

Risks and opportunities on adoption of ride-sharing applications - an exploratory study of Kathmandu.

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Abstract

The online-based industry has been growing since the internet being publicly available. The internet has given a path to people to involve in economic activities. Even in Nepal, an online-based economy has emerged rapidly that has made people adopt the internet for their business. Even in the transportation industry the internet and technology have opened a path to the economy. Ridesharing was first started by the company Uber in 2009 which is still a success to the industry. Similarly in Nepal Tootle was formed in 2017 and Pathao in 2018 has been popular and giving services as an opportunity to both rider and passengers. The study covers the risk and opportunities involved in the use of ridesharing. The risk identified as the privacy of the rider information, safety, and internet penetration. Similarly, the opportunities from the application can be a cashless transaction, environmental benefits, and economic benefits. Because of these elements, they have both positive and negative impacts on the adoption of the application. To analyze, the adoption of the technology acceptance model has been identified as a framework.

Keywords: cybersecurity, security threats, human psychology, privacy concerns, information security, e-governance.

1 INTRODUCTION

Smartphone has become the basic requirement of today's generation to keep their life going. Not just the young but people who are aged are also into the technology to their palm. The technology has covered the essential requirements as ordering food, clothing, socializing, traveling, etc. This application has made significant presence to the people lives. Among the thousands of applications, the ride-sharing application has also been growing as a part of daily use. Before the ride-sharing application, there was the taxi booking application which has similar functionality but had some limitations to both riders and passengers. A city with good access to the internet and registered with GPS make it easy for people to use the ride-sharing application. This has made the passenger to get the on-demand ride at any time and place with comparative price and luxury ride. However, with the significance of the ride-sharing application, there always comes the risk to various aspects. The ride-sharing application has two user interfaces for the rider and the passenger. There are three basic components in the application. The map, server, and payment channel. The server tracks and manages the detailed information of the users and provide the required data. Map used by the ridesharing can be of Google or Bing which helps the user to provide the exact location of both the rider and passenger using the Global Positioning System (GPS). The third component is the payment system which is integrated into various payment channels. The payment is cashless and helps users to avoid carrying changes at the time of need (Ahmed & Burki, 2017).

There is some popular ride-sharing application all over the world as Uber, Lyft, Creem, Didi Chuxing. These applications are providing services to the various city of all over the world. Uber was started in 2010 in San Francisco to offer increase interaction between cabs and customers. Lyft was introduced in 2012 which has offered similar services like Uber. Careem was introduced in Dubai in 2012 which primary function is to help taxi cabs to provide services to passengers (Chaudhry et al., 2018). Similarly in Nepal Pathao was introduced in 2018 which currently providing its services as a ridesharing and food delivery agency (Prayash Raj Koirala, 2020).

As the population increases the requirement for transportation is increased too. The growth in the

number of vehicles leads to congestion on the road. Private vehicles are the primary reason for the traffic congestion in the city. This is also the reason for the environmental degradation in a city. Traffic congestion reduces the vehicle's speed and decreases engine efficiency which increases air pollution. Also, the ideal vehicle increases the waste of fuel (Belz et al., 2016). In the ride-sharing application, however one factor that matters in the adoption is the safety of both rider and the passenger. There is always a chance of getting assaulted, harassed, and attacked which two more unknown people are sharing the ride. These types of actions can harm the services provided by the ride-sharing application (Chaudhry et al., 2018).

The study is done in the limited area of Nepal inside the Kathmandu valley with the most demanded ride-sharing application Pathao. The internet-based application has made the public save their time and money by using the shared ride. It has made public life eased and has provided the government opportunity to improve their laws and policies regarding vehicle utilization (Prayash Raj Koirala, 2020).

The study is made to get the feasibility analysis of the ride-sharing application in the Nepal context. Currently, the ride-sharing application is operated inside the Kathmandu valley in Nepal where the facility is high and has accurate route data. There can be several risks that can be caused by the services. By knowing these risks the rider and passenger both can take the safety measures. Also, there is more opportunity to the public that can be grabbed and take the benefits. The paper also presents the framework that talks about social and economic factors that affect the ride-sharing application adoption by the public.

1.1 Ridesharing (Global)

Ride-Sharing application has the significant growth in recent years globally. The country with the major cities as United states, United Kingdom, Hong Kong, Australia, Canada, etc. is the major places where ride-sharing application being part of people to their daily life. The top ride-sharing application in the market is Uber, Lyft, Creem, Grab, Didi Chuxing, EasyTaxi which are currently serving passengers. It is reported that in 2017 more than 50% of the ride-hailing market is occupied by Uber. Similarly, more than 80% of the market is covered by Uber and Lyft. The cost of the ride depends upon the demand and supply of the ride. The cost of the ride directly depends upon the demand of the ride. Higher the demand high the cost is and vice versa (Shokoohyar, 2018). What the ride-sharing application is? Almost everyone who travels is a driver or passenger. The ride-sharing application is based on the rider and passenger matching to the common destination. The passenger can order the ride through the application on a mobile phone using the internet. When there are riders near to the area of passenger then the ride is matched, and the rider will proceed with the ride. The rider then picks up the passenger and travels to the destination. After the successful ride passenger make the payment through the application which is integrated with different payment channels or by cash on delivery.

1.2 Ridesharing in Nepal

As technology has emerged worldwide, we can see the significant growth of technology in Nepal in past years. The access to the fast internet and presence of the 4G network provided by telecoms made it possible to play around with the technology. Technology has made significant importance to the economic growth in Nepal. Few cities in Nepal like Kathmandu have also gained popularity among the youth. Two most popular ride-sharing applications as Pathao and Tootle that we can see in the market competing. Nepal where the road and public condition is not that good as the same time the ride-sharing application has made relief to people to save time and money (Hamal, 2019). Tootle and Pathao started their services in Kathmandu in 2016 and 2018 respectively. The primary objective of both platforms is to provide online ride-sharing services through the motorcycle. Both

have emerged as the best example of the use of information technology in Nepali society (Hamal, 2019). There are several issues in Nepal to fully adopt the digital platform for transportation. In the paper, we will be discussing mostly the technical issues in the ride-sharing application faced in the Nepal context. The ride-sharing application is penetrated by the economic condition, Internet cost, and availability, government laws, etc. The study's primary purpose is to understand the risk and opportunities in the adoption of ride-sharing service provided by Pathao and Tootle in within Kathmandu valley.

1.3 Ride-share

A ride-share platform is an opportunity given to the rider and the passengers to establish a relationship before the ride. It helps both entities to interact with each other. The passenger is able to order the ride anytime through the smartphone application and phone calls. The application is operated through access to the internet by sending the request to the nearby ride which matches the passenger requirement the most. The requirement can be male or female, bike or scooter, price, route, etc. The nearby drivers who first approve the ride will gain access to more information about the passenger such as location, route, GPS, details, phone number, etc. Both entities are highly dependent upon the use of smartphones, applications, and the internet. The service provider has two types of applications in the market. The first type is the rider application which is used to approve the ride and make a payment, and another is the passenger application which is used to request a ride and make the payment. The application has to be able to run on iOS and Android platforms using the internet. It must have the features enabled to give the best user experience.

Some of major features in the application are as follows:

- Dynamic user experience
- The use of an advanced ride-matching algorithm
- Accurate Map interface and GPS tracking
- User details and profile
- Cashless transaction
- Feedback and rating system

There are basic steps that the users of the application need to follow. These steps are the basic requirement need to be followed. By following these steps, the users will be able to download and get the ride instantly. The first step is the user must have at least a smartphone and access to the internet.

- By using the smartphone and internet the user must download the application from the market. Most of the time the application is free of cost. The passenger and rider have two different types of applications and they must know which to download by their ride nature.
- After download, the user is required to register to the system using proof of identification such as a driving license for rider and citizenship for passengers.
- Once the user is approved with the valid details the user can start using the application by matching the ride with the passenger.

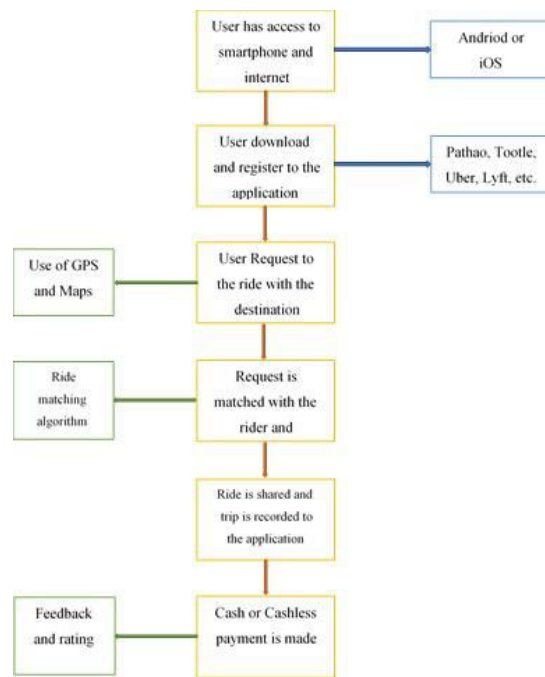


Figure 1: Structure of ride-sharing application (Miller, Kristi; Geiselbrecht, Tina; Moran, Maarit; Miller, 2016)

2 Theories on Technology Adoption

The paper considers the adoption of the ride-sharing application in Nepal. The adoption of ride-sharing applications has been viewed from different angles. The theories of ride-sharing applications have two levels of explanations. One is the macro level which is defined in terms of diffusion of the technology explained by Rogers in his paper. The acceptance and rejection of the technology are explained based on social practices. From the paper, it is being identified that the adopter of the technology mostly is young who are fond of new gadgets and well socialized with friends and people. Macro-level was too wide that it does not cover the micro-level. The research primarily focuses on the technology acceptance model (TAM) as a research framework that explores various factors. The acceptance of the technology is dependent upon the intentional behavior of the user. Various theories and predictions were made for technology acceptance based on the behavior of the users. One of the Theories of Reasoned Action (TRA) was developed to find how human behaves. The theory ignores the attitude of the user toward acceptance. The theory says that the actual behavior of the user is determined by their intention to use the technology (Nguyen et al., 2019). Another Theory of Planned Behavior (TPB) is purposed to overcome the limitation of the Theory of Reasoned Action (TRA). TPB talks about behavioral control which is self-control over technology acceptance (Olumide, 2016).

The technology acceptance model explains how the people of Kathmandu take the ride-sharing application as their need. The framework in the ride-sharing adoption has elements like ease of use, perceived opportunities, self-desire, the willingness of users, feeling safe in use, social influence, and risk in adoption. The adoption of the technology is based on behavioral control which came from the theory of planned behavior. The theory explains how much control a person can have over something to show some behavior. Using technology requires some sort of act of behavior. When there are more opportunities than the risk then there exists more behavioral control (Liao et al., 2018).

Article	Reference	Research Paper Objective	Main Result	Why is this paper Relevant	Other Remark
1	(Chen et al., 2019)	The objective of the paper is to provide a study of a certain corporate company to reduce the overall cost associated with the drivers in fuel consumption and tolls paid. The study is done to find out the losses made by the ride-sharing such as losses in time and transfer.	Reduce Mileage by 35.2%, Number of cars by 23.3%, Arrival time by 10 minutes	Because it talks about the environmental benefits from the adoption of ride sharing application.	It has developed a theory that helps in reducing the number of trips, mileages, and miles. The research population was the employees. It has formulated an ILP formula compose of the shortest path to solve the trip problems. It has only researched certain population of company employees and ignores the other age group such as below 20 and above 50.
2	(Ahmed & Burki, 2017)	The study covers the comfort and security the ride-sharing company can offer for both business and economy classes. To analyze the quality of ride associated with the business and economy classes which are offered by the ride-sharing companies.	Found that the business class faces less problems then the economic. List of problem identified are Difficulty finding the location Misconduct of riders Late arrival of riders High Fare Ride mistake swapped	Because it talks about problem such as difficulties finding location, high fare, etc. which are technical issues.	The research area is Karachi which concerns the problem faces by the riders. It only talks about the business and economy class and ignores the population below the economy class. The research is limited to Karachi and ignores the suitability of the application to rural areas.

3	(Belz et al., 2016)	Study the acceptance of the car-sharing platform to the people and tourists of Hong Kong. To study the benefits and significance of car-sharing services to various places and times in Hong Kong. To study the effects of the car-sharing application on the environment, society, and traffic clogging.	Women than men feel unsafe in ride sharing. Half of the car owners do not even use cars every day. A framework is suggested to determine carbon emission calculation.	It talks about the privacy and safety issues of the passengers.	The study took place in Hong Kong which is done to reduce the traffic congestion and air pollution caused by private vehicles. The study is very wide but has a limited participant of 200 people. Also, it does not talk about the adoption of the platform by the people.
4	(Bauer, 2017)	To study the social and cultural factors that provide insights between employees of Sodertalje, Sweden by sharing the ride while commuting. To provide further instructions to employees so that the ride-sharing will be more comfortable and attractive.	A framework of technology acceptance model for social practices is implemented to find how users behaves. 451 employees were studied where 5% downloaded the application because of loss of app flexibility. The model	Because it has implemented a technology acceptance model regarding the riders behavior and social practices.	It's concerned about the social practices for the ride-sharing adoption but very few regarding the environmental issues due to growing transportation.

			shows people's opinions toward the application.		
5	(Chaudhry et al., 2018)	Study of the application based service and cash less transactions. Study of passenger safety.	Problem identified as Several reports of harassment and assault and robbing of passenger is reported. Suggestions were made as implement dash cams, live transmission, ride monitors, distress alarm on application, and indoor light on, passenger insurance.	Because the paper talks about the passenger safety.	Several reports of harassment, assault, and robbing of passengers are being reported. It may have a detailed study about the passenger's safety but it is ignoring the opportunities with the ride-sharing is higher than the threats.
6	(Dias, 2017)	To study the impact of demographic and social-economic variables on the use of ride-sharing services.	Found that most of the application users are the young, educated, has high income, and work	Because it has designed the model about factor affecting market penetration of the services that predict adoption and use of ride-sharing application.	The paper has detail study about the impact of social-economic and demographic variables and demand side on the use of ride-sharing application,

			individual. The model for technology adaption is implemented that talks about the factor affecting market penetration of the services that product adoption and use of the system.		but does not have any report on supply-side attributes as cost and time.
7	(Yun et al., 2020)	To identify the factors affecting environmental sustainability. To identify factors of economical sustainability.	Car sharing industry has dynamic business model. Shows inter relation between innovation and car sharing.	Environmental sustainability consist of decrease consumption of fuel, cars and public roads. Economical sustainability consist of job creation, revenue creation, cashless transaction.	The study does not cover the customer aspect of the car-sharing platform.
8	(Cramer & Krueger, 2016)	To identify the factors that affect establishing the connection between driver and the passengers by the use of internet-based mobile technology. To study the competitive market between taxi and ride-	Found that Capacity utilization rate = Fraction of time has a fare-paying passenger in the car and total miles driven. Ride sharing has the higher fraction of	Because it talks about the internet based services and economic of the riders.	It studies the detailed comparison of Uber and Lyft but does not point out the any acceptance theories of that two technology.

		sharing platforms by the use of mobile technology.	time and miles driver. Reason behind are effectiveness of the application, large scale of Uber taxis, Bad taxi regulation and supply demand equilibrium .		
9	(Li et al., 2018)	To study the technological risk concern with the government and citizen and how government overcomes the risk.	Risk identified as privacy, liability, automation , safety, impact to industry. To overcome the risk following steps were taken as no response, prevention, control, toleration, adoption.	Because it talks about the technical risk consist of privacy, safety,etc.	Technological risks such as internet penetration, GPS inaccuracy, and human errors are not covered in the study.
10	(Lippke K., and Noyce C. 2020)	To provide deep understanding of social and behavioral phenomena of travelers acceptance for shared-ride service.	Willingness to pay is less for a shared-ride than solo-ride. Willingness to pay for commuter ride is less than leisure	Because it talks about the paying mode.	It highly concerned with the willingness of passenger to pay based social similarities, and ride type but do not talk about the way of payment as a cashless transaction.

			ride because of unreliable source. Willingness to pay for leisure ride is high than commute ride. Willingness to pay is affected by riders matched based on social preferences.		
11	(Koirala P.R., 2020)	To identify the features of both the driver and passenger-based applications to provide a better understanding to the users. Further, the paper has provided some suggestions to ride-sharing companies to improve and achieve their goals.	Paper studied financial, technical, psychological, usability, marketing aspect on the riders end.	The paper is based on Nepal.	The research is very limited to the study of ride-sharing in Nepal and has very little review of the global aspect.
12	(Clewell, Regina R. Mishra, 2017)	To study the adoption of the ride-hailing and car-sharing platform in the United States. To analyze the factors as demographics of the users on the	Impact of adoption are on travel behavior, on rider/owner, trip generation, mile	Because it talks about how people take the application to their daily life.	The research is done to major 7 cities of the USA, which is not feasible to make the same outcome to the countries like Nepal and India where the major technical issue may

		adoption. To find the reason for non-adoption of the ride-sharing and potential differences between the adaptors and non-adaptors.	traveled. Concern with the ride-hailing transfer and ignore car or bike sharing.		arise.
13	(Shah & Hiremath, n.d.)	To identify problems associated with the ride sharing.	Problems identified as lack of door-to-door service, fixed route, less reliable schedule. New services provide comfortable ride, reliable service, reduction of environment pollution and congestion, ride matching time and implement shortest path.	This paper is relevant because it talks about the risks associated with the ride-share applications.	The paper only has the issues associated with the ride-sharing application but ignores the benefits and significance of it.
14	(Zoepf et al., 2018)	To study the economics of the ride sharing drivers.	\$3.37 per hours before tax is earned by driver 74% of drivers earn less than	The paper study about the driver's wages and incomes.	The study ignores the passenger side of view toward the social and economic factors.

			<p>minimum wage. 30% drivers are in loss after vehicle expenses \$0.59 per mile is earned and \$0.29 per mile is expenses \$661 per month is net profit per driver</p>		
15	(Olumide, 2016)	To examine the various elements of the Technology Acceptance Model to predict the acquisition of literacy skills.	This paper talks about the TAM's primary variables such as Perceived Usefulness and Perceived Ease of Use which are directly related to the adoption of the technology to people's lives.	The paper has the detail evaluation of technology acceptance model which is part of the framework.	The TAM variable only talks about the user's behavior but ignores factors within the technology such as privacy of data, how user-friendly the technology is.
16	(Hamal, 2019)	To examine the demographic social variables as gender and class of the ride-sharing application Pathao and Tootle users in Kathmandu Nepal.	It studies the performance and evolution of the most popular ride-sharing platform in Nepal. It	The paper has the study about the current ride-share industry in Kathmandu Nepal.	The study doesn't include any TAM framework to know how people accept the ride-sharing application in Nepal.

			<p>studies the Pathao and Tootle emerging, issues and current state in the market. Also, consider the demographic factors which are influence by the technology and the idea.</p>		
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3 CONCLUSION AND FUTURE WORK

The study is done within the limited range of Kathmandu valley which is the capital of Nepal. Kathmandu is the place where the technology growth rate is rapid than in other places of Nepal. We can say till now the ride-sharing application is almost available only in Kathmandu. Pathao and Tootle are two competitive services that are currently serving their purpose in Kathmandu. The study explored the evolution of these platforms and the factors that impact the adoption of the services. The emergence of technology has affected the daily life of people where the ridesharing has made it easy for local transportation. The study is based on the evaluation of people's thoughts about how the public takes ridesharing as a risk or an opportunity to them.

The chapters cover the detailed background of ride-sharing globally and in Nepal. Globally it is found that over 80% of the global market is covered by the two most popular platforms like Lyft and Uber. Their emergence made public ease to travel and make a cashless payment. The ride-share platform in Nepal has also emerged and attracted many riders but still because of poor transportation laws people suffer from many issues. Because the application of the platform is user-friendly, it is easy to register and use it instantly. Verification is only required for the rider application, which takes some days after all the requirements are received.

Further, the Technology acceptance model has been studied with various theories. Theories have identified the factors that may impact the acceptance and rejection of the ride-sharing application by the public. A framework has been identified with elements as ease of use, perceived opportunities, self-desire, the willingness of users, feeling safe in use, social influence, and risk in adoption.

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