Mobility as a Service Operating Model to Enable Public Policy

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Abstract

Mobility as a Service (MaaS) is the concept through which travelers plan, book, and pay for public or private transport on a single platform using either a service or subscription-based model. Observations of current projects identified two distinct approaches to enabling MaaS: the private-sector approach defined as a “business model,” and the public sector approach that manifests as an “operating model.” The distinction between these models is significant. MaaS provides a unique opportunity for the public sector to set and achieve public policy goals by leveraging emerging technologies in favor of the public good.

Common policy goals that relate to transportation include equity and access considerations, environmental impact, congestion mitigation, and so forth. Strategies to address these policy goals include behavioral incentivization and infrastructure reallocation. This study substantiates two models for implementing MaaS and expanding on the public sector approach, to enable policy in favor of the public good.

varying definitions of Mobility as a Service (MaaS) exist throughout the literature. Many focus on key attributes to the traveler experience such as planning, booking, and paying for mobility services. Jittrapirom et al. performed a comprehensive review of international MaaS projects and noted, “An implementation of MaaS can have significant impacts to the existing business model of public transport, especially on the level of integration” (1). As discussed in their review, the dialogue to date has focused on the business aspects and commercial models for this new approach to providing transportation services. Alternatively, this study introduces the concept of the public sector role in governing MaaS ecosystems by naming it and providing a few examples for why policy-centric leadership is necessary to ensure MaaS reaches its full potential.

Many papers have focused entirely on the fact that MaaS has yet to agree on a definition. While the industry continues to debate the specific requirements of MaaS, this paper proposes the following definition because it addresses a missing component while distilling the common attributes in prior findings. MaaS is a framework for fulfilling public policy goals by combining all public and private transport services in a region through a central interface (i.e., web, mobile application, or phone) to plan, book, and pay for integrated mobility options that are optimized to equitable outcomes for individual preferences. MaaS provides the capability to enable policy through the application of various technologies toward the attainment of an identified goal. MaaS originated in the private sector with initial approaches creating subscription plans that package mobility services into a single agreement in exchange for a set monthly fee from the user. As MaaS expanded, the research shows the industry segmented MaaS into one of two categories. One is the initial business approach that focuses on the profit models of the various providers. The second is an emerging idea that the government must lead this change by guiding with policy to ensure the greater good of public needs are met. That approach will require a new set of goals and operational considerations. For clarity, the following terms are introduced: the “MaaS Business Model” and the “MaaS Operating Model.”

The MaaS Business Model provides a combination of predefined, region-specific mobility options in exchange for a flat rate paid by the user. Under the MaaS Business Model, the entity that offers the subscription package of services may or may not operate any of the services themselves. As a key element of this approach, entities create a package of services through either a formal business arrangement, or by purchasing fare media in bulk

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and reselling it as part of a larger package to users. Some private MaaS operators may have a legal obligation to meet minimum access and environmental requirements (such as permits and licensing) but they are not beholden to decision-making processes that consider broader implications such as how their services affect the environment. The review of the several MaaS pilots in “Prototype Business Models for Mobility as a Service” (2) investigated representative examples of differing MaaS Business Models in Budapest, Hungary; Greater Manchester, U.K.; and Luxembourg City, Luxembourg. Businesses operating within this model will have a primary objective of maximizing revenue, even if there are additional goals of creating more efficient service, or to enhance the use of public programs. The corporate structure of a MaaS operator will likely require a fiduciary responsibility to shareholders to increase profit, and, as such, may not entirely align with broader societal goals.

Profit should not be considered a negative aspect of this approach. Indeed, there can be successful profitable companies that also act in good public faith (e.g., Toms Shoes and Patagonia both balance stated corporate aspirations for good with shareholder and corporate profit). Profit is pointed out simply to delineate the difference in motivating factors of the business goal. There may be limited utility to MaaS subscription packages for certain individuals, and there is likely to be price sensitivity. A study analyzing different subscription bundles in Eindhoven and Amsterdam showed that factors other than price influenced decisions. “In fact, the results show that the probability to subscribing to the service monotonically decreases at an increasing rate with increasing price” (3). An overview of pilot projects using the subscription approach can be found in “Questioning Mobility as a Service: Unanticipated implications for society and governance.” (4) Additionally, it provides a theoretical basis for the necessity to separate this model from the alternative, which the rest of this paper will focus on.

Public sector entities should drive the “MaaS Operating Model.” As noted by the European Metropolitan Transit Authorities (EMTA), while “the common tenor in the discussion of MaaS is around societal goals of sustainable transport, congestion prevention and even public health, it would be naïve to consider the producer interest of an industry that accounts for 5% of Europe’s [Gross Domestic Product] GDP as inevitably aligned with the wider, far more complex needs of society as a whole … As the interests of these organizations may not naturally contribute to cities’ and regions’ mobility challenges and development objectives, a detailed elaboration of the MaaS concept from a public authority perspective and a stronger involvement of public organizations in the discussion around the market structure of MaaS is inevitable” (5). The concept of the public sector addressing the needs of the public good in MaaS is why the definition this paper started with stated “equitable outcomes for individual preferences.” If private entities wish to maximize profit tailored to highly personalized choices they should be required to do so in a way that prioritizes the needs of the general public. In other words, if individuals have the right to make choices in their own best interest (MaaS Business Model), they must be required to do so in a way that creates better outcomes for the rest of the world (MaaS Operating Model). Mobility rights must come with responsibilities. Governments are starting to understand their need to adequately charge facilities or services to flexibly account for those choices as noted in EMTA’s joint statement.

Unfortunately, previous research confirms the digital discrimination that often occurs with sharing economy and MaaS Business Models (6, 7). Without strong governmental policy pushing the needs of the community over the needs of the private companies, MaaS Business Models will instead prioritize density over coverage and lower costs over accessibility (8).

The MaaS Operating Model allows governmental entities to layer technologies in a manner that progressively enhances the user experience through providing greater access to multimodal transport services paid for through a common payment interface while simultaneously ensuring public policy outcomes through incentives, requirements, and rules. In this manner, the technologies required to deliver the technical capability of coordination among services occurs through a roadmap of digital products. This layering approach to technology implementation can incorporate unique regional desires as defined in their guiding policy. The MaaS Operating Model promulgates prevailing business rules and contracts to govern the relationship and often standardizes application programming interfaces (API) with data sharing arrangements. Growing interest from the public sector affirms benefits from the “as a service” approach; however, the public sector is often responsible for a different set of goals than the private players offering a MaaS subscription.

Alternatively, public sectors’ governing bodies must address policies dictated by state or federal law, or by statute or regulation. Therefore, a MaaS Operating Model is an important addition to defining MaaS frameworks. These policies often require outcomes that ensure equitable access based on gender, race, income, or disability. Sometimes the policy aligns more to environmental goals or public health outcomes. The goal in any given region will be unique, but it will be common that MaaS offerings that are led by a public sector player will be implemented with a goal in mind that defines a public good. The distinct differences in these models reflect the
approach and engagement processes that must be identified and then implemented for MaaS while designating the appropriate role(s) for such an arrangement.

Both models are likely to be present in any given region, with multiple players offering similar services and features.

**Background**

A foundational study in MaaS defined a topological approach in which levels define the maturity of MaaS in a region. According to the study, “Level 0 is No Integration, Level 1 is Integration of Information, Level 2 is Integration of Booking and Payment, Level 3 is Integration of Service Offer, Level 4 is Integration of Societal Goals” (9). “A wide range of alternative modes and customized mobility services is expected to have societal value, increasing accessibility in reaching places and in the ability to utilize transport modes” (1). In practice, those societal goals may be identified by multiple entities in a region working together to develop a policy approach that serves common interests.

The topological approach demonstrates how both the Business Model and Operating Model for MaaS may have common technologies. From a technology standpoint, Level 1 logically corresponds with real-time travel information such as currently offered through companies like Google Maps™, Transit App™, Moovit™, and so forth. Entities operating at Level 1 likely receive information from real-time passenger information (RTPI) from the public transportation agency themselves or through the General Transit Feed Specification (GTFS) in the U.S. or Service Interface for Real Time Information (SIRI) internationally. At Level 2, entities likely implement a mobile ticketing scheme leveraging a card- or account-based back-end technology through the fare collection operator. Therefore, at Levels 1 and 2 both models likely offer similar technological processes. The public sector layers their available technologies to meet the same customer-facing capability that the private sector counterparts employ.

However, at Level 3 the business goals are more likely to dictate the approach. For the private sector MaaS operator, the subscription set of services may target a specific demographic, a certain class of earners, or even members of a certain group such as loyalty to a bank, private mobility service provider, or social club. This approach may limit the user group to a set so exclusive that necessary public objectives are not met. The MaaS Operating Model would also need to exist in a region to ensure equity among users is met, and that broader societal goals can be attained, as Level 4 outlines. Competition among a multitude of providers may increase range of services and may even enhance quality of service, but if left entirely to the private sector, may not realize the full potential that Level 4 MaaS offers.

Review of existing MaaS implementations demonstrates that both models will need to exist in a region to ensure the best of both aspects of service maximize the opportunity that MaaS provides. Each model has strengths—the private sector capability to develop and implement quickly with innovation and competitive focus, and the public sector as defender of the public good. The remainder of this paper focuses on sample policies that may guide the public sector development of a MaaS solution set to identify the policy position that most resonates with their need, as well as examples of current MaaS projects and policies identified as crucial to their mission.

Many of the initial MaaS pilots undertaken internationally originated under the MaaS Business Model. Over time, growth in MaaS pilots has been somewhat constrained because of a variety of influences including political, regulatory, and societal pressures. The public sector has become a natural actor in this space as it became evident that “public transportation must be the backbone of MaaS” (10). One study focusing on MaaS projects in Luxembourg, Manchester, and Budapest indicates that “public transport authorities appear to be best positioned players to act as the MaaS operators. However, our findings from the in-depth analysis revealed that the public transport authority in the study areas are unable to undertake such role due to structural and resource constraints” (2). It appears that, even if public transit is viewed as the natural leader for MaaS, it may not have the operational capacity to solely implement a MaaS scheme. This further demonstrates the cooperation that will be required for MaaS to succeed.

To date, research has focused on the competition and/or “co-opetition” of having an either/or approach in demonstrating the differences between a private sector versus public sector lead for MaaS. That is why the separation of operating model and business model within the MaaS framework is necessary. Offering a varied approach to MaaS enables all providers in the space with a capability that can incorporate both models to maximize eventual adoption by the public. Each approach has unique motivating factors and constraints. A separate study noted this missing component in the current market landscape but called it “Collaboration as a Service” and noted that “unless it is in the commercial interest of the coordinative entity or their operators there is little incentive to work with other transport modes in the public sector to create more holistic, end to end journeys for consumers. This leads to situations where these modes compete with public transport for journeys” (11). MaaS as an emerging tool for transportation demand management is already complex and at times confusing.
Therefore, instead of adding yet another acronym, this study aims to demonstrate the need to refine the existing definitions to demonstrate the unique approaches that can be implemented based on the motivations of the entity involved, therefore operating and business modeling within MaaS.

Policy Enabled MaaS in an Operating Environment

MaaS remains an emerging topic and therefore research is limited. Miniare’s comprehensive review found only a few studies “that systematically analysed bibliography: Utriainen and Pollänen selected 31 documents focusing on the roles of different transport modes in MaaS, Durand et al. selected 14 documents and specifically analysed travel preferences and behaviour, whereas Wittstock and Teuteberg selected 95 documents (37 scientific and 58 grey literature) and attempted to identify MaaS core elements” (12). However, recent studies indicated a need to develop policies that align MaaS outcomes with a higher societal purpose. “If MaaS does transition from niche towards mainstream there is a need to consider whether and how framework conditions can or should be set to ensure the impact of MaaS on mobility aligns with higher level goals for mobility in relation to sustainability and equity. In short, there is a need for responsible innovation” (13). By their nature, MaaS Business Models will be designed to maximize profit. In a MaaS Operating Model approach, public sector entities will likely be more concerned with meeting overarching public policy goals.

The desired policy goal will be different dependent of the unique needs of a region and therefore can be singularly focused, for example, on affordable housing or congestion mitigation, or multifaceted in a holistic approach that meets multiple societal objectives. When implemented to address a policy goal, it would be beneficial for a MaaS solution to maximize the use of existing infrastructure. To that end, leveraging the ongoing investment in public transport builds on the public good as opposed to detracting from it.

Whim, a private company offering a comprehensive subscription-based service in Helsinki, Finland, reports “63% of Whim customer journeys are made using public transportation, compared with 48% used by the general population” (10). A different study that outlined the political support of the public sector in the offerings in Finland observed “the shared vision in Finland enabled not only public-sector actors in terms of alignment with over-arching policy goals, but also private actors in terms of a sense of support from the government to continue facilitation of the development of MaaS” (14). Early indications like these point toward public transportation adoption as a key component of MaaS.

Allowing the public sector to define strategies that fulfill their broader purpose through a MaaS Operating Model permits implementation of specific policies which future research can review to determine fit for purpose.

MaaS Business Model approaches that lack the public policy component often lead to pressures on core public transport services and eventually lead to deteriorated ridership. Manville et al., Graehler et al., and Clewlow and Shankar determined that car sharing services measurably impacted transportation modal choice, causing in some instances a 1.7% to 3% annual decline in bus ridership in the U.S. after the introduction of the service (15–17). However, Miramontes et al. found contrary results in Munich, Germany, when combining public policy, Operating Model considerations, and the Business Model (18). Their research indicated that multimodal mobility services, when provided through a dedicated “mobility station” designed to allow users of public transportation to immediately connect to other services and when governed by strong policy-based outcomes, drove both adoption and continued public transportation ridership.

Goodall et al., English, and Kanger and Kivimaa discuss the difference between North America and some European cities in their approach to policies and regulations around public transportation, congestion management, and MaaS markets (19–21). The experience in Finland, where thoughtful policies led to preservation of public transportation services and drove innovation in the MaaS marketplace, contradicts the lessons from London where an initial lack of policies for ride hailing led to measurable increases in congestion and decreases in public transportation ridership. In Switzerland, Sjöman et al. discovered after a 6-month smart mobility lab trial that economic incentives alone did not push drivers out of their vehicle and into car sharing, bicycle sharing, or public transportation (8).

Recent studies applied simulation programs to identify areas of improvement in public and private partnerships and even shared modes. Multi Agent Transport Simulation tool (MATsim) is an open source software program that simulates multimodal journeys and the resulting impact on the overall environment. It is a useful tool to predict behaviors and is used to conduct policy analyses on how shifting service parameters affects service and, by extension, business rules. “MATSim is an activity-based, extendable, multi-agent simulation framework implemented in Java” (22). A separate study used the MATsim program to simulate behavior of several types of shared mobility including free-floating car sharing, free-floating electric bike-sharing, and ride hailing. In the study, several tests were performed to simulate the activity of transportation alternatives in the shared
schemes, and how those alternatives might affect changes to the traditional service offerings in the reference city of Zurich. “Since shared modes can also be considered part of the transportation services, it is studied to what extent they could substitute highly subsidized bus and tram lines in providing accessibility towards lower-density areas. To this end, all 25 bus and tram lines with a fare recovery of less than 75% were dropped in return for subsidized offers of shared mobility. By far the most subsidies are paid for ride hailing whereas car sharing and bike sharing rides only present a marginal share. Most importantly, in all cases, the total amount of subsidies is lower than the amount currently paid for regular transport service on the lines that were dropped” (23). Such simulations can assist in scaling policy decisions that are appropriate to the region being served. It demonstrates how different modes are used by different user groups, in this case bike share may be better suited to a dense city center, but the use of ride hailing could replace low-performing bus routes serving regions with lower density, especially if subsidies are applied.

**Methods**

**Strategies for Identifying Key Policy Goals**

Current planning and measurement tools in many industries are designed to predict based on historical trends. As technology moves faster than historical prediction tools can adapt, new methods must incorporate data points from multiple sources to increase the likelihood of success. A good example in government oversight is the approach utilized by Municipal Planning Organizations (MPO) in the U.S. who ingest multiple data points to deliver a more informed decision. “MPOs strategically consider transportation investments and land-use planning to maximize the impact of those investments and develop holistic plans focused on regional goals like economic development and environmental stewardship” (24). This indicates the importance of a regional leadership role to define goals across siloed agencies and measure results that can account for more recent changes to travel behavior and associated consumer choices.

In a separate study, three countries’ household expenditures were analyzed and found that annual spending is divided in several categories, with outcomes that are unique to each country. For instance, “in the US 27% is spent on housing, 19% transportation, and 9% healthcare. The United Kingdom spends 29% on housing, 17% transportation, and 2% healthcare, while Japan spends 24% on housing, 10% transportation, and 5% healthcare” (25). These differences demonstrate unique opportunities for each region to tailor policy goals that overcome multiple areas of concern. “Although healthcare is often the first thing people think of when it comes to health, it only drives about 10% to 20% of health outcomes. A greater impact on health are “social determinants of health (SDOH). SDOH are widespread and systemic conditions that enable or inhibit access to healthcare, quality of life, and economic advancement. They include socioeconomic status, education, and access to jobs, food, social supports, and healthcare. There are significant disparities in SDOH based on demographic characteristics such as race and income. Negative outcomes caused in part by social determinants lead to health disparities that range from food insecurity and social isolation to higher rates of chronic diseases and shorter life spans” (26). One way to shift spending and improve outcomes in each category (if that is a desired outcome) is to implement a policy-focused MaaS offering.

For instance, the U.S. could reduce its annual spending on healthcare through a policy-focused MaaS implementation that incentivizes the use of low-emission mobility services. As air quality increases, it is reasonable to infer that negative health impacts of pollution will also decrease leading to a gradual reduction in spending on healthcare. For example, a World Health Organization study in Europe concluded that “Depending on the valuation methodology [Value of Statistical Life (VSL) or Value of a Life-Year (VOLY)], the health-related external costs from air pollution ranged between C330 billion and C940 billion in 2010, and would be reduced in the baseline to C210 to 730 billion in 2030 (2005 C prices)” (27). Conversely, Japan, which has a relatively low healthcare expenditure but a high expenditure on housing, may choose a policy approach focused on increasing access to affordable housing. MaaS could contribute to achieving this societal goal through incentivizing private sector service of mobility options to housing areas in need of redevelopment to make these areas more attractive to investors.

Using the example from the U.S. above, a region could have both MaaS models established. The private MaaS provider could offer a subscription package of services but it may only reach a small percentage of the population. On the other hand, the public MaaS provider could state a goal of lowering emissions. They could then leverage their MaaS operating plan to structure connections to providers using electric vehicles. To enable equity, they could even use accounting features in the back-end of their ticketing scheme to subsidize the use of the package of services more heavily to targeted neighborhoods in poverty zones. These are examples of layering technologies in the MaaS Operating Model to address policy, and, in this case, also enable equity.

A comprehensive review of the literature revealed very little available research on MaaS Operating Models and policy as a means to incentivize behavior. While many
entities have conducted pilot studies of MaaS Business Models, few measure the efficacy of public policy and the Operating Model. To date, research emphasized consumer adoption, comprehensiveness of service offerings, uptake of new services versus use of public transportation, and the traveler’s openness to using new mobility options (28).

Research by Lajas in Portugal confirmed the importance of the MaaS Operating Model and public policy as integral to successful MaaS, noting that “its implementation is aligned in all the decision levels, stemming out firstly from a strategic vision what type of system the proposed policy framework supports. A ‘MaaS’ system concept implemented as a mobility management tool will have a higher potential in terms of monitoring capabilities of the mobility system, where it is possible to actively increase the efficiency of the transport system and at the same time have an active role in the promotion of sustainable mobility goals among other cross-sectorial policy goals (e.g., land-use, environment, or housing policy)” (29).

The public policy goals of a region could include many facets of the same topical requirement. For instance, “improve healthcare” as a goal could encompass improved health and well-being, lower healthcare costs, increased access to employment for healthcare benefits, environmental improvements to address air quality effects on health, and so forth. The stated policy goal of a region should be clear enough to create programs that can support the targeted outcome. As previously stated, the social determinants of health can either enable or inhibit access which in turn affects health on multiple levels.

**Commute-Related Stress as a Policy Driver**

While there are numerous examples for policies to implement in MaaS frameworks, the remainder of this paper will focus on potential strategies to address health through commuter behavior. Improving health is an almost universal key policy goal that could be affected by positively influencing commuter behavior. Addressing the link between commuter behavior and stress could identify opportunities for a MaaS strategy to meet improved healthcare outcomes. Although not all stress is bad, long term, ongoing high stress levels have been proven to cause medical issues. “The World Health Organization (WHO) Global Burden of Disease Survey estimates that by the year 2020, depression and anxiety disorders, including stress-related mental and health conditions, will be highly prevalent and will be second only to ischemic heart disease in the scope of disabilities experienced by sufferers” (30). Understanding how stress is affected by one’s commute is an important step in exploring how a policy-focused MaaS approach could contribute to minimizing a person’s exposure to travel-related stressors.

A thorough review of existing research on emotional well-being as experienced in daily travel behavior can be found in Zhu and Fan (31). The abundance of studies dedicated to commuting stress confirms the importance of the topic and demonstrates the need to expand on the results. One study stated that “car drivers had higher levels of self-reported stress and concluded that further research on the implications of commute mode and stress is necessary and could have important public health implications” (32). A separate study comparing vanpool commuters and single occupant vehicle (SOV) drivers found that “vanpoolers reported an average of 21% less stress than the SOV commuters, with vanpoolers reporting a 5% decrease in stress, and SOV commuters reporting a 16% increase in stress” (33). Each of the various modes including driving alone, riding public transportation, riding a bike, carpooling, vanpooling, and so forth, result in unique impacts to overall health. External factors of economic and environmental impact as well as personal health, demonstrate the importance of a multi-faceted strategic policy to maximize the effectiveness of MaaS.

Furthermore, commute-related stress increasingly is an equity issue. The Eno Transportation Center notes that socioeconomic conditions, including increasing prices in city centers, movement of lower-income residents further from walkable locations and public transportation access, and the shift in rural areas to older and poorer demographics, results in fewer transportation options, increased commute times, and decreased access to transportation choice. “Lack of transportation access can have significant impacts at an individual, community, state, and federal level. The negative health externalities of transportation access barriers can cause poor health outcomes and high healthcare costs which are covered by existing safety net programs, Medicare and Medicaid. Implementing a Health in All Policies framework will help identify policy and program improvements across many facets of government” (26). The policies that guide the framework in a MaaS Operating Model will enable a holistic approach to solving complex government and equity issues.

**Health Impacts on the Travel Experience**

The literature indicates that the commute itself affects health, stress, and well-being. The following represent additional studies with similar implications. Commute-specific studies often include differentiators for the experience based on gender, distance, time, mode, and so forth. Public transit users experience significant stress
attributable to wait time. “The experience of waiting and wondering when transit will arrive is perhaps the most stressful part of the experience” (34). Additionally, “women have higher levels of stress, which may be attributed to increased levels of expectation and activities in the home” (35–37). And “long commutes contribute to a much lower health-related quality of life, with coordinating increases in stress, especially among parents” (37). Additionally, in 2015 a team of researchers at the University of California Los Angeles interviewed a selection of its vanpool participants to reveal their perceived benefits of using a vanpool. Based on respondent information from recorded statements, the study determined that “riders indicated that participating in a vanpool was a source of dramatic reduction in stress” (38). There is a multitude of studies that link commuting stress to manifestations of illness-based absences from work or diminished work performance; a broad review of the literature can be found in Novaco and Gonzalez (36).

The connection between stress and commuting is clear, which makes it an ideal example for defining a MaaS policy that is linked to improving health outcomes within a strategy that also addresses equity. Improving health outcomes as a policy goal is representative of why the MaaS Operating Model is an important component, whether or not there is also a MaaS Business Model in place. Ideally, the two approaches would complement each other to ensure the marketplace is multi-sided and open.

**Discussion and Conclusion**

**Contribution to Scholarly Knowledge**

MaaS must address policy that leads to broader societal implications of improving health, environment, and equity. Follow-up research that focuses on the utility of subscription packages could reveal new insights outside of traditional economic theories. As previously described, the MaaS Maturity Model can account for inclusion of trending modes like ride hailing, scooter sharing, electric biking, and so forth. Policy decisions organized according to a specific goal encourage transportation operators to align models reinforcing predefined regional requirements. Future research should focus on models that enable the best balance of individual and societal benefits. Truly understanding the effect of MaaS in operation for both individuals and society may lead to an eventual shift in user behavior. MaaS providers can gain insight into market adoption if research is expanded to understand underlying factors for personal choice in modal utilization. MaaS has the capability to improve on the user experience. However, it would be shortsighted to place importance of the best user experience ahead of societal good. As policy-leading MaaS offerings become the norm there will be renewed opportunity to review the efficacy of such programs to measure and refine future offerings.

**Implications for Managerial Practice**

Future studies on the various policies that have been applied will reveal which policies gain the most acceptance, or which deliver greater societal benefits. MaaS is currently in the early stages of practical application and therefore the opportunities are endless. Creating a strategic plan dedicated to aligning a specific MaaS approach with a stated policy goal will enhance the likelihood of success in achieving that goal. Within each goal, subcategories may draw out unintended or unrealized potential. MaaS policy goals that include health-based outcomes should consider the unique differences and opportunities specific to each mode. MaaS may offer new strategies to enable equity as a result of coordinating functions across public and private organizations. It may also be an indicator for overall success that a MaaS strategy directed at improving public health through a MaaS Operating Model introduces new stakeholders. For instance, employers, insurance agencies, even public health organizations, have the potential to interact in the transportation environment and act as partners in the mission of meeting the public good. These new stakeholders further expand the reach that transportation has into other aspects of an overall “smart city” and can address unique differences in rural and suburban approaches to mitigating factors in each unique solution.

A one-size-fits-all approach will not deliver the same results as unique qualifying differences based on the desired regional outcome. A policy-leading MaaS Operating Model would provide the necessary oversight to incentivize shared modes. Implementing control measures is extremely important as the service landscape continues to evolve, and ideally should be defined well in advance of fully automated (single occupant) vehicles becoming the roadside norm. This would empower public entities to stay ahead of technological advances by creating a stated framework that future developments can shape toward. In most cases, this will foster innovation by allowing the developer community to be part of the requirements dialogue, making it easier to align technology to impending regulation and not the other way around. Under that scenario, public and private partnerships, whether formal or informal, become increasingly important.

The recent dominance of the practical application of MaaS within the transportation framework of a region has identified new opportunities to enhance the public good as opposed to a reactionary approach to service implementation. Traditional transport offerings are being disrupted almost daily by new market entrants.
such as micro transit and electric scooters, and a resurgence in alternative modes such as bicycle commuting. As MaaS gains popularity, it is incumbent on the public sector to enable a MaaS framework to be ready for the private sector providers and define an operating environment that enhances the use of public space and investment. Advancements in technology provide unique opportunities to encourage use of alternatives as well as to influence behaviors with the potential of achieving societal goals. Those goals can only be reached through a clear definition phase, implementing a set of policy drivers to achieve them, and by applying modern measurement tools to record results, refine approach, and iterate toward successful outcomes. This is precisely why it is important to differentiate the uniqueness of the private sector business and the public sector operating models. Both are necessary to advance the usability of the ecosystem, but one side without the other limits overall potential. If the private sector is the sole actor, the ability to address societal goals is minimized. If the public sector is the sole actor in providing MaaS, innovation will be stifled. Creating a competitive environment that also enables oversight of the public good will be a powerful tool in the future of the mobility landscape.

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