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The governance of risks in ridesharing: Lessons learned from Singapore

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The governance of risks in ridesharing: Lessons learned from Singapore

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Abstract: In the past few years, we have witnessed that many different types of innovative technologies, such as crowdsourcing, ridesharing, open and big data, have been adopted around the world with the aim of delivering public services in a more efficient and effective way. Among them, ridesharing has received substantial attention from decision makers around the world. Because of the multitude of currently understood or potentially unknown risks associated with ridesharing (unemployment, information privacy, environmental risk due to increased emissions, liability), governments in different countries have adopted diverse strategies in coping with risks associated with ridesharing. In some countries or municipalities, ridesharing is prohibited. In other countries, ridesharing, however, received strong support from governments. In this article, we address the question *how are risks involved in ridesharing governed over time*. To answer this question, we present a single in-depth case on Singapore and examine how the Singaporean government has addressed risks in ridesharing over time. This case study about Singapore can be regarded as a revelatory case study, helping us to further explore the governance practices in other countries.

Keywords: governance; risk; ridesharing; innovative technologies; Singapore

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1. Introduction

In the past decades, we have witnessed the adoption of many different types of innovative technologies around the world with the aim of delivering public services in a more efficient and effective manner (Brown, & Osborne, 2013). Sharing economy is such an example (Benkler, 2002). It is defined as any marketplace that brings individuals together to share or exchange otherwise underutilised assets (Avital et al., 2014; Botsman, & Rogers, 2010; Koopman et al., 2015; Sundararajan, 2014). Sharing economy allows customers and service providers interact with each other in a peer-to-peer marketplace which is facilitated by innovative technologies. Many sharing industries, like Uber, BlaBlaCar, AirBnB, TaskRabbit, and Grab, have established themselves in many different fields, such as transportation, hospitality and consumer goods. In U.S, millions of citizens rent space rooms, cars, and even power tools from total strangers (Burbank, 2014). Sharing economy in recent years has received substantial attention because its business model disrupted many traditional industries (Zervas et al., 2016; Taeihagh 2017a).

In the transportation domain, the uncertainty of energy cost, together with pressure to increase energy efficiency and reduce carbon emission, has fueled interest in seeking alternatives to private vehicle use (Agatz et al., 2012; Shaheen, Cohen, & Chung, 2010). Ridesharing is such an alternative (Morency, 2007) and in North America, it can be traced back to "car clubs" or "car-sharing clubs" during World War II (Chan, & Shaheen, 2012; Shaheen, Cohen, & Chung, 2010). Traditional carsharing (like carpooling) moves people using existing infrastructure and vehicles in a more efficient way. However, it is limited in responding to flexible commuting options (Levofsky, & Greenberg, 2001). From 2004, a new generation of ridematching platforms was developed (Agatz et al., 2012). This new generation of ridesharing enables individuals to enjoy the benefits of private cars without the need of ownership (Shaheen, Cohen, & Chung, 2010). It increases occupancy rates and the efficiency of urban transportation systems (Agatz et al., 2012; Koopman et al., 2015). It offers commuters a more comfortable and time-efficient travel option and allows owners of vehicles to recover some of the journey costs (Chan, & Shaheen, 2012; d'Orey, & Ferreira, 2015). Furthermore, it is widely accepted that ridesharing is helpful in reducing congestion, pollution, emissions, and parking infrastructure demands (Caulfield, 2009; Chan, & Shaheen, 2012; Fellows, & Pitfield, 2000; Furuhata et al, 2013; Jacobson, & King, 2009; Morency, 2007; Noland et al, 2006; Rayle et al, 2014; Stiglic et al, 2016). Ridesharing may also play a role in redistributing income through

providing the poor residents with the opportunity to access cheap transport services or secondary jobs (d'Orey, & Ferreira, 2015). It's democratic, and policy implications have also been discussed by public policy and governance scholars; they argue that ridesharing enables people to communicate with one another and increase social capital (Nielson et al., 2015), and it is regarded as a new form of civic engagement in policy fields, which provides opportunities for citizens to directly engage in developing and implementing solutions and services (for example, resolving congestion problem and reducing emission through increasing utilization rates) (van Meerkerk et al., 2015).

In short, ridesharing is viewed by some as highly beneficial for both individuals and the whole society. The Sharing Economy and ridesharing in particular promise substantial productivity gains due to increasing the utilisation rate of existing resources and reduction of transaction costs and regulatory overheads (Chan, & Shaheen, 2012; Taeihagh 2017a). However, it disrupts current markets. It is assumed that ridesharing will endanger incumbent industries and may result in concerns about safety and privacy of customers, unfair competition, and service quality (Feeney, 2015; Nielsen et al., 2015; Rogers, 2015; Taeihagh 2017a). For instance, Uber was banned in Germany in March 2015.[2] In the same month, Uber shut down UberX in Seoul following a prolonged government crackdown and temporarily suspended its pilot ridesharing program in Fukuoka. It was also under pressure from authorities in Manila, Bangkok, Kuala Lumpur, Taipei, and Jakarta.[3]

Some public administration scholars have recognised that innovation and risks are inextricably interrelated due to the uncertainty of innovation in both processes and outcomes (Brown, 2010; Brown, & Osborne, 2013; Osborne, & Brown, 2011; Flemig, Osborne, & Kinder, 2016). However, little is known about how to govern risks involved in ridesharing (and other types of innovations).

A research question is thus raised in this article: *how to govern risks involved in ridesharing*. Different cities/governments have adopted different strategies to deal with ridesharing. Some countries, like Germany, have banned the use of ridesharing such as Uber.[4] Some, such as the city of New York, tried to ban Uber initially but then decided to hold back in response to users' demands.[5] In short, it seems that governments in different jurisdictions

[2] http://www.bbc.com/news/technology-31942997

[3] https://www.techinasia.com/singapore-issues-carpool-laws-drivers-paid-rides

[4] http://www.bbc.com/news/technology-31942997

[5] http://www.bbc.com/news/technology-38061843

have adopted different strategies for coping with risks associated with the adoption of ridesharing. We will answer this research question through an in-depth case study. To this purpose, Singapore is the chosen case, and we will intensively study how risks involved in ridesharing are governed by Singapore government.

In section 2, our theoretical framework is first presented. Following this, the method used and case description is shown in section 3. In section 4, strategies for addressing risks associated with ridesharing applied by Singapore government are identified. Discussion and conclusions are drawn in the final section.

2. Theoretical framework

This section includes two subsections. In subsection 2.1, the characteristics of ridesharing are summarised. Five governing strategies in addressing risks involved in ridesharing are elaborated in section 2.2.

2.1 Ridesharing

Three different types of ridesharing can be identified based on the relationships between participants: *acquaintance-based, organization-based, and ad-hoc ridesharing* (Chan, & Shaheen, 2012). The acquaintance-based ridesharing is formed among friends, families and co-workers. The organized-based ridesharing demands participants to receive the services by formal memberships. (Nielsen et al., 2015). Ad-hoc ridesharing is achieved through self-organization or various computerised ridematching platforms. In the remainder of this study, we focus on the ad-hoc ridesharing, which is also called "real-time ridesharing" or "instant ridesharing" (Agatz et al., 2012) and the concept of ridesharing as discussed refers to ad-hoc ridesharing in the remainder of the paper.

Agatz et al. (2012) identified six key features of ridesharing: *dynamic*, *independent*, *cost-sharing*, *non-recurrent trips*, and *automated matching*. They are introduced as follows: (1) dynamic: the ride-share can be set up quickly and allows the drivers with additional spaces to establish links with users that want an on-demand ridesharing; (2) independent: different from traditional transportation where a central organisation owns vehicles and employs drivers. The drivers of ridesharing do not have any affiliation relationships with any private companies; (3) cost-sharing: the costs during the trips are shared by participants. This is thus cost-effectiveness

for users, however most drivers of ridesharing are profit-seeking (Anderson, 2014); (4) non-recurring trips: trips of ridesharing are non-recurring, implying that ridesharing is one-way trips; and (6) automated matching: a system helps riders and drivers to match each other instantly (Levofsky, & Greenberg, 2001). Ridesharing platforms also use reputation systems, for instance in the case of Uber, a two-way rating system is used in which both riders and drivers and can leave additional feedback which can be used for maintaining and improving the ridesharing experience.[6]

2.2 Risk in the adoption of innovative technologies

In recent years, we have witnessed the application of many different technological innovations, such as nuclear power plants, big data, waste incineration power plants, autonomous cars, crowdsourcing, internet of things, and block-chain technology (Janssen, & Helbig, 2016; Prpić et al., 2015; Hilbert, 2016). However, they are surprisingly becoming new sources of problems since they are perceived to have unintended consequences and create new, previously unimaginable risks as a result of which the social acceptability of these innovative projects may be low (Brown, & Osborne, 2013; Gerrits, 2016).

Risk and uncertainty are two highly related concepts: the former implies that probabilities of the events and their possible outcomes are known whereas the latter means that we are aware some events might occur, but we are not aware of their probabilities (Wildavsky, 1991; Stirling, 2007). Technologies, procedures or instruments might be used to convert uncertainty into risk (Borraz, 2011). It has been widely acknowledged that several different types of risks are involved in the adoption of innovative technologies, such as market risk, political risk, technological risk, finance risk, environmental risk, organizational risk, social risks and turbulence risks (see Aven, & Renn, 2010; Expert Group Report, 2010; Flyvbjerg, 2003; Jaafari, 2001; Kutsch, & Hall, 2010; Li, 2016; Perminova, Gustafsson, & Wikstrom, 2008). In this article, we are primarily interested in technological risks. Technological risks are defined as potentially negative social, physical, and economic consequences that are related to the concerns of citizens in the adoption of innovative technologies (see Renn & Benighaus, 2013). We focus our attention on citizens' concerns because they are the direct users of innovative technologies, and they might be negatively influenced by them.

[6] https://drive.uber.com/joburg/2772-2/

2.3 The governance of risks in ridesharing

Some researchers have acknowledged that the adoption of innovative technologies will inevitably result in some unanticipated risks (Clarke, 1999; Taleb, 2007). Often these unknown risks tend to cause substantial losses for the involved actors (Perrow, 1999). As such, the governance of these unknown risks inherently involved in the adoption of innovative technologies is of crucial importance.

The issue in terms of the governance of technological risks has received scholarly attention from different fields, such as governance, planning and public policy (Wildavsky, 1991; Boin, & van Eeten, 2013; Brown, & Osborne, 2013; Taeihagh et al. 2013; Duit, 2016; Fischer, & Forester, 1993; Taeihagh 2017b; Flemig et al, 2016; Lodge, 2009), risk management and governance (Borraz, 2011; Renn, 2008; van Asselt, & Renn, 2011), science and technological policy (Jasanoff,1990; Longstaff, 2005), complexity science (Walker, Marchau, & Swanson, 2010; Walker, Lempert, & Kwakkel, 2013; Taeihagh et al., 2014), and organizational sociology (Perrow, 1999). They provide different answers to the question of how technological risks associated with the adoption of innovative technologies are governed, and identify some governance strategies, such as resistance, resilience, robustness, antifragility, adaptation, fragility, risk assessment, deliberation and negotiation, public participation, and learning by doing (see Duit, 2016; Taleb 2012; Walker, Lempert, & Kwakkel, 2013; Wildavsky, 1991). After a literature review, we identify five governance strategies that can be adopted by decision makers in governing risks involved in the adoption of innovative technologies: *no response, prevention-oriented strategy, control-oriented strategy, toleration-oriented strategy* and *adaptation-oriented strategy* (see Borraz, 2011; Brown, & Osborne, 2013; Jasanoff, 1990; Lodge, 2009; Renn, 2008; Taleb, 2012; Walker, Marchau, & Swanson, 2010; Walker, Lempert, & Kwakkel, 2013; Wildavsky, 1991). These strategies are briefly elaborated below (for a review of the various strategies to govern risks of innovative technologies see Li, Taeihagh, & de Jong (forthcoming)).

1. *No response*: no specific actions are taken by decision makers to address risks. This might imply that decision makers are ignorant about the potential consequences that might be brought along by innovative technologies (Stirling, 2007). If the nature of the innovative technology is unknown, decision makers tend to put off decisions (Walker, Marchau, & Swanson, 2010). When Uber launched its ridesharing service in San Francisco, California

in summer 2012, local government did not know whether these new services should be established as peer-to-peer taxi services, ridesharing, or for-hire vehicle services (Rayle et al., 2014). Also, no response implies that no backups or regulatory frameworks are developed by decision makers to address the impending dangers and threats.

2. *Prevention-oriented strategy*: decision makers take preventive actions with the aim of eliminating risks in the adoption of innovative technologies (Longstaff, 2005; Stulz, 1996). Regarding the governance of risks in adopting innovative technologies, this strategy implies that decision makers may prohibit the adoption of innovative technologies to avoid the existence of risks (Longstaff, 2005). This strategy is appropriate for situations in which changes are highly predictable (Wildavsky, 1991), and it can promote coordination and reduce discretion and facilitate predictability (Stone, 1989). However, this strategy has slow responsiveness, and the designed systems tend to become paralysed or self-destruct in the face of unexpected dangers and threats (Comfort, 1994).

3. *Control-oriented strategy*: this strategy favours traditional risk assessment, and it suggests that scientific knowledge is helpful in narrowing the supposed uncertainties and gaining more precise definition of risk (Wynne, 1992). In addition, this strategy emphasises centralization and 'high modernist' forms of surveillance (Lodge, 2009), and it partially corresponds with our understanding about the regulatory state, in which policy makers attempt to regulate risks through formal policies, laws or regulations (see Moran, 2003). An example of this strategy is that policy makers apply existing policies to regulate innovative technologies with the aim of controlling the associated risks (Witt et al., 2015).

4. *Toleration-oriented strategy*: the main aim of this strategy is for *risk tolerance* (Landau, 1969). It means that policy makers take actions to prepare for the risks with the aim of enabling a system or organisation to perform satisfactorily in a wide range of environments (Taleb, 2012; Wildavsky, 1991). This strategy corresponds to many researchers' understanding of resilience, which means that a system or organisation can survive a broad range of uncertainties (Taleb, 2012; Nair, & Howlett, 2016; van Buuren et al., 2013). Developing alternative is the first option of this strategy. In energy provision markets, governments prepare several different sources of energy for impending unanticipated events; when one source of energy is unavailable, the other sources of energy could be alternative options (Longstaff, 2005). Moreover, policy change or reform can be the second option of this strategy (Walker, Marchau, & Swanson, 2010).

5. *Adaptation-oriented strategy*: the decision makers attempt to improve the adaptive capacities of the regulated socio-technical system. It emphasises the changes of the system to respond to plausible futures in a better way (Walker, Marchau, & Swanson, 2010), and it corresponds with the idea of adaptive resilience identified by some researchers (Boin, & van Eeten, 2013; Duit, 2016). Many different tactics match this strategy, such as learning by doing, public participation, forward-looking planning, co-deciding, and negotiation (Fischer, & Forester, 1993; Lodge, 2009; Nair, & Howlett, 2016; Taleb, 2012; van Buuren et al, 2013; Walker, Lempert, & Kwakkel, 2013). One example is the establishment of an independent review committee which facilitates information access to all the public (Malhotra, & van Alstyne, 2014). Another example is that roundtable discussions involving representatives of all the potential stakeholders are organised by policy makers in the governance of risk in mobile telephony. No clear rules and specific procedures are established, and a vague list of issues to be discussed are developed. The chair of these discussions allows all participants to voice their opinions and concerns (Borraz, 2011).

These five different strategies in this article function as a heuristic tool to facilitate our analysis on the governance of risk in the adoption of ridesharing in Singapore.

3. Method and case description

The aim of this article is to answer how technological risks associated with the adoption of ridesharing are governed. The case study approach is a suitable strategy to answer how-oriented research questions (Yin, 2009). Singapore is relevant for our study for three reasons. First, as it is one of the world's leading innovation hubs.[7] Many different types of innovative technologies are adopted there, and Singapore government has accumulated substantial experiences in governing risks associated with innovative technologies. Singapore is thus a good option for us to study how risks specifically regarding the adoption of ridesharing are governed. Second, Singapore government has a reputation for its pro-active governance style. Findings in this article can provide practical suggestions and implications for decision makers in other countries. Third, it is likely for us to conduct interviews with stakeholders involved in the governance of risks in the adoption of ridesharing in Singapore. This is a practical reason

[7] http://www.straitstimes.com/singapore/singapore-could-be-global-innovation-hub

for us to choose Singapore as a case for study. We view the Singapore case as a revelatory case because few studies have been conducted to comprehensively research how risks associated with ridesharing are governed. Through interviews with government officials, taxi companies, taxi drivers, experts, ridesharing companies, private-hire car drivers, and users, we can trace the process regarding the governance of risks in the adoption of ridesharing, and identify the strategies applied by Singapore government in coping with risks in adopting ridesharing.

We have examined the governance of ridesharing from its initial introduction in Singapore in January 2013 to December 2016. Uber and Grab are the two dominant ridesharing companies in Singapore. They offer a range of price points and services that could be booked through a smartphone. The platforms set fares based on distance, location and demand. The ridesharing companies take a 20 percent commission of the charged fares (Feeney, 2015). In 2010, Uber was launched in San Francisco. Uber does not own fleets of passenger cars, and instead recruits individual car-owners and drivers as 'partners'. The private-hire car drivers are not allowed to pick up passengers from the street. In September 2014, ridesharing service through Uber had been provided in over 200 cities in 45 countries around the world (Feeney, 2015). Grab was founded by Tan Hooi Ling and Anthony Tan. It is mostly used by citizens in Southeast Asia, and now has up to 1.5 million bookings per day.[8] The governance processes of ridesharing in Singapore can be categorised into five different phases thus far, and are presented below.

Phase 1: Hands-off of ridesharing (January 2013 – September 2014)

Uber started its trials in Singapore in January 2013 and officially launched its car-sharing service in February 2013.[9] GrabTaxi started in Malaysia in 2011 and launched in Singapore in October 2013.[10] In March and September 2014, Uber launched UberX and Uber Taxi respectively in Singapore.[11] Initially, Uber and Grab were operating in Singapore unfettered. The ridesharing companies see themselves as technology firms rather than transport providers.

[8] http://www.wsj.com/articles/grab-joins-nutonomy-to-offer-self-driving-taxis-in-singapore-1474598345

[9] http://thenextweb.com/insider/2013/02/23/uber-officially-launches-in-singapore/

[10] http://www.straitstimes.com/singapore/transport/lta-cracks-down-on-illegal-rental-car-taxis

[11] https://www.techinasia.com/uberx-cars-singapouber-brings-cheaper-rides-to-singapore-with-closed-beta-launch-of-uberx

Phase 2: Regulating ridesharing (November 2014 – July 2015)

With the popularity of ridesharing, taxi drivers in Singapore started to view ridesharing companies as competitors.[12] They argued that the private-car drivers should be subject to various regulations that applied to taxis.[13] Taxi drivers voiced their disapproval of the wide application of ridesharing in Singapore. However, Singapore government has established "Smart Nation" programme as a national vision and is promoting adoption of new technologies, implying that it would be counter to the Smart Nation vision to ban the use of the ridesharing apps such as Uber in Singapore.[14] Recognising the legitimate concerns of the taxi drivers, Singapore government seeks to increase the fairness for all players in the marketplace.[15]

In November 2014, Land Transport Authority (LTA) started to regulate third-party ridesharing companies. It required all the third-party ridesharing companies to register with LTA. Parliament on May 11, 2015, approved the bill, *Third-party Taxi Booking Service Providers Act*. This act demanded all third-party taxi booking companies with over 20 participating taxis to receive their certificate from LTA. In addition, service providers are required to provide the live data on their booking to LTA[16] One July 8, 2015, Uber increased its fare during evening's SMRT train disruption. This was not received well by the users of the booking app.[17] One week later, on July 17, LTA stated that surge pricing was used only for chauffeured vehicle booking services and not its taxi booking service (UberTAXI).[18]

Phase 3: Collecting opinions of the stakeholders involved in ridesharing and the implementation of the new regulation (October 2015 – December 2015)

In October 2015, an industry review was led by Ng Chee Meng (Senior Minister of State for Transport). Various parties, including commuters, taxi drivers, taxi companies, ridesharing companies, and private-hire car drivers were consulted. The National Taxi Association (NTA)

[12]http://www.straitstimes.com/singapore/transport/lta-cracks-down-on-illegal-rental-car-taxis

[13] http://www.channelnewsasia.com/news/singapore/third-party-apps-lead-to/2171588.html

[14] https://sg.news.yahoo.com/taxi-drivers-stop-complaining-start-133501112.html

[15] https://sg.news.yahoo.com/taxi-drivers-stop-complaining-start-133501112.html

[16] http://www.straitstimes.com/singapore/transport/law-to-regulate-cab-booking-services-in-singapore-how-third-party-taxi-apps-work

[17]http://www.straitstimes.com/singapore/transport/uber-price-surge-during-train-disruption-irks-users

[18]https://www.lta.gov.sg/apps/news/page.aspx?c=3&id=6b01c0ea-6002-4d01-986f-984d0578ec44

called for 'fair competition' and stated that commuter safety should be protected through requiring private-hiring car drivers to pass the same checks as regular taxi drivers.[19] On November 11th, 2015, Grab announced plans to launch GrabHitch, a carpooling service that provides a low-cost, door-to-door transport service, with prices closer to public transport.[20]

Five days later, on November 16, 2015, the NTA, along with ten taxi drivers, met with Mr Ng to share concerns and recommendations.[21] On January 28, 2016, GrabTaxi announced that it would combine its GrabCar and GrabTaxi services (and others) under a new parent company Grab.[22]

Phase 4: The reforms of current regulation framework (April 2016 – June 2016)

On April 12, 2016, a new licensing framework, *Private Hire Car Driver Vocational Licensing (PDVL) framework*, was released.[23] This regulation required all drivers of the private hire car to have a background check and participate in a 10-hour training course and pass the necessary tests. In addition, the current Taxi Driver Vocational License (TDVL) will be updated. The duration of the courses that the taxi drivers need to attend are shortened from six- to nine-hour to between three and five hours.[24]

On June 13, 2016, Grab stated its first cross-border carpooling which allows the commuters to share their ridesharing between Johor Bahru and Singapore.[25] One week later, on June 20, 2016, LTA indicated that it deemed the service model not compatible with regulations in Singapore and had informed the company about it.[26] As a result, Grab's ride-sharing service between Singapore and Johor Baru, that started on June 20th was changed to a free three-week trial.[27]

Phase 5: Further levelling the playing field (August 2016 – December 2016)

[19] http://www.channelnewsasia.com/news/singapore/grab-uber-welcome-new/2688488.html

[20] http://www.straitstimes.com/business/companies-markets/uber-rival-grabtaxi-plans-carpooling-service-in-singapore

[21] http://www.channelnewsasia.com/news/singapore/taxi-association-pushes/2266584.html

[22] http://www.channelnewsasia.com/news/singapore/grabtaxi-rebrands-itself-for-regional-push-8218866

[23] http://www.channelnewsasia.com/news/singapore/grab-uber-welcome-new/2688488.html

[24] http://www.channelnewsasia.com/news/singapore/grab-uber-welcome-new/2688488.html

[25] http://www.channelnewsasia.com/news/singapore/grab-launches-johor/2867438.html

[26] http://www.channelnewsasia.com/news/singapore/paid-cross-border/2888196.html

[27] http://www.straitstimes.com/singapore/transport/grabhitch-cross-border-service-now-free-after-lta-says-paid-service-violates

Also in the same month, Singapore government stated that it would review its Taxi Availability (TA) framework. The TA standards were established in January 2013. They require taxis drivers to work a certain minimum daily mileage and during the peak hours. In contrast, private-hiring cars do not have to adhere to these requirements. LTA claimed that it would monitor the situation carefully and guarantee the needs of the users and the welfare of taxi drivers.[28]

On September 23, 2016, nuTonomy testing two driverless cars it developed has set up a partnership with Grab to allow its users to try them out for free.[29] On September 25, 2016, in an accident involving a private-hire car under Uber, a woman was killed.[30] On December 17, 2016, LTA released its review report about TA, and it reported that the "percentage of taxis with minimum daily mileage of 250km" requirement would be removed.[31]

4. Case analysis

In this section, we first summarise the types of risks involved in the adoption of ridesharing, and then we analyse how risks involved in ridesharing are governed by Singapore government over time.

4.1 Risks in ridesharing

Ridesharing in practice may result in technological risks. Five key ones are elaborated in detail as follows.

1. ***Privacy***: ridesharing platforms collect sensitive information about their customers, such as telephone number, geolocation data, and credit card number. Some users of ridesharing have complained about the ridesharing company's inappropriate gathering or use of rider

[28] http://www.channelnewsasia.com/news/business/singapore/taxi-availability-rules-to-be-reviewed-by-this-year-ng-chee-meng/3123116.html

[29] http://www.straitstimes.com/singapore/want-to-grab-a-free-ride-in-a-driverless-car

[30] http://www.channelnewsasia.com/news/singapore/woman-killed-in-three-vehicle-accident-believed-to-involve-uber/3157284.html

[31] https://www.lta.gov.sg/apps/news/page.aspx?c=2&id=8d105be4-5fa5-4837-b346-300533288a03

data.[32] Some critics even now label Uber as a Big Data company that is transforming its business and focusing on leveraging the wealth of information they gather to provide new services and generate revenue by selling this data to others (Hirson, 2015). If the collected private data on journalists, elected officials, and venture capitalists were used improperly, the outcomes might be disastrous (see Rogers, 2015). Although Uber has been working on improving its privacy policy, it remains to be seen whether its policy is effective in the future (Feeney, 2015).

2. ***Safety***: customer protection raises concerns for users of ridesharing services in many countries (Agatz et al., 2012). Customers may feel unsafe and insecure when they take strangers' cars (Nielsen et al., 2015). The drivers of ridesharing are not professionally trained and licensed like their taxi driver counterparts. The background checks for drivers of ridesharing are not as strict as they are for taxi drivers and drivers of ridesharing do not need to submit fingerprints scans. Also, there are instances that drivers of these ridesharing services may have assaulted passengers or committed other crimes.[33] In addition, the vehicles of ridesharing may not be rigorously inspected. For example, Uber does not require regular vehicle inspections, and its cars are not subject to the similar rigorous safety examinations as normal taxis.[34] It has also been found that many drivers in Singapore buy second-hand cars to work as ridesharing drivers. This might raise safety concerns.[35]

3. ***Influence on incumbent industries***: some researchers have argued that the biggest risk of ridesharing to consumer welfare is from politics rather than safety issues. Ridesharing is disruptive, implying that it may result in unanticipated outcomes for incumbent industries (Avital et al., 2014). In this case, the taxi drivers viewed ridesharing companies as their competitors, and taxi drivers claimed the use of ridesharing platforms, such as Uber and Grab, has negatively influenced their businesses.[36] Media reports indicate that Uber drivers

[32] https://www.wired.com/insights/2015/01/uber-privacy-woes-cautionary-tale/

[33] Zauzmer J. and Aratani L., Man visiting D.C. says Uber driver took him on a wild ride. The Washington Post, July 9, 2014, https://www.washingtonpost.com/news/dr-gridlock/wp/2014/07/09/man-visiting-d-c-says-uber-driver-took-him-on-wild-ride/

[34] Feeney, M. Is ridesharing safe? January 27, 2015, http://www.cato.org/publications/policy-analysis/ridesharing-safe

[35] http://newsinfo.inquirer.net/788470/more-singapore-drivers-buying-used-cars-to-work-for-uber-grab

[36] http://www.straitstimes.com/singapore/transport/cabbies-talk-of-love-hate-relationship-with-grab-and-uber

have been attacked in Australia, Mexico and Costa Rica by taxi drivers.[37] The taxi industry claims that ridesharing enjoys an unfair advantage because it does not need to follow pricing or consumer protection regulations (Malhotra, & Alstyne, 2014). Uber, for instance, employs 'surge price' when demand is high. On July 8, 2015, Uber increased its fare during evening's SMRT train disruption. This led many users of the booking app felt unhappy.[38] On November 25, 2015, UberX in Singapore fares were reportedly as much as 3.8 times higher during the North-South Line train disruption.[39] In addition, ridesharing also brings mixed influence on public transit: it both complements and competes with public transportation for individual trips (Rayle et al., 2014).

4. ***Liability***: scholars have argued that the moral dimension of innovation should be emphasised, and we need responsible innovation (Stilgoe et al., 2013). Ridesharing as an innovation may result in the rise of non-professional and non-regulated workers. In addition, it is likely that many drivers of ridesharing will use rental cars.[40] The drivers of ridesharing thus may not be covered by insurance. When accidents occur, this may result in losses for drivers and passengers (Feeney, 2015). An unresolved legal issue is who is liable when in an accident a ridesharing vehicle is involved. Uber has denied liability for accidents that occur while its service is used. Uber's argument is that it only provides a platform that facilitates matching drivers with passengers thus bearing no legal responsibilities for property damage or injuries caused by the drivers (Feeney, 2015). However, some argue that ridesharing companies enjoy profits, but they offload risks to others (Malhotra, & van Alstyne, 2014). An accident involving ridesharing occurred in Singapore, and a 19-year old girl died.[41] Currently, there is no consensus regarding the question of how to deal with ridesharing cars when they are involved in accidents.

5. ***Automation***: With the development of ridesharing in Singapore, automation of ridesharing has made some progress. On September 23, 2016, nuTonomy testing two driverless cars it developed has set up a partnership with Grab to allow its users to try them out for free. In

[37] Amanda Lee, New entrants turn the taxi industry on its head, October 24, 2015, http://www.channelnewsasia.com/news/singapore/new-entrants-turn-the/2214680.html

[38] http://www.straitstimes.com/singapore/transport/uber-price-surge-during-train-disruption-irks-users

[39] http://www.straitstimes.com/singapore/uber-plans-to-launch-ride-sharing-option

[40] http://www.straitstimes.com/singapore/transport/more-drivers-buying-used-cars-to-work-for-uber-grab

[41] http://www.channelnewsasia.com/news/singapore/woman-killed-in-three-vehicle-accident-believed-to-involve-uber/3157284.html

December 2016, Grab announced an investment in motorbike-hailing service by Honda Motor Co. Grab, and Honda would form a partnership to developing ridesharing technology.[42] It can be certain that autonomous ridesharing may come true in the near future. This means that users can book a driverless car for their travel journeys. Automation of ridesharing may result in new challenges for decision makers. For example, this may lead to unemployment of taxi and private-hire car drivers due to the decreased demands on cars with drivers. Moreover, new unintended consequences are surfacing such as exacerbation of organ shortage problem due to decreasing number of deaths because of driver errors in motor-vehicles accidents by 94%.[43]

These five concerns are the main technological risks associated with ridesharing. They are highly related to the concerns of users, which need serious considerations for decision makers. After identifying these concerns, the strategies applied by Singapore governments to cope with them are elaborated in the following section.

4.2 The governance of risks in ridesharing in Singapore

In this case, five different types of governance strategies in coping with risks associated with ridesharing can be identified. They are the no response strategy, prevention-oriented strategy, control-oriented strategy, toleration-oriented strategy and the adaptation-oriented strategy. These strategies are elaborated in detail below.

1. *No response*: when Uber and Grab started their operations in phase one, Singapore government regarded them as an innovative technology that can efficiently achieve an automated matching between drivers and users. As such, they essentially promoted their wide adoption and argued that ridesharing is helpful in resolving traffic congestion problem in Singapore. At the time, no framework was established to specifically regulate ridesharing which indicates a no response strategy.

[42] http://www.channelnewsasia.com/news/business/automaker-honda-invests-in-ride-hailing-service-grab/3360640.html

[43] http://www.slate.com/articles/technology/future_tense/2016/12/self_driving_cars_will_exacerbate_organ_shortages.html

2. *Prevention-oriented Strategy*: In this strategy, actions are preferred that aim at the avoiding the existence of risks. In this case, it has been reported that the carpooling service offered by Grab would soon enable people to use it and share a ride across the border between Singapore and Johor Bahru in Malaysia in phase four. However, LTA promptly informed the company that regulations in Singapore do not allow such a service model and that the company was not in compliance with existing regulations.[44] Similarly, regulations in Malaysia do not permit cars with Singaporean registration to provide ridesharing services in Malaysia if they do not have a public service vehicle license.[45] Thus, Singapore government decided to prohibit the ridesharing service of Grab. Its main aim is to eliminate the existence of risks, which is characterised as a prevention-oriented strategy.

3. *Control-oriented strategy*: This strategy means that actions are taken with the aim of controlling risks. In this case, Parliament approved the bill, *Third-party Taxi Booking Service Providers Act*. Under this new law, all third-party providers of taxi booking services are required to register themselves with LTA and comply with its regulations. In addition, Singapore government developed a *Private Hire Car Driver Vocational Licensing (PDVL) framework* for private-hire car drivers, which comes into effect in the first half of 2017. They all indicate an attempt to regulate the functions of ridesharing in Singapore, which suggests the adoption of a control-oriented strategy by the government.

4. *Toleration-oriented strategy*: Singapore government attempted to deregulate the taxi industry and promote their competitiveness vis-a-vis ridesharing services. It updated the regulatory framework for taxi drivers, *Taxi Availability*, and removed certain regulations, such as the minimum daily 250km mileage requirement for a percentage of taxies, and the percentage of taxis operating during the peak hours (shoulder peak periods requirement), with the aim of further levelling the playing field. The reforms of current policies indicate the emergence of a toleration-oriented strategy.

5. *Adaptation-oriented strategy*: Singapore government established a committee to review the risks regarding the adoption of ridesharing in phase three. Viewpoints, perceptions and suggestions from a broad range of stakeholders, such as customers, private-car drivers, taxi drivers, ridesharing companies and taxi companies were collected. This means that

[44] http://www.channelnewsasia.com/news/business/paid-cross-border/2888196.html

[45] http://www.channelnewsasia.com/news/business/paid-cross-border/2888196.html

Singapore government attempted to enhance the mutual understanding of various actors with the aim of building consensus regarding the nature of the risks involved in ridesharing.

5. Conclusions and Discussion

We report an in-depth case study in this article to present which types of technological risks highly concern Singapore government and citizens, and how Singapore government has addressed these risks so far. During the case, we found that Singapore government has identified five different types of technological risks: privacy, liability, automation, safety, and impact on incumbent industries. To cope with them, Singapore government adopted five different strategies: no response, prevention-, control-, toleration-, and adaptation-oriented. In general, Singapore applies a pro-active approach to prepare itself to address the risks associated with ridesharing.

A few studies have been conducted to explore how decision makers govern innovative technologies (Brown, & Osborne, 2013; Flemig, Osborne, & Kinder, 2016). This case study on governance of ridesharing in Singapore is revelatory and provides insights for decision makers in other countries on how to proactively address risks of ridesharing. Furthermore, the wide access to smartphones and internet makes it easier for citizens around the world to use ridesharing for addressing their travel needs. Governments around the world face difficulties in governing the risks associated with ridesharing, and with increased rate of adopting and the possibility of widespread automation of these services in future this issue is becoming an urgent priority. Some countries, like France and Germany, banned the adoption of ridesharing while some major Chinese cities, like Beijing, Shanghai and Guangzhou, adopted strict regulations to limit the widespread adoption of ridesharing. Our case study showed a comparatively positive example regarding the governance of risks in the adoption of ridesharing. Singapore government neither prohibits the development of ridesharing nor lets it develop freely. Rather, it took proactive measures to level the playing field to achieve both the wide application of this innovative technology and increase the competitiveness of incumbent taxi industry. In this case, it seems that Singapore government applied an adaptive approach to address technological risks associated with ridesharing and collected opinions, perspective, and ideas from different stakeholders involved in the governance of ridesharing. Moreover, with the rapid technological advancement and development of new business models, Singapore government is proactively

monitoring the implementation of its policies on regulating ridesharing and making adjustments.

Our work suggests an adaption-oriented approach is a comparatively better approach for decision makers to address technological risks associated with the adoption of innovative technologies (including ridesharing). Our study has found that Singapore government has learned to apply such a strategy in coping with risks in ridesharing. We nevertheless must acknowledge the particularities of the Singapore case. First, innovation has been established as a national strategy by Singapore government, implying that it essentially tends to promote the application of various innovative technologies (including ridesharing). As such, it prefers reconciling the relationships between innovative technologies and incumbent industries. Second, Singapore government is highly responsive to the demands of citizens. As a city-country, Singapore government has a tradition to apply a proactive governance style in societal governance. Therefore, it is likely that Singapore government may apply an adaptation-oriented strategy in coping with the risk involved in ridesharing. Furthermore, an important factor contributing to the successes of this proactive adaptation-oriented approach is the presence of high level of policy capacity in Singapore.

Finally, we would like to make some reflections on our methodology. One critical limitation of a single case study is that it has a limited generalisation. We intend to conduct comparative studies, and more case studies and interviews in other countries to gain more insights into the governance of risks in ridesharing, and examine the question of how to explain the selection of different strategies in different cities or countries regarding the governance of risks associated with ridesharing.

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