

Workshop 5: How Much Regulation Should Disruptive Transportation Technologies be Subject to?

Regulation in an era of disruptive innovation

Janet Chua and Marcel Tan

The emergence of new technologies is reshaping the economy, impacting traditional businesses – as competing substitutes and as complementary enablers. Businesses are increasingly competing on intangible assets, such as data and user networks. The transport sector, in particular the conventional taxi industry, has felt the impact of such competition, with the emergence of universally recognised names such as Grab and Uber in recent years.

Such ride-hailing platforms have rather uniquely impacted the conventional taxi industry, by being both a competing substitute (with the proliferation of private-hire cars being a viable alternative to taxis), as well as a complementary enabler (by offering taxi companies and taxi drivers an additional booking platform). The disruption of these ride-hailing platforms to the conventional taxi industry in Singapore and the ASEAN region has gone through a full cycle of entry, competition, exit and consolidation.

The Grab-Uber merger in particular, has exposed a number of regulatory issues that have social, in addition to, economic repercussions. While governments strive to be business-friendly and encourage and foster innovation, there remains a need to strike a balance with the numerous policy objectives, which includes maintaining well-functioning markets.

In this paper, we explore from a practical perspective, the business model of ride-hailing platforms and its relationship with the conventional taxi industry. We further study how ride-hailing platforms fit in with the prevailing regulatory regimes, the interface between sectoral and competition regulations and the balance between social and economic policy objectives. We conclude by looking at the design and efficacy of various regulatory rules and options, and how governments can continue to remain nimble and responsive to new disruptive technologies.

The co-authors of this paper are staff members of the Competition and Consumer Commission of Singapore (CCCS). However, their analysis, conclusions and recommendations in this paper are the authors' personal views, which do not represent CCCS's position.

The ride-hailing regulation: Brazilian municipalities case

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Both mass (bus) and individual (taxi) public transportation system are heavily regulated in the Brazilian cities, where counties are responsible for its organization, authorizations and inspection. The checkpoints are located in routes and bus stops in case of the mass transportation, which are previously established and forced upon users. The fare is also pre-set through normatives with little to no flexibility, except for a bunch of cities where taxis are allowed to give discounts, even though they cannot raise the fare according to the demand. Another item under custody of public administration is the amount of vehicles. These quantities are set through authorization for both mass and individual public transportation. Entrance of new players in these markets is done by a bidding process where the government chooses the winner using one of the following criteria: best technical conditions for providing the service, better price paid for the public administration for the rights to explore the services or lowest individual fare given the minimum service requirements. In the last few years a new kind of service is being offered in the Brazilian cities, the e-railing.

The amount of trips that are done with the help of a cellular application has been increasing fast in the Brazilian cities. This service is available in hundreds of cities already, ranging from cities just shy of 130 thousand inhabitants to large metropolises with millions of people. These e-hails are posed as an alternative not only to using one's own car, but as replacement for regular public transportation, both mass and individual. At first counties resisted in authorizing these services as its proposal differs a lot from the established authorization models, especially regarding the way the fare adapts itself to the rise and fall of the demand and the lack of a way to limit to the supply.

As such, this article proposes to present a round-up of legislation from 10 Brazilian cities, from various regions and population sizes, including the solutions found to regulate the service, the legal innovations that

made possible clearing the service and maintaining, to this date, the characteristics that differentiate e-hailing from the regular service: the fee model for charging for the service based on the demand and the lack of limit to the amount of operators.

Regulatory standard setting for emerging technologies – the case of autonomous vehicles in Sweden and Norway

[Lisa Hansson](#)

The development of more or less automatic vehicles has been ongoing many years. 30 years ago, the EU-founded project Eureka Prometheus including elements for developing self-driving vehicles. Vehicle producers, universities, technology companies, among others, are today involved in the development of autonomous vehicles. In several countries, experimental activities in actual traffic situations are ongoing. The legal conditions for autonomous vehicles vary between countries. A number of countries have introduced or are considering introducing rules for such activities. Some countries see autonomous vehicles as prohibited unless otherwise stated in the regulations. Other countries have exactly the opposite view, i.e. anything not explicitly prohibited is allowed. Roles and responsibilities in terms of safety, liability, cybersecurity, privacy, infrastructure etc. are discussed and evaluated.

The paper describes how new regulatory standards are being shaped for emerging technologies in the transport sector, using the case of autonomous vehicles in Sweden and Norway. The paper provides an analytical model based on regulatory governance theories, which also can be used for comparative analyses of other countries. The model takes into account a heterogenic perspective on actors involved in the regulatory standard setting process, identifies pre-conditions of standard setting (originally proposed by Hood 1986) and regulatory standard setting strategies (Lodge & Wegrich, 2012).

The findings show that the process of shaping regulatory standards is multiple. It holds a strict juridical aspect but is also influenced by the uncertainty that future technology might bring and other changes in society that might affect automated vehicles.

The paper places its results in an international context and is a complement to other country specific studies on regulation of autonomous vehicles, for example, Fagnant & Kockelman (2015) study on US/California and Taeihagh & Lim (2018) overview of US, UK and Germany. By introducing a theoretical perspective on regulatory standard setting, the paper also contributes to a further understanding on how to analyse the shape of new regulation in the transport sector in general.

Transport network companies and ride hailing in a traffic saturated city – the case of Ho Chi Minh City, Vietnam

[Thi Phuong Linh Le and Abraham Leung](#)

Transport network companies (TNCs) as ride hailing service providers are growing rapidly in many jurisdictions. With great potential to offer better convenience to users and also drivers, TNCs do not merely replace taxi services and also influencing other modes and travel behaviour. Unlike developed countries, limited attention about TNCs has been paid in developing countries. In response, this study aims understand the usage of TNCs in traffic saturated cities and provide better insights into future TNC regulation and policy. We surveyed Uber and Grab users (n=630) in Ho Chi Minh City (HCMC), where traffic is often congested, heterogeneous, and public transport uptake is relatively low. TNCs in South East Asia also offer scooter pick-ups at very cheap prices due to low cost of labour. This is markedly different to countries (such as USA) where TNCs first developed.

Travel and socio-demographic patterns of the respondents are analysed, so as the effects of personal beliefs (such as pro-environmental behaviour, social norms and lifestyle). While there are some similarities of TNC travel patterns in HCMC and other jurisdictions - with TNCs being more popular amongst higher income individuals, and could substitute some trips, we do not find TNCs are able to replace personal vehicle ownership. This could be attributed to high levels of ownership of scooters in Vietnam, as the cost to acquire and operate them is low. Most major cities in Vietnam still lack grade-separated public transport. Until these projects are complete, bus-based public transport in Vietnam is unlikely to compete effectively against TNCs, which the latter offers door-to-door services and could lane filter through congestion. Public concerns about TNCs in HCMC are also explored, and the regulatory and funding regime of Vietnam's TNCs and public transport in light of TNC's disruptive impacts. This study offers policy makers in developed country settings

more empirical understanding of TNC, and to help devise better policies to ensure TNCs are sustainable, equitable and complementary to conventional public transport.

The Introduction of Autonomous Public Transport

Ian MacDonald

This paper, titled, "The Introduction of Autonomous Public Transport" will review the considerable literature available about the social, economic and regulatory changes, which will need to occur to meet the world-wide introduction of autonomous vehicles, more specifically as autonomous public transport.

There is diverse opinion about the benefits of autonomous transport technology and trepidation at the regulatory requirements to meet that change not only with the make-up of a new transport work force but with safety considerations, no better exemplified by the choices an autonomous vehicle must make in choosing whose life to save in an unavoidable accident.

Much has also been written about the economic benefits of the introduction of new autonomous transport technology and this paper will review some of that work, including the significant paper of Messrs. Bosch, Becker (Felix and Heinrik) and Axhausen, titled, "Cost-based analysis of autonomous mobility services" – Elsevier (2018) 76-91.

The one certainty that this paper will highlight is that the introduction of an autonomous public transport system will happen and perhaps sooner than anticipated.

Australia is at the forefront in the development of new transport technology and this paper reviews the recommendations of the 2018 Federal Senate Select Committee's report on the "Future of Work and Workers" and the House of Representatives recommendations from their inquiry into "the social implications from the introduction of driverless vehicles". These inquiries reference the need for regulatory change consequential upon the introduction of the new technology.

The paper will highlight how different jurisdictions are dealing with the changed technology and provide examples such as the creation of the Australia and New Zealand Driverless Initiative, which claims to be the peak industry body that services the wide ecosystem of automated vehicles across Australia and New Zealand.

From a regulatory perspective the issues that have been identified, include; what type of skilled or unskilled workforce is required, if at all, to maintain an autonomous transport system, what new regulations will be required to ensure that the technology is safe and to what standard will new autonomous vehicles be subjected given the issues confronting all technological advancement at the moment with the hacking of supposedly secure systems occurring almost daily?

The paper will advocate that, as with the invention of the world wide web in 1989 and its accelerated introduction, well before regulation had caught up with its negative impacts, it is vital that the introduction of autonomous transport technologies does not occur until adequate and effective regulation is in place to deal with those issues that are known and perhaps still unknown.

A Regulatory Framework for the Individual Passengers Road Transportation Industry of Public Interest

Flavio Augusto Oliveira Passos Dias, Matson Lopes da Silva, Fernando Meister Vieira de Farias and Gustavo Vinicius Delmondes Chaves

The Individual Passengers Road Transportation Industry of Public Interest - IPRTIPI have traditionally been offered in two services: taxis, operated in some countries under closed markets to incumbents, but not so much in others, and Private Hire Vehicle - PHV, typically available under open markets. However, the information technology available in the last decade inside the popular smartphones has introduced disruptive solutions to old market failures in IPRTIPI and in public takeovers, as well as provided facilities that have attracted the attention of both captive and potential users. That technological package has allowed competitive entry services, such as UBER, 99 and Cabify, even forced in some places, to mitigate failures and show that the IPRTIPI is contestable at this time. A bibliographical review indicates that both deregulation and closed market produce market failures in IPRTIPI; setting insistence on any of these extremes conduct to regulatory failure, which still occurs in several countries. In view of this, and the similarity of the services in IPRTIPI, it is proposed to unify the regulation of these services with the establishment of general guidelines at national level, including the minimum criteria for entry, safety, information and availability services. Competence can be delegated to the local authorities to establish or

make more flexible the other criteria necessary to keep the IPRTIPI as close as possible to perfect competition market. Services can also be expanded, benefiting the industry with economies of scale, density and scope. By offering equal entry conditions for incumbents and potential competitors, conflicts between operators of those different services can be mitigated, allowing the most efficient to establish themselves in the market.

Proposal for a mobility data platform model and suggestions for adjustment in the governance system of urban mobility in Brasília / Brazil

Thayna Oliveira, Matson Lopes da Silva, Fernando Meister Vieira de Farias and Anna Beatriz Almeida

The Government, State, external actors, customer-users and society in general need to exercise control over the supply and quality of urban mobility services. Such control is one of the pillars for a good governance of these services, which is the way a variety of actors organize and interact with each other to provide mobility services in order to serve society's interests.

The control of these services require the intensive use of mobility data through a data access platform that guarantees at minimum:

- customization to the characteristics of the Government of Brasília;
- facilitate large volumes of data between Public Administration actors and private sector partners, avoiding duplication of efforts and generating coordinated and interdisciplinary inter-sectoral dialogue;
- real-time access by government officials to data on transport operators;
- the availability of data and information services of interest to customer-users, especially according to the concept of Mobility-as-a-service - Maas.

The present research intends to present a customized model of mobility data platform and propose some adjustments in the system of governance of the urban mobility services of Brasília, in order to favour the improvement of mobility services and customer-user satisfaction.

As an initial result of the research, an analysis of the legislation and regulatory standards related to the provision of urban mobility services has been made. This study will serve to examine the alternatives of data platform models, as well as for the proposition of regulatory improvement, aligned to Federal Decree No. 9203, 2017, which provides for the governance policy of the Federal Public Administration.

In the present stage, through case studies, the adequacy of alternatives of mobility data platform models to the characteristics of the existing urban mobility governance system in Brasília will be evaluated. Initially the models analysed are those adopted in the "PETRA" project, through which the mobility data platform was built for the cities of Rome, Venice and Haifa, with funding from the European Union. Such platform models are: " Open data policy "; " A data-oriented platform "; " A network status modelling platform "; " A trip modelling platform " and " A trip planning app connected to the platform ", as described in the article "Petra: Governance as a key success factor for big data solutions in mobility" (Veeneman et al., 2018).

As a scope reduction, in order to facilitate the feasibility of the research, the following limitations are recognized: a) initial focus only on the areas of greater Maas supply in Brasilia (especially in the central region, called the Pilot Plan); b) Mobility data from Brasília to be used are only those from the Individual Private Passenger Transportation Service Based on Network Communication Technology in the Federal District.

Throughout the research, it is expected the establishment of partnerships with stakeholders to test the resulting proposal and evaluate its effective adaptation to the institutional scenario of Brasília.

Driverless bus passenger main concerns

Jordi Rosell

The driverless bus implementation is closer to what we can think, once the prototypes have been improved to operate under controlled conditions in different cities. However, this progress is not matched by the academy itself: studies are rather scarce for a sector that is going to transform on the coming years. This expansion is related to doubts about passengers concerns on this new technology. The data was collected in a driverless bus trial from September to October 2018 in eight Catalan municipalities (Spain). With more than a thousand riders surveyed, the main objective is to detect the main driverless bus passenger's problem and

analyse which factors influence their decisions. A strength of our study is that the respondents physically experienced an automated driverless bus, whereas in many existing studies there is a lack of this experience. The main problems are security inside and outside the vehicle and problems with riders with reduced mobility. A less frequent problem is related to a lack of information and assistance due to an absence of personnel. Using a multinomial logit, we find the determinants of these concerns. Some preliminary results point that these problems are related to gender and in specific age cohorts. Having a driving license influence positively on security outside main concern. Moreover, it seems that driverless bus trial conditions affect rider's opinions on their most concern.

Towards a Framework for Mobility-as-a-Service Policies

Göran Smith and David A. Hensher

Mobility-as-a-Service (MaaS) is a concept that bundles personal transport services from multiple transport service providers into a joint interface in which the services can be searched, booked and paid for (Heikkilä 2014). MaaS has in limited cases been proven to make it easier for citizens to use several complementary transport services (e.g. Sochor et al. 2016). As a consequence, it has been argued that the prospective diffusion of the concept could enhance the relative attractiveness of using transport services, in comparison to privately owned vehicles (e.g. Hietanen 2014), and thus lower the negative externalities of the transport system (e.g. Falconer et al. 2018).

Public authorities are increasingly pursuing a range of activities meant to pave the way for MaaS. Prominent examples in recent years include: a new transportation code in Finland that demands all transport service providers in Finland to release single journey tickets for third-party resale (Audouin and Finger 2018); an attempt to launch a national intermediary MaaS integrator in Sweden (Smith et al. 2018) and a decision to integrate private transport services in the public national travel planner and to release public transport data and tickets for third-party resale in Denmark (cf. scenario 4 in Qvartz 2018). Moreover, public agencies around the world have invested heavily in research (e.g. the EU-funded project MaaS4EU), trials (e.g. SMILE in Austria), collaboration programs (e.g. MaaS meet-ups in Sweden) and service development (e.g. an innovation challenge hosted by the public transport authority in the Helsinki region, Finland).

However, due to the nascence of the MaaS concept, we do not know if these activities will be sufficient for catalysing concrete MaaS developments yet. Moreover, scholarly advice on what the public sector can do to support the development of MaaS that contribute to policy objectives (e.g. Li and Voegelé 2017; Jittrapirom et al. 2018; Smith et al. 2019) have thus far not been compiled into easy-to-use tools for analysis. Accordingly, the emerging body of literature on MaaS offers little guidance for public policymakers. Drawing on the literature on governance (Sørensen and Torfing 2016; e.g. Torfing and Triantafillou 2016) and sustainability transitions (e.g. Rip and Kemp 1998; Rotmans et al. 2001; Geels 2002) and based on a review of how the MaaS concept differs from current state of affairs, this paper sets out to fill that void.

The paper first provides a theoretical backdrop. This is followed by a review of what MaaS is, how it can be conceptualized, and what types of innovations it requires. This review serves as basis for the proposed framework for MaaS policy analysis, which outlines nine areas that MaaS policy programs should address: terminology, objectives, technologies, business models, modes, alternatives, partnerships, directionality and diffusion. Thereafter, based on 19 interviews with 33 individuals involved in ongoing MaaS developments in New South Wales (Australia), the current MaaS policies of Transport for New South Wales are used as an example to illustrate how the framework can be applied. Lastly, implications for research and practice are discussed.