

The 8th International Symposium on Frontiers in Ambient and Mobile Systems  
(FAMS-2018)

## Passenger Safety in Ride-Sharing Services

Benish Chaudhry<sup>a\*</sup>, Ansar-Ul-Haque Yasar<sup>b</sup>, Samar El-Amine<sup>c</sup>, Elhadi Shakshuki<sup>d</sup>

<sup>a</sup>University of Modern Sciences, Dubai, United Arab Emirates

<sup>b</sup>Transportation Research Institute (IMOB), Hasselt University, Belgium

<sup>c</sup>Université de Technologie de Belfort-Montbéliard, France

<sup>d</sup>Acadia University, Canada

---

### Abstract

With the rise of ride-sharing services available in the world, it has ease users to commute with app based services and cashless transactions. The introduction of ride-sharing companies in the start gave the users the liberty to use one application and account to be used universally. However, with the rise of such services, one question that does ring a bell is the passenger safety, especially in countries with loose law controls. This paper focuses on the aspect of passenger safety in ride-sharing services. There have been reports of harassment, assault and robbing passengers on these rides. However, no strict measures could be taken because of the company not having full control over the driver, vehicle and ride. Poor feedback system has also added fuel to the fire. As much as they are filling the gap of better services across the world, there is a dire need of having possible security measures to make sure that rider safety is ensured from the start of the journey till he/she reaches the destination. Different suggestions that have been given include the introduction of mandatory dash cams in the rides through which the rider can put a live transmission of his/her ride on social media or YouTube, in order to have more eyes. Moreover, an introduction of watchdog network, which can volunteer to monitor rides, can also keep an eye on the transmission and can contact lawmakers in case of emergency. A distress alarm on the app can be made available, which can report discomfort of the rider or suspicious behaviour of the driver. Other measures like keeping indoor lights on during after-dark hours, display of ride sharing company's sticker on front and rear of the car and introduction of passenger insurance add-on in the ride type can also enhance security of the rider.

© 2018 The Authors. Published by Elsevier B.V.

Peer-review under responsibility of the Conference Program Chairs.

**Keywords:** Transportation; Security; Passenger safety

---

---

\* Corresponding author.

E-mail address: [benishch@yahoo.com](mailto:benishch@yahoo.com)

## 1. Introduction

Ride-sharing service was pioneered by Uber, which started in 2010 in San Francisco. The purpose of Uber was to offer chauffeur driven black cabs to corporate customers. By 2012, any vehicle could offer the Uber service, provided it has passed a conformity test. Currently, Uber operates in more than 600 cities across the world and offers food delivery in addition to passenger commute. The standard of Uber service is different across the world. While in UK, and US it is considered to be the most suitable service, some countries in Europe report Uber to be comparatively unsafe and the population prefers using the local taxi service instead of Uber.

Uber's competitor Lyft which was introduced in 2012, operated with the same Uber-like mission. However, they differentiated themselves by offering services, which made it unique to Uber. They introduced "gratuity" service through which a customer can 'tip' a certain driver for his services. The gratuity is also paid through the app and the customer has the option to add it at the end of the ride. Moreover, the safety checks at Lyft are much tougher than Uber. They offer options like customer music preference, which is made available on the driver's app and he can make sure the customer enjoys the ride with his choice of music. It gives the driver a chance to increase his rating and also gratuity for a certain ride. Lyft rides were also identifiable by the display of pink furry moustache on the front grill of the vehicle. Lyft is now operating in over 300 US cities and it recently expanded its operations to Canada. However, the downside to Lyft is the failure to expand to other regions of the world.

Similar ride-sharing service Careem was introduced in 2012 in Dubai. Careem is operating in over 50 cities in Middle East, North Africa and South Asia. Its value increased when Saudi and Emirati investors backed it. Careem also reached an agreement with the local taxi corporation in UAE and a taxicab can also be ordered using the same Careem app.

While ride-sharing was becoming a popular gig in the rest of the world, China introduced its own ride-sharing service by the name of Didi Chuxing. It is by far the largest monopolistic ride-sharing company in the world, which is backed by the three largest Internet giants, Alibaba, Baidu and Tencent. Uber tried to run its operations in China but with the availability of a Chinese service, Uber faced \$1 billion losses per year, until the war between Didi and Uber was resolved by Didi acquiring Uber in China. Now Uber operates in China with a small economic stake in the company.

The convenience of ride sharing services from public transportation includes a multiple of reasons availability being on top. In Sydney alone, Uber is offering services to areas marked as deserts where there is no access of rail or taxis. This makes it easier for people who are commuting from newly developed suburbs where access of public transportation is yet to come. Moreover, Uber is offering service round the clock as well. It is often impossible to find a taxicab at late hours and most of the public transportation stops operating after certain hours. In such situations, Uber's availability makes travel choice easy for riders. The payment system of ridesharing also makes it convenient for riders to pay through app with stored payment details. It is convenient for the drivers as well as they don't need to carry change or excuse a customer for unavailability of certain denomination. Moreover, passengers don't have to carry cash around to make ensure a certain service. The bi-directional rating system of Uber also makes it convenient for the drivers to be rated by passengers and vice versa. The greed for better rating make the drivers work harder by improving their service e.g. by cleaner cars, safer driving, helping passengers settle and often light music to make the journey more comfortable for the rider. While taxis can be hired on the roads but at particular hours, the probability of finding a taxi and the wait times might increase significantly. With ridesharing, the wait time is mentioned on the app and you can track the location of your driver in real-time. This makes the waiting easier considering the guarantee that a driver is on his way to pick you from the location. With all other pros, it is necessary to mention the use of technology in ridesharing. The convenience of keeping a track of your journeys, payments, transactions and driver, makes ride sharing the fad of the contemporary times.

While the ride sharing services are convenience for the population at large, the local taxi corporations from various countries have done strike against the introduction and operations of ride-sharing services. While the process of matching drivers with passengers in real time takes place in the Uber application, it should still be seen critically<sup>4</sup>

because of the lack of state regulations regarding ride-sharing apps and companies. Some of the countries are Egypt, Saudi Arabia, India, Italy, Spain, Australia, Croatia, Bulgaria, Czech Republic, USA and many others. While the introduction of the service could not be stopped by the strikes, the main issue to bring at large to the governments was the territory in which the local taxi drivers would have full control. One of the territories was the airport of the said countries. The taxi drivers wanted to make sure that only their services are made available at the airports. Most of the countries have reached an agreement and some have signed contracts with the local taxi corporations to make sure that the airports stay under their control.

While safety is a growing issue in ride-sharing services, it has been an issue in local taxi services as well. With the advent of such services, the competition in service characteristics also includes the likelihood of safety in the country.

## 2. Problem Statement

When we talk about the service sector, the quality of the service is what makes it successful. While tangibles, responsiveness and reliability are main factors to consider in service quality, assurance of employees to deliver what is expected and to maintain the trust promised in the mission of the organization matters a lot. Service Quality and customer satisfaction are considered to be discrete but diligently related constructs and there is a positive relationship between both of them<sup>2</sup>. The value received by each customer signifies the quality of the service provided. So customer satisfaction level might vary from one customer to another according to the service provided to the customer at that time.

In transportation, however, one of the contributing factors in customer satisfaction is personal security<sup>1</sup>. While personal security is a rising issue in public transportation, it is becoming a matter of great concern and debate in ride-sharing services. The chance of undergoing assault, violence, harassment or attack has become a critical factor in traveller's decision making. Any anticipation of negative behaviour can affect all characteristics of travel options, which may include the mode, time of day; route to be taken etc. and it also force a person to not travel at all.

Most ride sharing services do not use any display sign or sticker, which makes it difficult for pedestrians or passer-by to differentiate it from private transportation. In countries, where the culture of family/official chauffeur is common, it becomes even more difficult to make ride-sharing cars stand out from the crowd. The ease in becoming a ride-sharing driver also accounts for the challenge in the likelihood of a driver being susceptible to crime. Multiple incidents have been reported on social media and on news about harassment from a ride-sharing driver. This increases and decreases the number of customers on ride-sharing services and also affects Word-of-Mouth advertising<sup>3</sup>. Even though the number of safety incidents reported in comparison to the number of rides taken is nearly insignificant, even then, it is necessary for the ride-sharing companies to devise different methods through which passenger safety can be enhanced. Future of ride-sharing service success might depend on customer safety and security during the ride and driver behaviour towards the passenger.

If we look at the issues from a driver perspective, the traditional criminal background check involves fingerprints. In USA, there are live fingerprints and private fingerprints. Live finger prints are usually taken from all taxi and public transportation drivers and costs close to \$100. Most Transportation Network Companies (TNC) are however, using the private finger print method because of low costs. It costs around \$20 to get a private fingerprint done. However, there is a major discrepancy between the two. Because of the inferior checking method, a lot of felons are not shortlisted and a lot of offenses go unnoticed<sup>9</sup>. Most of the ride sharing services is using these inferior methods for hiring their drivers. This increases the likelihood of a felon being given the job of a ride sharing driver and eventually puts the passenger to risk of theft, assault and murder. Some states are suing ride-sharing services because they believe that all drivers should go through unified criminal background checks thus making it transparent. Moreover, citizens and cities should reserve their right on how to screen their drivers in order to ensure the safety of their local community. The demand for unified fingerprinting is a necessity for public safety.

### 3. Methodology

The approach to measuring whether ride-sharing services have caused any net changes in road accident fatalities and rate of arrests has been done earlier<sup>5</sup>. The study takes only Uber in view and not other ride-sharing services. Even though the introduction of ride-sharing has caused ease to the market but because of little to no regulations, these ride-sharing services has put the passengers, pedestrians and other drivers to greater risk by being on the road. As the service is run on smartphone application, the driver of a ride-sharing service has to use his phone to accept/reject a ride, follow directions and call a passenger. This makes the vehicle potentially more hazardous for the road because of driver distraction. Moreover, it is likely that the driver of the vehicle may be intoxicated at the time of a ride and may accept it considering the short distance, or time or greed for money, only to able to reduce wait times and serve another passenger<sup>6</sup>. Alcohol consumption can result in other risky behavior like sexual assault, which can increase the risk of accidents and crime.

A theoretical framework has been presented on how any type of public transportation influence driving under alcohol consumption<sup>7</sup>. The model predicts that the lower price of ride-sharing services lowers the probability of one taking the chance to driver one's self. The lower price raises the demand for hanging out. The availability of ride sharing reduces the chance of one consuming alcohol and then deciding on driving under the influence. Also, because of the ease of app, one doesn't have to give directions to the driver to reach a certain point. The net effect can actually reduce fatalities because the person under alcohol influence would most likely be the passenger.

In order to calculate the risk associated with ride-sharing service, a difference-in-difference specification has been used<sup>5</sup>. An earlier study used the similar approach to show that between 2009-2014, the introduction of ride-sharing services reduced vehicular homicide rates<sup>8</sup>. The empirical evaluation of fatal accidents or arrests per 100,000 residents in a suburb  $i$  in a month  $m$  and year  $t$  can be as follows

$$\text{number per 100,000 residents}_{imt} = \beta \text{uber}_{imt} + X' \gamma + \theta_i + \tau_{mt} + \phi_{imt} + \epsilon_{im} \quad (1)$$

The variable of interest uber shows if it was accessible to the residents in that month and year. 'X' is the set of factors that can affect either alcohol consumption or safety of drivers or both. This may include different laws like age at which you can get a driver's license, marijuana laws; other factors may include tax rate of beers, real per capita income, unemployment rate and demographics of the given suburb. Some of these factors can make a significant difference. Graduated driver licensing laws restricts teens from driving and therefore reduces fatalities<sup>10</sup>. Studies show that introduction of beer taxes in a certain suburb reduces traffic fatalities<sup>11</sup>. Keeping two types of economic indicators, real per capita income and unemployment rate, studies prove a relationship between alcohol consumption and economic standing<sup>12</sup>.

The equation includes suburb-fixed effects,  $\theta_i$  that accounts for any time-invariant differences between ride sharing and non-ride sharing suburbs. The suburb specific linear, monthly time trends  $\phi_{imt}$  calculates the possibility of differing trends by calculating for trends in the outcome variables specific to the suburb or geographic location. Standard errors are grouped by suburb to correlate within each country. Specification also includes indicators for each month and year in the sample  $\tau_{mt}$ .

### 3. Possible Solutions

In order to ensure passenger safety during and after the ride, certain measures can be taken. Uber offers GPS tracking where you are able to share your journey with your family and friends in real time. Moreover, they have laid out a list of behavior that can result in regulatory actions against the driver or rider. Examples of these include physical contact with riders, driving unsafely, breaking the law while riding Uber, abusive behavior or language use with the rider or driver, unwanted contact with the rider after the trip is over, etc.

Each of these potential solutions can be pilot tested across different ride-sharing service to measure the comfort of the customer and feedback can be received from the customer through short survey at the end of the ride. It should be noted that not all measures could be successful in all countries. The nature of safety issues reported in

each country might require a different set of measure to be taken. However, generically the following measures can be helpful in sorting a solution or adding a safety component to the existing ride-experience.

### *3.1. Dash Cam and Watchdog Network*

A lot of countries are introducing cam services in public transportation in order to increase security of passengers and driver. Not only does it monitor suspicious behaviour but also monitors passenger and driver behaviour at all periods of time. This helps in improving the quality of the service and to enhance safety of riders in these modes of transportation. However, in ride-sharing services, since the ride is itself an outsourced asset of the company, it is generally not required to add any features to the car itself other than the car working in good condition and the age of the car. However, due to the security issues in ride-sharing services, it is necessary that a dash cam be introduced in the car for the safety of the rider and the driver.

Certain conditions should be put on the driver regarding the use of dash cam. It should be made sure that the driver turns it on and LIVE before starting the ride; the rider should be allowed to disengage from the ride if the cam is not working or responding or if the driver refuses to turn it on. The Cam's LIVE transmission should be available on the ride-sharing app, and should be available for share with the rider's network.

A possible social media plug-in should also be available. According to the rider's consent, their LIVE transmission should be made available on their social media network like Facebook, Instagram or YouTube, through which it can be made sure that there are multiple eyes on the rider.

An independent watchdog network can also be created. It can be a group of volunteers who are trusted by rider or multiple riders and who can respond and take action in case any safety issue occurs with a rider. These watchdogs should be able to view the live transmission of the ride-sharing cams closer to their vicinity. If there is any suspicious movement or behaviour that any 'watchdog' observes, he/she can report it on the Watchdog network and action can be taken in order to make sure that the rider is safe.

### *3.2. Distress Alarm*

In case of harassment or safety issues of a rider, a distress alarm should be made available on the ride-sharing application. This distress alarm can be used to send a signal to the ride-sharing service, with driver and passenger information; similar signal can be sent to local lawmakers, and it should send a notification to the Watchdog network mentioned above. The watchdog network in case of having close proximity to the affected rider can personally go to the site of incident.

Similar distress alarm can be made available on the driver's app as well. In case a rider is trying to harm or harass the driver, he can signal and report the incident. In the feedback loop, if the passenger gives lower rating to the driver or reports against the driver, his distress alarm can justify his case or help secure his position.

### *3.3. Miscellaneous*

There are other measures, not major but can add to the security of the rider. The purpose of all this is to make sure that the rider is safe from the point he/she starts his journey to the destination. There should be a restriction of keeping the indoor light on for after-dark hours. These hours should be instructed to the ride-sharing drivers and it should be made compulsory to keep the lights on during the entire duration of the ride. Not only will it keep visibility of the inside to the general traffic, but also in case of dash cam, will provide a video of the journey.

Another addition that can be made mandatory is the display of ride-sharing company's sticker on the front and rear of the vehicle. Lyft drivers are encouraged to display pink fluffy moustache on the grill in order to identify themselves as Lyft rides. If other services display of their logo mandatory for the drivers, it will make it easier for passer-by traffic to understand that the car is being used for ride-sharing services.

### 3.4. Passenger Insurance

Another option could be the addition of ‘passenger insurance’ on the ride options. The rider can choose passenger insurance covered ride for his journey and pay extra to get it. In case of any issues, the ride-sharing company will make sure that either someone from them or third party will rescue the rider.

## 4. Summary and Conclusion

Even though ride-sharing service has facilitated public usage of commute but the safety of passenger is still a much-debated issue across the media. There is a need to introduce small and big measures to ensure the passenger and driver stays safe during a certain ride.

One of the suggestions was to introduce dash cams in the ride and allow public access to the ride. In addition to dash cam, a need to create a volunteer watchdog network who can monitor a certain ride and can report a suspicious incident or responsively reach out to the passenger can also help the passenger.

In addition to that, distress alarm availability on the app can help the passenger to report any safety concerns through the app and can alert the company and lawmakers closer to the ride. There is a need to make sure that there is a linked connection between the application and the lawmakers so actions can be taken promptly.

Other small yet significant measures may include keeping the indoor lights of the vehicle on during after-dark rides. Also, there is a need to display stickers of the ride-sharing company on the front and back of the vehicle so that other vehicles can identify that it is a serviced ride.

Passenger insurance can also be added at an extra cost. They can choose to have additional insurance in case of safety issues, which will be covered by the insurance company of the ride-sharing company.

Such measures are important to ensure that ride-sharing companies offer better services to the passengers. Print and social media can influence the customer base of a service and in order to keep the service steady or rising, the introduction of such safety measures can increase the marketing and profit of the respective company.

## References

1. Atkins, S. T. (1990). Personal security as a transport issue: a state of the art review. *Transport Reviews*, 10(2), 111-125.
2. Beerli, A., Martin, J. D., and Quintana, A. (2004). A model of customer loyalty in the retail banking market. *European Journal of Marketing*, 38(1/2), 253-275.
3. File, K. M., and Prince, R. A. (1992). Positive word of mouth: Customer Satisfaction and buyer behaviour. *International Journal of Bank Marketing*, 10(1), 25-29.
4. Rogers, Brishen. (2015). The Social Costs of Uber. 82 U Chi L Rev Dialogue 85
5. Dills, Angela K. and Mulholland, Sean E., Ride-Sharing, Fatal Crashes, and Crime (November 29, 2017). Available at SSRN: <https://ssrn.com/abstract=2783797> or <http://dx.doi.org/10.2139/ssrn.2783797>
6. Rayle, Lisa, Shaheen, Susan, Chan, Nelson, Dai, Danielle, and Cervero, Robert. (2016). App-Based, On-Demand Ride Services: Comparing Taxi and Ridesourcing Trips and User Characteristics in San Francisco. *Transport Policy* 45(C): 168-178.
7. Jackson and Owens. (2011). One for the road: public transportation, alcohol consumption, and intoxicated driving. *Journal of Public Economics* 95:106-121.
8. Greenwood, Brad N. and Wattal, Sunil. (2017). Show Me the Way to Go Home: An Empirical Investigation of Ride Sharing and Alcohol Related Motor Vehicle Homicide. *MIS Quarterly* 41(1): 163-197.
9. Kiplinger, Lisa. (2016). Kalamazoo shooting: A look at Uber background checks. *USA TODAY* 7:55 a.m. EST February 22, 2016. <http://www.whosdrivingyou.org/rideshare-incidents#deaths> (Viewed 2/29/16).
10. Dee, T., Grabowski, D.C., Morrissey, M.A., 2005. Graduated driver licensing and teen traffic fatalities. *Journal of Health Economics* 24 (3), 571–589.
11. Saffer, H., Grossman, M., 1987. Beer taxes, the legal drinking age, and youth motor vehicle fatalities. *Journal of Legal Studies* 16 (June (2)).
12. Henkel, Dieter. (2011) Unemployment and Substance Use: A Review of the Literature (1990-2010). *Current Drug Abuse Reviews*: 4(1): 4-27.
13. Uber, Connecting Sydney's Villages (2015) <<http://newsroom.uber.com/sydney/2015/05/connecting-sydneys-villages/>>.