join. Another central part of the discussion regarding responsibilities concerns who should pay for the development and operation of the ticketing system. Should it be sponsored by the state, and if so, to what degree? Beyond unanimously denouncing the proposed budget (and time plan) as low-balled, many referral bodies argue that the state should fully finance the implementation, including all added costs for those who are obligated to join. In contrast, the referral bodies seem to have different opinions on, whether the proposed model, in which the operating costs are financed through transaction fees, is feasible and fair or not. Some worry that it, in the end, is the end-users who will have to bear the costs that the system entails, and that it therefore will rather worsen than improve the attractiveness of using mobility services.

In summary, the reported analysis suggests that there are clashing views among actors involved in MaaS developments on the severity of the problems that MaaS is supposed to address, on how centralized the

business ecosystem should be, and on how responsibilities should be divided across public and private sectors as well as between public actors. Although not covering all previously reported disagreements (such as where MaaS should be implemented, see Mladenović & Haavisto, 2021), these results are largely in line with previous findings on MaaS developments in the Nordic context (e.g., Audouin & Finger, 2018; Hult et al., 2021; Smith, 2020; Zhao et al., 2020). However, we report the views of a larger volume and variety of actors than previously investigated, which enables us to provide a more complete and detailed view of what dimensions of the three issues that there is disagreement over. Disagreements on whether infrequent travelers struggle with buying public transport tickets (problems), if knowledge about MaaS should be concentrated to a central actor (centralization), and whether the public transport authorities' development costs should be reimbursed by the state (responsibilities) have for instance, not been described before. The slow-moving and convoluted implementation of the proposed national ticketing system, moreover, suggests that these disagreements constitute challenges for public-private MaaS developments.

4.2. Implications for practice

Notwithstanding the governance model, MaaS developments are likely to require coordination across actors that stem from a variety of sectors, operate at different spatial scales, and oftentimes have previously not collaborated (Meurs et al., 2020; Smith, 2020). However, since public-private MaaS entails that both public and private actors take on new operative roles, this model is presumably more dependent on coordination across the public and private than the other models (see Torfing, 2016). The disagreements presented in the previous paragraph provide empirical backing to that presumption and highlight that coordination activities must address disagreements on problems, centralization, and responsibilities. Additionally, two lessons on how to best coordinate public-private MaaS developments can be drawn from the analyzed policy process.

Firstly, the literature on governance typically distinguishes between three principal types of coordination mechanisms: *hierarchy*, which relies on public sector command; the invisible hand of the competitive *market*; and *network*, which is based on coordination through trust and collaboration (e.g., Powell, 1991). Although these mechanisms are ideal types and thus do not exist in a pure form in practice (Lupova-Henry & Dotti, 2019), they can help to distinguish governance strategies. In the studied case, network has arguably been the dominating coordination mechanism; the inquiry process, through which the government negotiated its views with the referral bodies, as well as the preceding Samtrafiken initiative are examples of network coordination activities. Still, coordination by hierarchy and market have also been present. In fact, the inquiry report fundamentally proposes legislation (hierarchy) that would force actors to contribute to creating a market for MaaS (market). Hence, the governance strategy is best described as a mix of network, hierarchy, and market coordination, although the emphasis has been on network instruments.

The literature on collaborative governance suggests that such a mixed approach to governance can overcome the weaknesses of pure network coordination, like the need for a so-called meta-governor (Jessop, 2003) capable of overseeing ambiguous networks of interdependent but autonomous actors (Sørensen et al., 2023; Sørensen & Torfing, 2009, 2017). A lack of authority has previously hindered Samtrafiken from taking a meta-governor role for MaaS developments in Sweden (Smith et al., 2020). The proposed national ticketing system would give them such authority if implemented. Overall, the referral bodies comments suggest that public-private MaaS models that combine some cross-jurisdictional harmonization and centralized support functions with forums for collaboration and some degree of autonomy for both private actors and public actors at local/regional level are more likely to be broadly accepted. In other words, a pragmatic mix of hierarchy, market, and network instruments. Still the lack of tangible

success in the studied case indicates that there is still more to learn about what the mix should look like.

Secondly, the list of identified weakness of network governance also includes limitations of the number of participants, unclear accountability, and lack of trust among participants (Powell, 1991; Schrank & Whitford, 2011; Sørensen, 2018). In this case, the lack of opposition to some of the assumptions in the inquiry report might be related to the homogeneity of the participant group. Although the policy process was open, 53 of the 69 organizations that sent in a consultancy response were either regional public transport authorities, national authorities, or interest groups of some sort (see the Appendix). This implies that primarily incumbent and resourceful organizations were given a voice in the policy process, which in turn, might have reduced the likelihood of alternative viewpoints and dissent. Broad representation is important for both ensuring that policy developments are democratic (Henriksson et al., 2019; Sørensen & Paulsson, 2020) and for aligning organizations' activities with the shared agenda (Mukhtar-Landgren & Smith, 2019). Hence, this case study suggests a need for additional measures, as compared to the standard policy process, that ensure that a large variety of involved and affected stakeholders can influence MaaS policymaking.

4.3. Implications for research

The reported analysis showcases that MaaS governance is a complex issue and that more research is needed to enable policymakers to make informed choices about their strategies. Given the limitations of this exploratory case study in terms of the context studied and the applied literature, case studies of public-private MaaS developments in other places using complimentary analytical frameworks are needed to understand the transferability of the findings. Beyond that, this paper highlights three avenues for further research on MaaS governance.

Firstly, limited research hitherto on public-private MaaS formed the motivation for our case study. In contrast to previously studied cases of MaaS, the proposed model is neither solely market-driven, nor fully public-controlled. Still, the analysis of problem representations and assumptions illustrates that it is grounded in a narrative of an inevitable digital disruption of the mobility landscape and a need to accelerate distributed innovation practices to increase market competition and improve the user focus within mobility. Despite the tough criticism the inquiry report received, the referral bodies rarely challenged these assumptions. Likewise, only a few of the referral bodies questioned that the inquiry report did not explicitly discuss the political dimensions of its proposals, such as the inherently political decisions to create a market for MaaS by forcing public transport authorities to open for resale and to shape the same market via a standard agreement (see Mazzucato, 2018).

Hence, the policy process can arguably at least in part be described as post-political, meaning that the governance of MaaS in this case was consciously or unconsciously reduced to consensus-driven technocratic management (Hopkins & Schwanen, 2018; Swyngedouw, 2010). This resembles the innovation-oriented rhetoric that dominates the general MaaS debate (Mladenović & Haavisto, 2021; Pangbourne et al., 2020). In contrast, it conflicts with the voices that argue that strong governmental control of the delivery of MaaS is needed to ensure that its diffusion contributes to political goals such as a modal shift away from private car use (e.g., Docherty et al. 2018). Future research should study how this narrative has come about and how it influences MaaS governance choices.

Secondly, the paper departed from a public/public-private/market-driven trichotomy (see Fig. 1), which in essence describes the public and private roles in the business ecosystem for mobility services during the delivery of MaaS. The reported analysis has arguably shown that this categorization of MaaS models insufficiently describes the complexity of MaaS governance.

The choice of governance strategy is more complex than simply picking which roles the public sector should play in the business ecosystem for mobility services during the delivery of MaaS, i.e., the

operation phase. Previous research has argued that public organizations can play important roles during the development and diffusion phases as well, thus adding a time dimension to MaaS governance choices (Smith, 2020). This study illustrates that the choice of governance mechanisms as well as which actors should be responsible for and involved in coordination activities are important governance choices too, thus adding further complexity. Additionally, coordination ambition can differ, ranging from efforts to ensure that activities do not undermine each other to attempts to ensure that they all contribute to the realization of shared goals (Reff Pedersen et al., 2011), and, as suggested by van de Welde (1999), it is relevant to distinguish between how three distinct types of issues are coordinated: *strategic* (what do we want to achieve?), *tactical* (which services can help to achieve these aims?), and *operational* issues (how to produce these services?). In summary, MaaS governance strategies therefore encompass at least choices regarding the level of ambition as well as regarding *what* is governed *when* by *who* and *how* (see Lupova-Henry & Dotti, 2019). With these dimensions as a starting point (see also Hirschhorn et al., 2019; Smith & Hensher, 2020; Veeneman, 2022), this study highlights a need to develop tools for describing MaaS governance strategies that match this complexity and outperforms the public/public-private/market trichotomy in terms of usefulness for governance analyses.

Finally, and as touched upon in Section 4.2., future studies of MaaS governance should, moreover, shed light on the effectiveness of MaaS governance strategies. The question of MaaS' potential to evoke a modal shift away from private car use and/or decrease transport exclusion largely remains unresolved (e.g., Feneri et al., 2022; Hensher, 2022; Ho, 2022; Sochor, 2021). So does the question of what public actors can do to ensure that MaaS contributes to these, or other, political objectives (see also Mulley & Kronsell, 2018; Smith & Theseira, 2020).

CRediT authorship contribution statement

Göran Smith: Funding acquisition, Conceptualization, Investigation, Formal analysis, Writing – original draft, Writing – review & editing, Writing and Editing. **Claus Hedegaard Sørensen:** Project administration, Conceptualization, Formal analysis, Funding acquisition, Writing – original draft, Writing – review & editing, Writing and Editing.

Declaration of competing interest

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Data availability

Data will be made available on request.

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Appendix

The consultation group consisted of 21 public transport authorities and regions, 20 interest groups, twelve national authorities, five technology providers and consultants, four mobility service providers, three legal authorities, one mobility service operator, one station company, one research institute, and one citizen. 23 of these responded even though they were not officially invited to do so, see Table 3. Additionally, 14 actors were invited but did not respond: Funktionsrådet i Sverige, Inlandsbanan, K2 - The Swedish Knowledge Centre for Public Transport, Region Örebro, Samtrafiken, Svenskt näringsliv, Sunfleet, Transdev, Transportföretagen, Travel, Uber, Visita, Voi, and Vy.

Table 3
The consultation group

Referral body/bodies	Categorization	Invited
2030-sekretariatet	Interest group	No
Advokatsamfundet	Interest group	No
Allrail	Interest group	No
Cabonline	Mobility service provider – Taxi	Yes
Delaktighet, handlingskraft, rörelsefrihet	Interest group	Yes
Fidesmo	Technology provider	No
Förvaltningsrätten i Linköping	Legal authority	Yes
Integritetsskyddsmyndigheten	National authority	Yes
Jernebane	Interest group	No
Jernhusen	Station company	No
Justitieombudsmannen	Legal authority	Yes
Järnvägsfrämjandet	Interest group	No
Kammarrätten i Jönköping	Legal authority	Yes
Kirei; Unicon Konsult	Technology consultant	No
Klimatkommunerna	Interest group	No
Kommunalförbundet 'kollektivtrafikmyndigheten' i Västernorrlands län; Regionala kollektivtrafikmyndigheten i Västerbotten; Regionala kollektivtrafikmyndigheten i Norbotten; Region Jämtland Härjedalen; Luleå Lokaltrafik; Skelefteå buss; Länstrafiken i Västerbotten	Regional public transport authorities and associated companies	Some
Konkurrensverket	National authority	Yes
Konsumentverket	National authority	Yes
Kurt Hultgren	Citizen	No
Länstrafiken Kronoberg	Regional public transport authority	No
MTRX	Mobility service provider – Train	Yes
Myndigheten för delaktighet	National authority	Yes
Myndigheten för digital förvaltning	National authority	Yes
Nobina	Public transport operator	Yes
Passagererpulsen	Interest group	No
Post- och telestyrelsen	National authority	Yes
Region Blekinge	Regional public transport authority	No
Region Gotland	Regional public transport authority	Yes
Region Gävleborg	Regional public transport authority	Yes
Region Halland	Regional public transport authority	Yes
Region Jönköpings län	Regional public transport authority	No
Region Kalmar län	Regional public transport authority	Yes
Region Skåne	Regional public transport authority	Yes
Region Stockholm	Regional public transport authority	Yes
Region Uppsala	Regional public transport authority	Yes
Region Värmland	Regional public transport authority	No
Region Västmanland	Regional public transport authority	No
Region Västra Götaland	Regional public transport authority	Yes
Region Östergötland	Regional public transport authority	Yes
Resenäerna	Interest group	Yes
Riksrevisionen	National authority	Yes
Saga Rail	Mobility service provider – Train	No
Silverrail	Technology provider	Yes
SJ	Mobility service provider – Train	Yes
Skatteverket	National authority	No
Statens väg- och transportforskningsinstitut (VTI)	Research institute	Yes
Structab	Technology provider	No
Svensk kollektivtrafik	Interest group	Yes
Svenska färdtjänstföreningen	Interest group	No
Svenska resebyrå- och arrangörsföreningen	Interest group	No
Svenska taxiförbundet	Interest group	Yes
Sveriges bussföretag	Interest group	Yes
Sveriges kommuner och regioner	Interest group	Yes
Sveriges konsumenter	Interest group	Yes
Synskadades riksförbund	Interest group	Yes
Trafikanalys	National authority	Yes

(continued on next page)

Table 3 (continued)

Referral body/bodies	Categorization	Invited
Trafikverket	National authority	Yes
Transportstyrelsen	National authority	Yes
Tåg företagen	Interest group	Yes
Valfrihetens vänner	Interest group	No
Vinnova	National authority	Yes
Västsvenska handelskammaren	Interest group	No

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