**Social Perception of Efficiency, Safety, and Implementation of Electric Scooters in China, South Korea, and the United States**

A Research Paper submitted to the Department of Engineering and Society

Presented to the Faculty of the School of Engineering and Applied Science
University of Virginia • Charlottesville, Virginia

In Partial Fulfillment of the Requirements for the Degree
Bachelors of Science, School of Engineering

Sungwoo Cho
Spring, 2020

On my honor as a University Student, I have neither given nor received unauthorized aid on this assignment as defined by the Honor Guidelines for Thesis-Related Assignments

Signature  Date 4/6/2020

Sungwoo Cho

Approved _____ Date _____
Sharon Ku, Department of Engineering and Society

**Fable of Tomorrow**

Dear Electric Scooters,

I have seen you and your kind appearing everywhere the past year. Many people in communities seem to love you for your efficiency, affordability, and ease of use. I have to admit, I have also indulged in your services. Along with being so beneficial to people's commutes, you have offered jobs to people by hiring them to charge your kind. Honestly, I really do appreciate all the services you provide to the people around the world, but there are some concerns I have regarding these seemingly beneficial contributions.

Although your services if used with the right precautions are beneficial, why have you implemented different rules for different countries? My friends in South Korea need a valid driver's license to use you, but my friends in China and the United States do not have this restriction. Meanwhile in China, people can get fined if they use you without a helmet, but South Korea and the United States have no rules promoting this necessary safety precaution. I am not saying that these rules are negatively affecting our communities. I just wonder why these rules are not implemented throughout all countries. I do admit, the culture of these countries do differ, but the safety of my kind is my number one priority. On top of these regulations, your services should include stricter time limits. I say this because I have seen people use you while under the influence of alcohol. If a stricter time frame of use is not available, could any other precautions be implemented to prevent the stupid decisions of my people? Why don't we collaborate more to ensure the safety of my people which would result in less blame on your side?

While your services have been useful, I feel like your kind has plagued my communities. Similar to Frankenstein, you seem to initially be the ideal transportation mode but over time deteriorated and caused chaos. You have been spreading into every city and country rapidly. With this spread, our streets have become more congested increasing safety concerns for other vehicles on the road. A concrete definition of whether your kind is classified as a vehicle is necessary to regulate the rules you must abide

by. My people highly value their privacy, but with you sending our locations with GPS systems raises worries. How do we ensure that our data regarding location is safe with your kind? Beyond conflict with your kind and mine, there seems to be conflict within yourselves. When one company regulating you gets phased out, it seems like another one is instantly implemented to take over the position. I guess that the implementation of your kind is something our communities cannot resist. Regarding different companies coming into our communities, there seems to be a war between your kind to monopolize the market. There will always be people that will use your services even if they cause issues regarding safety of the users and other vehicles on the road.

Now moving past my concerns, I also want to apologize. I feel like your kind is similar to a child that my people have raised over time. It seems like the teen rebellion years have come upon us, and we have been in constant argument. Besides the concerns that I have of your growth, you have also had some positive effects on communities. I want to say sorry because of the actions of my people to your kind. We have people who destroy you for attention on social media, and people that steal you to get your services for free. I am sorry, you do not deserve this. How can I ask for changes from your side without acknowledging the horrible actions of my kind. Hopefully, with further collaboration between us, we can settle our differences and improve the relationship between humans and technology.

To a better future between our kinds.

Sungwoo Cho

## Introduction

According to the United States Bureau of Transportation Studies, over 2 million cases of transportation related injuries were recorded in 2017. With the ever-increasing amount of new modes of transportation being introduced the last few years, the number of transportation related injuries have increased. Many factors such as convenience and social perception explain the continued increase in users. With cities implementing promising regulations regarding safety and positive reviews from users on social media and other platforms, the stakeholders of the new modes have trust in the beneficial aspects. Although they are trusted by the community, the evolution of transportation continues to raise concerns regarding safety, efficiency, and accessibility. However, the increase in injury rate has not slowed down the implementation and integration of new transportation technologies such as electric scooters.

In a recent study performed in two urban emergency departments located in Southern California, 249 e-scooter related injuries were recorded over a one-year period (Bekhitm, Fevre, & Bergin, 2019). Despite the risks and safety aspects that are affiliated with mixed modal transportation, cities all around the world have experienced a growth in population and usage of electric scooters. The addition of these alternatives impact the safety and efficiency of the transportation infrastructure. Smart cities often attempt to prioritize efficiency and safety, but in implementation, the former tends to eclipse the latter. Due to safety, and efficiency being affected, the social perception of the new modes affect their implementation in cities. Not only does this technology affect the United States, but it also plays a big role in the development of smart cities in other countries such as China and South Korea.

The cultural differences between the United States, China, and South Korea have a great influence on the social perception and implementation of electric scooters. Along with cultural differences, the population and the level of government involvement are also big factors affecting the aforementioned. Mixed-modal transportation, specifically electric scooters, being compact and

low-carbon is beneficial but with the ever-increasing number of vehicles, roads have become more conflictual due to the lack of space (Zuev, Tyfield, Urry 2018).

Technological, social, and political factors must be considered to optimize the efficiency and safety of the transportation infrastructure. Data from previous studies and voices from community members of China, South Korea, and the United States will be collected to provide various perspectives. Along with data from community members, a SCOT diagram will be provided to visualize the values, stakeholders, and research related to this ethical topic. The Actor Network Theory (ANT) methodology will also be used to further analyze the relationship between humans and technology. The following paragraphs will dissect the social perception on safety and implementation of electric scooters in China, South Korea, and the United States to determine a global standard for electric scooter safety.

## Literature Review

China, South Korea, and the United States differ in a multitude of ways ranging from population size to the level of government involvement. These differences result in varying perceptions on safety, efficiency, and implementation of electric scooters. The population density per square kilometer of the United States is 36 compared to South Korea's 530 and China's 148 (The World Bank, 2018). The immense difference in density relates to the congestion of traffic in the city. With increased traffic density and additional transportation alternatives being implemented, the traffic infrastructure is destined to experience an increased amount of injuries. In 2017, Shenzhen, a major city in southern China, had city police confiscate several thousand electric bicycles and detain several hundred users (Zuev, Tyfield, & Urry 2018). Although the ban improved the safety of the traffic infrastructure, it decreased the efficiency of the city. Kuaidi, an express delivery service relying primarily on electric two-wheelers (E2Ws), ceased to operate after the ban. Responsible for delivering around 6 million parcels a day, the stall on the operation of the company left customers without their purchases and packages (Zuev, Tyfield, & Urry

2018). Similarly, the recent implementation of electric scooters in Hangzhou has raised concerns. In the situation of an accident between an electric scooter and car, the question of which side is responsible has been raised. Kang Kai, a lawyer at the Beijing Yingke Law Office, has stated that the electric scooter user would be responsible for breaking traffic laws, but the results of specific scenarios would have to be decided by the transportation enforcement department (China Daily, 2017). Also, Chinese traffic laws restrict the use of electric scooters on roads and sidewalks. China already has such a big user base for electric bicycles which makes the implementation of electric scooters difficult. The high population density of the communities in China injunction with the event of confiscation creates a negative perception regarding the safety and efficiency of electric scooters. Meanwhile, electric-two-wheelers, specifically electric scooters, have been flourishing in the United States. According to the National Association of City Transportation Officials (NACTO), 38.5 million trips were recorded in 2018 on shared electric scooters in the United States (Yue, 2019). South Korea, similar to the United States, has recently implemented electric scooters into their communities and has seen a growth in usage. Although only one company, Kickgoing, has released shared electric scooters, many community members have purchased personal electric scooters (Nikola, 2019).

Cities in South Korea and the United States have seen an ever-increasing number of community members using these new modes of transportation although they present issues regarding safety in the traffic infrastructure. The increasing number of users in these two countries opposed to China can be explained by the difference in government involvement. As portrayed in the ban of E2Ws in Shenzhen, the implementation of smart technology in China can be described as a top-down methodology. In a top-down method, the government plays the biggest role in making executive decisions. On the other hand, South Korea and the United States use a bottom-up methodology which gives the community a leading voice.

Along with the difference in population density and level of government involvement, cultural values affect the perception and implementation of new transportation modes. The community members of China, South Korea, and the United States must have a certain level of trust to continue using these new modes given that they have increased the number of injuries. Trust in the new technology derives from cities proposing promising safety regulations along with positive reviews on social media and other platforms. In the United States, regulations are made regarding parking, data sharing, road usage, etc. For instance, the city of Charlottesville states that devices should be equipped with front and back lights visible from at least 300 feet at night ("Scooters and Dockless Bike Share," 2019). The United States has stated that electric scooters should stay on roads with speed limits under 25 miles per hour when bike lanes are not available (Steinman, n.d.). Along with product and speed regulations, the city has detailed parking instructions and limits on the speed of vehicles. With the incorporation of these rules, community members are able to put trust in the safety and efficiency of the scooters. South Korea has implemented some differing rules such as requiring a driver's license to operate shared and private scooters (Jane Byun, Personal Communication, February 28, 2020). Also, the country has encouraged the use of electric scooters on sidewalks differing from China and the United States (Nikola, 2019). Although the sidewalks are congested, the streets impose a greater risk of injury due to the immense amount of traffic.

## STS Framework

Social Construction of Technology (SCOT) is a framework for analyzing the development of technologies. The methodology is a visual representation of connections between relevant groups, problems, and solutions (Sismondo, n.d.). In this case, the SCOT methodology is used to study the social construction and perception of safety and efficiency on electric modes.

The Actor Network Theory (ANT) is a framework that creates a network of not just people but also objects and organizations unlike other network theories (Callon, 1986). This method emphasizes that

the relationship between all human and non-human actors is just as important as the social network as seen in the SCOT methodology. In this case, the ANT methodology is used to analyze all the human and non-human actors regarding electric scooters. The human actors include electric scooter users, business owners, and employees of the scooter companies. The non-human actors include electric scooters, businesses, the environment, and the data collected by the companies through the scooters.

## Methodology

The first method of data collection used was document analysis through related articles. The reasoning behind using this method was to gather information on the three countries' rules and regulations regarding electric scooters.

The next method for data collection I used was interviews. The reasoning behind using this method was to gather data from first hand experiences regarding electric scooters. Interviewing students from three countries also allowed for more information on each country's culture along with their differences. To get a first person perspective regarding electric scooters in China, I interviewed two graduate students who live in the country. First, I interviewed Duyao, a graduate student at the Harbin Institute of Technology. Being a part of the Shenzhen community, Duyao believes that the confiscation was justified due to electric bicycles being the leading factor of transportation related injuries in the city (Duyao, Personal Communication, November 3, 2019). I also discussed the factors that affect the social perception and implementation of new modes of transportation. Contrary to my preference for a bottom-up methodology, he preferred the top-down methodology. Both methods have their pros and cons, and I believe that the variance results from cultural differences. Second, I interviewed Sun Hao, a graduate student at Zhejiang University studying environmental engineering. Discussing electric scooters, he mentioned that he had not personally used one, but had seen them around town (Sun Hao, Personal Communication, February 24, 2020). To gain a perspective from South Korea, I interviewed Jane Byun,

an undergraduate student studying at Hanyang University. Similar to Sun Hao, she stated that she had not used a shared electric scooter before but has started seeing them in bigger cities (Jane Byun, Personal Communication, February 28, 2020). Although shared electric scooters were fairly new, she mentioned that she has seen a huge increase in private electric scooters in the community. The insight from community members of China and South Korea opened new viewpoints regarding electric scooters.

To obtain the voices of more community members, I used surveys to gather data from these three countries. The survey allowed me to get a better understanding of each community's opinion regarding electric scooters. The questionnaire provided data regarding frequency of electric scooter use, opinions on the incorporation of scooters into the traffic infrastructure, safety concerns, etc.

## Data Analysis

In Figure A below, a SCOT diagram for China, South Korea, and the United States is shown. The stakeholders include electric scooter users, pedestrians, motor vehicles, the environment, and businesses. In the United States, electric scooter companies including Bird and Lime have the greatest impact in implementation and the community's social perception. Along with Bird and Lime, the United States has many other companies coming into the shared electric scooter industry. On the other hand, China and South Korea each have one primary company due to a more recent implementation. South Korea's leading company being Kickgoing and China's being InnoMake. Payment for the user of scooters is done through credit or debit card in South Korea and the United States, but the payment in China is done by a messaging app called WeChat. In this app, users have features that allow them to call taxis, pay for electric scooters, and post on a feed for other users, etc. Although South korea uses a debit or credit card system, the payment method will eventually shift to an app called KakaoTalk, where users have features similar to China's WeChat. The shift is just contingent on how big electric scooters get in the country for KakaoTalk to implement scooter payment into their app. Although China, South Korea, and the United

States share many similarities in the diagram, the cultural, social, and technological aspects create subtle differences. For instance, the differences in population density and traffic infrastructure cause different necessary methods of implementation.

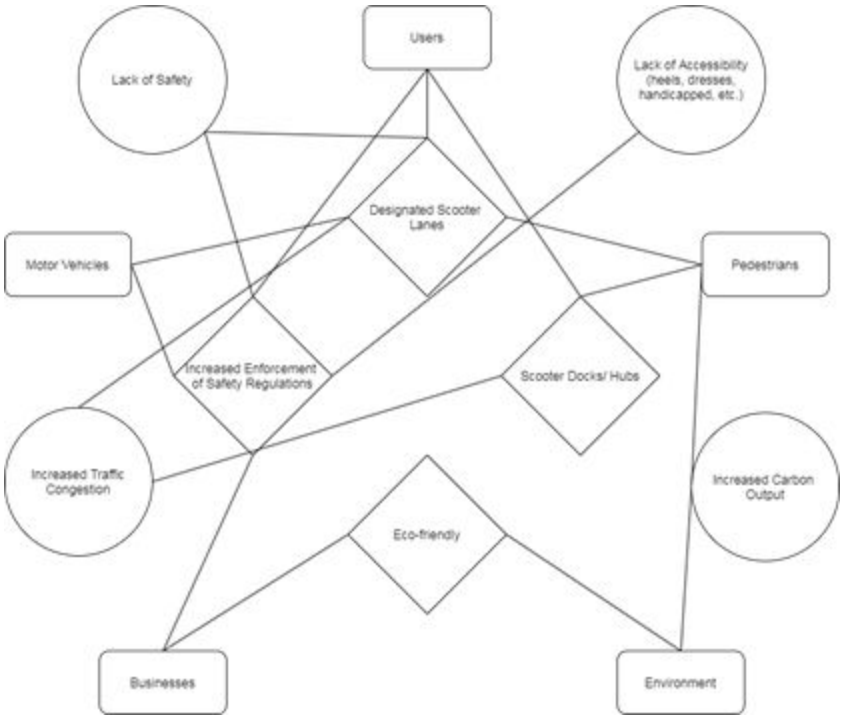


**Figure A**: *A SCOT Diagram*

The differences in the level of government involvement greatly impact the perception of safety and implementation of electric scooters in the community. The level of government involvement in China, South Korea, and the United States also greatly impacts the perception and implementation of electric scooters. China uses a top-down methodology while South Korea and the United States use a bottom-up methodology as previously explained. With the community leading the decisions of implementation, the voices of the members praising the efficiency may overpower the safety concerns. Meanwhile, the government mainly focuses on the community's well-being, therefore, with a top-down methodology, implementation is restricted if it negatively affects the safety. The bottom-up methodology used in the United States can explain the immense amount of new electric scooter companies entering the

industry day by day. The top-down methodology justifies the bans on E2Ws in Shenzhen, China. From interviewing Duyao and Sun Hao, I was able to learn more about the Chinese culture along with the community's perception on electric scooters. I interviewed Duyao first to ask about the topic of implementation of electric scooters. He stated that he believed that the level of government involvement was the most important aspect of implementation. We had a discussion regarding the ban of E2Ws in Shenzhen, and he stated that the ban was justified due to E2Ws being the number one cause of traffic related accidents (Duyao, Personal Communication, November 3, 2019). This response was interesting because, even with a top-down methodology approach of implementation, the community members of China seem to agree with the government's prioritization of safety while losing some efficiency. From the conversations with Duyao and Sun Hao, electric scooters seem to still be a relatively new concept in China, but they both mentioned that they expect them to grow within the next few years (Sun Hao, Personal Communication, February 24, 2020).

The population density and the needs of users in each country also play a big role in the perception of electric scooters. As mentioned before, the population density differs greatly between China, South Korea, and the United States. A high population density results in a higher traffic density. This justifies the specific regulations regarding where electric scooters should be used and safety. In countries such as China and South Korea, restrictions on electric scooter use on roads are put in place to prevent increased traffic congestion and injuries between scooters and cars. Meanwhile in the United States, regulations state that electric scooters should not be used on sidewalks but rather share the road with cars. Although effective in some small cities or neighborhood roads, concerns are raised in bigger cities in the United States. Regarding the issue of traffic congestions, the best place to use electric scooters would arguably be in bike lanes, but pushing electric scooters into bike lanes also raises issues for people who commute by bicycles which is very common in China, South Korea, and bigger cities in the United States. On top of congesting the roads, electric scooters have posed a threat of plaguing

sidewalks with their large numbers. Users have to take a picture of their electric scooter after use, but regulations on where the user ends up parking them are not enforced enough. Scooters can be seen thrown around the sidewalks and not properly parked throughout many cities around the world especially in a university setting.

The problem of traffic and sidewalk congestion could be solved by having electric scooter docks similar to those of bikes and improving bike lanes to accommodate this new mode. Both Sun Hao and Duyao raised concerns for the implementation of electric scooters due to the population density. Similarly, from the interview with Jane, I was able to further understand South Korea's perception on safety and implementation of electric scooters. She stated with only one big shared electric scooter, she has not seen many users compared to the United States (Jane Byun, Personal Communication, February 28, 2020). South Korea has similarities with China in that most potential users decide to use public transportation or walk due to accessibility and convenience.

The cultural aspects regarding common transportation methods have a great influence on the success of electric scooters after implementation. With community members in China and South Korea being very familiar with public transportation and walking, it may be hard for electric scooters to be as big as they have become in the United States. To supplement the data from interviews, surveys were used to gather large pools of data from users which prevents one-sided data collection. Surveying a total of 32 people, data was collected from China and the United States. As seen in Figure 1a in the appendix, 45% of Chinese students surveyed through WeChat stated that electric scooters will eventually become the most used mode of transportation. On the other hand, as seen in Figure 1b, only 16.7% of students in the United States stated that they would become the most common mode. This data was very interesting since the implementation of scooters in the United States has been further developed and implemented earlier than China. I believe that the data from Chinese students regarding scooters becoming the most common mode is due to the popularity of electric bicycles in the country. With a mode similar to scooters already

having a great influence, using the scooters seems like more approachable and just another alternative to the electric bicycles they use on a day to day basis. The question of whether electric scooters should be accountable for following the same traffic laws as cars was also asked. As seen in Figure 2a and 2b, 65% of Chinese students and 66.7 % of students in the United States agreed that scooters should follow the same traffic laws as cars. Although most people agree that they should follow the same laws, when implemented, there would be problems enforcing these rules. For example, without having a police at every corner, it would be incredibly difficult to catch an electric scooter user running a red light by using the sidewalk or just injuring the traffic light. This issue was also seen when the people surveyed were asked for any concerns they had regarding electric scooters. Students from all three countries raised concerns with electric scooters having a negative impact on the traffic infrastructure due to increased congestion. Along with increased congestion, many students stated that the electric scooter companies need stricter safety regulations to prevent injuries of users such as helmets, regulating usage under the influence of a substance, visibility, etc. Although the three countries have differences in culture, they share the commonality of wanting a more efficient and safe implementation of this new mode.

Including differences in level of government involvement, population density, and users, subtle design differences between countries and even cities in the same country were found. These differences included varying speed limits on electric scooters, different dead zones, etc. Although small differences in regulations exist, the fundamental infrastructure of electric scooters were the same throughout the country. With different traffic infrastructures and needs from users, electric scooter companies must be adaptable in their design to cater to the needs of the community. According to Sun Hao and Duyao, electric scooter companies are having a hard time getting implemented due to the monopoly big electric bicycle companies have in the industry. Therefore, scooter companies must show an advantage to be adapted by the already electric bicycle using community. Capitalizing on the maneuverability, price, ease of storage, and taking up less space,  these companies must show interpretalized flexibility.

Another cultural factor that influences this topic is social media. Social media being a huge influence in people's everyday lives including mine, I was able to use participatory observation to collect data from social media. It has greatly impacted the community's perception on the topic regarding electric scooters. The reviews and word of mouth can positively or negatively impact the social perception of implementation. Students in universities around the United States are constantly exposed to positive feedback regarding electric scooters from peers and social media. Resulting in the growth of users, the increase of scooters at universities result in further implementation of electric scooters in other cities. Also, Shenzhen, being the model city for China's smart city development, depicts a general view of implementation for other cities in China. The city's initial response impacts the future addition of new technologies.

## Discussion

While researching and gathering information on the social perception of safety and implementation of electric scooters, I learned and developed ideas regarding the need of universal regulations and the impact of cultural differences. While the rules and regulations will differ from country to country, there are rules such as requiring helmets, speed limits, visibility, etc. that can be universally applied to all countries that incorporate electric scooters into their traffic infrastructure. Gathering first person experience from community members from all three countries, the data gathered shows that safety was their number one priority followed by disruption and increased congestion in the traffic infrastructure. On top of the universal regulations, each country, with differing traffic infrastructures, must analyze their population density, dead zones, and more to seamlessly implement electric scooters into their communities. Similar to universal regulations and rules, I learned about the impact cultural differences have on implementation. Differences in payment methods, level of government involvement,

common transportation methods, opinions on data sharing, etc. have a heavy influence on the social perception of implementation and safety of electric scooters.

The design of electric scooters differ from country to country, which results in different human to non-human relationships. For example, as seen in Figure B, the method of payment differs where China uses WeChat and the United States uses credit or debit cards. South Korea, on the other hand, uses debit or credit cards but with further implementation of electric scooters, will move towards using KakaoTalk as payment. Another interesting relationship analyzed by ANT is of the users specifically the older community members. Elderly members of the community may have a harder time using electric scooters due to technological illiteracy along with being stubborn and not wanting to stray away from what they are used to. In China and South Korea, the main three methods of transportation are buses, subways, and walking which are very accessible for the older population. Since these methods of transportation display much less risk of injury than scooters, the relationship between older users and scooters may take longer to develop. In the United States, many of the older population rely on private modes of transportation such as cars. This may result in a higher adaptation rate of electric scooters since driving portrays more risk than public transportation. Electric scooters also have a relationship with the traffic infrastructure, pedestrians, and bicyclists. In the United States, electric scooters are encouraged to be used on the roads proposing increased congestion for cars and buses in local streets. In China and South Korea, scooters are to be used on sidewalks. With the sidewalks already congested with pedestrians and sometimes bicyclists, electric scooters would be an unwanted addition to the community. These human and non-human factors form a network relating many dissimilar events which differ from country to country.

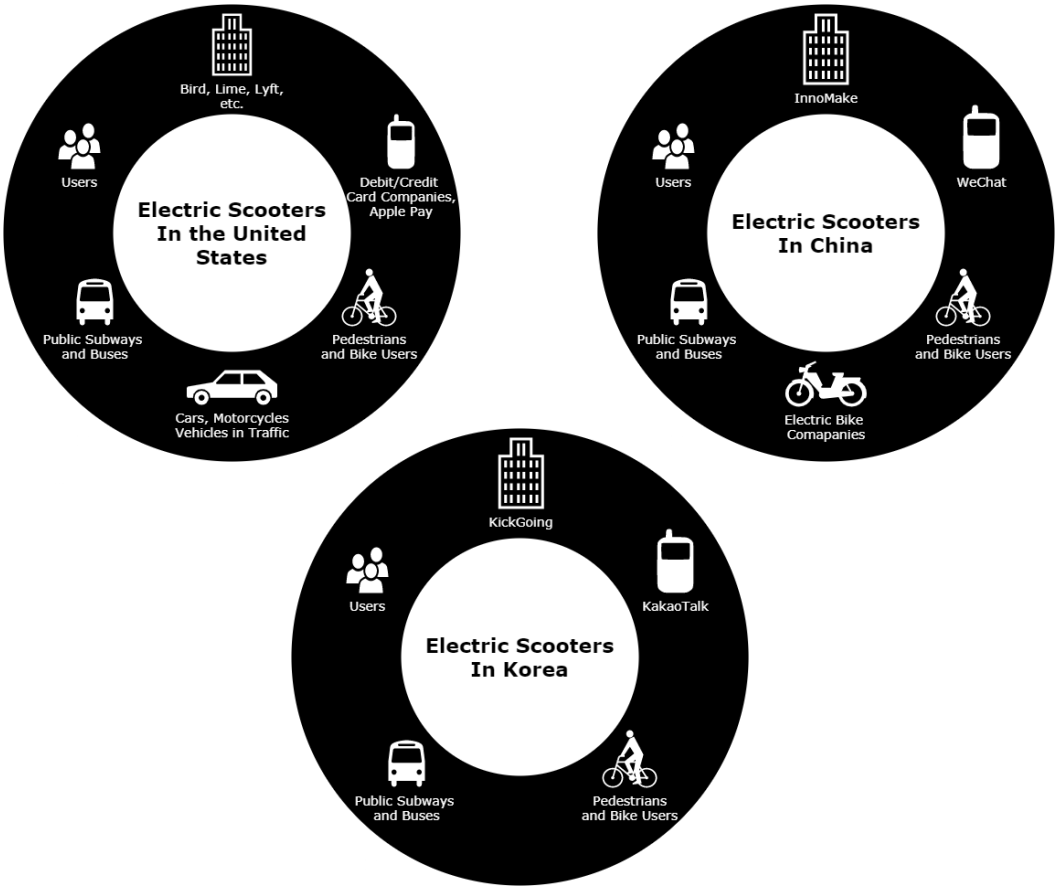


**Figure B**: ANT Diagrams for United States, China, and South Korea

## Conclusion

Many factors influence the social perception on safety and implementation of electric scooters including cultural and technological factors. Cultural factors including population density, level of government involvement, and ranging to even the most common mode of transportation used in each of the three countries studied. Technological factors also play a big role in the social perception of electric scooters. Data sharing, GPS systems, and payment methods are some examples of technological factors.

While doing research, I have found that a lot of technological factors are interconnected with the cultural aspects. While payment options could be described as a technological factor, the different types of payment methods ranging from WeChat to debit or credit cards can be accredited to the different cultures between the three countries. The scooters do raise concerns regarding safety due to increased traffic congestion and inadequate safety regulations. These problems may limit further development and implementation of this technology. With implementation, electric scooters should not be viewed solely as a technical artifact but rather a complex socio-technical system. As portrayed through the ANT methodology, scooters are constituted by heterogeneous humans and nonhumans. Having some negative effects, this new mode of transportation can be a beneficial addition to the traffic infrastructure with the right regulations and precautions. With the data found from analyzing the perception of communities, cultural differences, etc., a global safety standard for electric scooters could be implemented to ensure a smooth and safe integration of these new modes. In our society today technology has grown at an exponential rate, therefore new modes of transportation are bound to appear. The data and experience obtained from electric scooters can be directly used to build resilience or prepare for smooth implementation of future modes. After implementation by taking the necessary precautions, electric scooters should be treated as members of the community with the level of impact they have. Hopefully in the future, our community and the world of electric scooters can harmoniously share the community.

## Bibliography


Bekhit, M. N. Z., Fevre, J. L., & Bergin, C. J. (2019). Regional healthcare costs and burden of injury associated with electric scooters. *Injury*. doi: 10.1016/j.injury.2019.10.026

Callon, M. (1986a). 'The Sociology of an Actor-Network: The Case of the Electric Vehicle'. Mapping the Dynamics of Science and Technology. Callon, M., Law, J. and Rip, A. (Eds). Macmillan Press, London: 19-34

Duyao (2019, November 1). Personal communication.

Jane Byun (2020, February 28). Personal communication.

Nikola. (2019, July 21). Newest mobility trend arrives in Korea. Retrieved from https://kojects.com/2019/02/09/electric-scooters-in-korea/

Population density (people per sq. km of land area). (n.d.). Retrieved November 3, 2019, from https://data.worldbank.org/indicator/EN.POP.DNST.

Scooters and Dockless Bike Share. (2019, June). Retrieved December 1, 2019, from https://www.charlottesville.org/departments-and-services/departments-h-z/neighborhood-development-services/scooters-and-dockless-bike-share.

Sismondo, S. (n.d.). Two Questions Concerning Technology. Retrieved from https://collab.its.virginia.edu/access/content/group/2ffca47c-ccce-410c-a315-3389f41f6ae9/Course Readings and Digital Media and Resources/Core Conceptual Documents for Everyone-VSD, SCOT, ANT/Sismondo Chapter 9 SCOT and Construction of Technology from Introduction to STS.pdf

Steinman, D. (2020, February 14). Which Electric Scooters for Adults are Street Legal? Retrieved March 1, 2020, from https://www.ridetwowheels.com/electric-scooters-adults-street-legal/

Sun Hao (2020, February 24). Personal communication

United States Bureau of Transportation: Injured Persons by Transportation Mode. (n.d.). Retrieved November 3, 2019, from https://www.bts.gov/content/injured-persons-transportation-mode.

Yue, F. (2019, August 14). Electric scooters: Love or hate them? Here's what you need to know. Retrieved March 2, 2020, from https://www.usatoday.com/story/tech/2019/08/13/why-scooters-become-popular-and-controversial/16203357001

Zuev, D., Tyfield, D., & Urry, J. (2019). Where is the politics? E-bike mobility in urban China and civilizational government. *Environmental Innovation and Societal Transitions*, *30*, 19–32. doi: 10.1016/j.eist.2018.07.002

宋薇 . (2017, March 17). Shared electric scooters in Hangzhou draw controversy. Retrieved March 1, 2020, from https://www.chinadaily.com.cn/china/2017-03/17/content_28590728.htm

**Appendix**

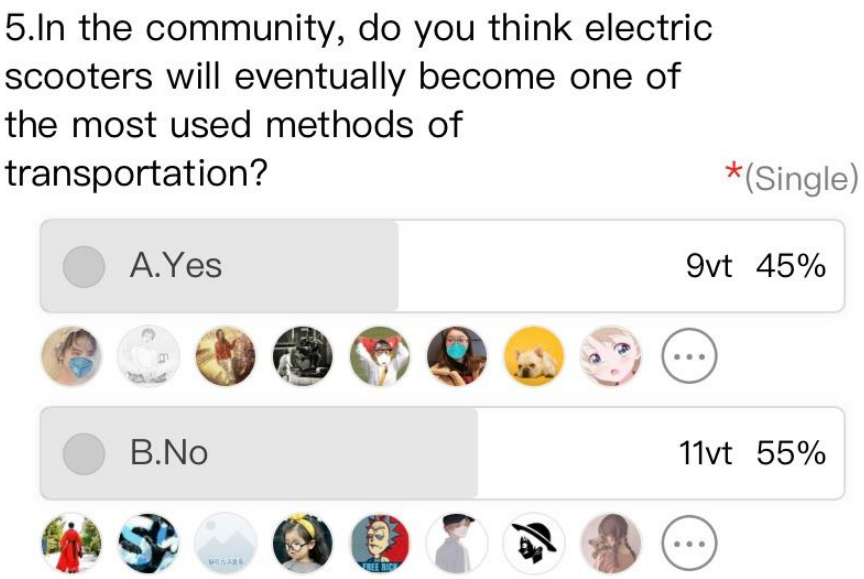


*Figure 1a:* Survey results from China regarding opinions on whether electric scooters will become one of the most used methods of transportation using WeChat.

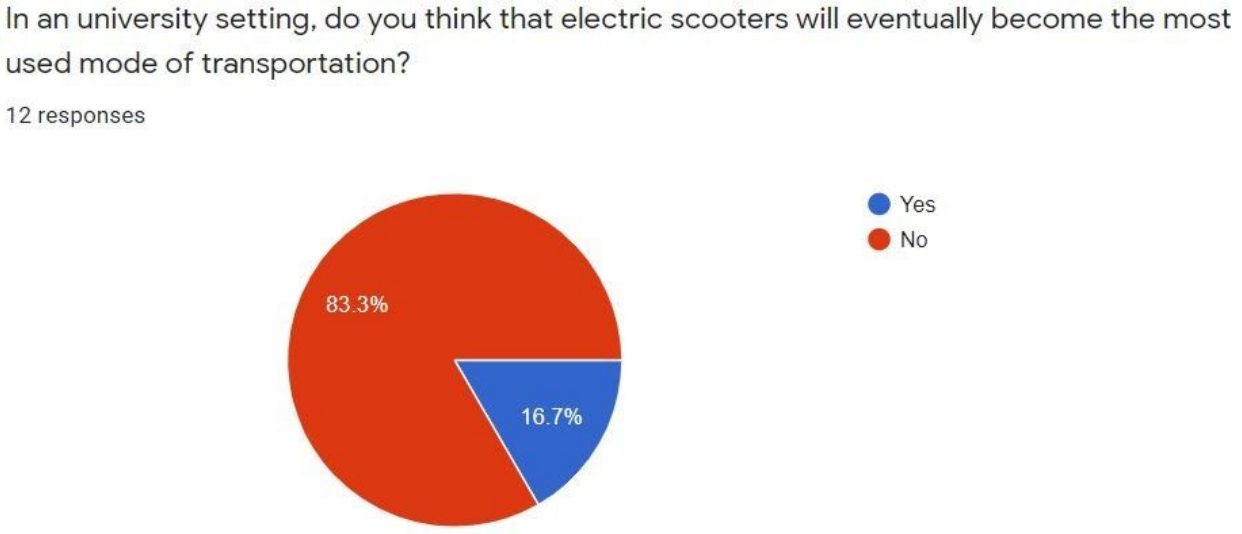


*Figure 1b:* Survey results from the United States regarding opinions on whether electric scooters will become one of the most used methods of transportation using Google Forms.

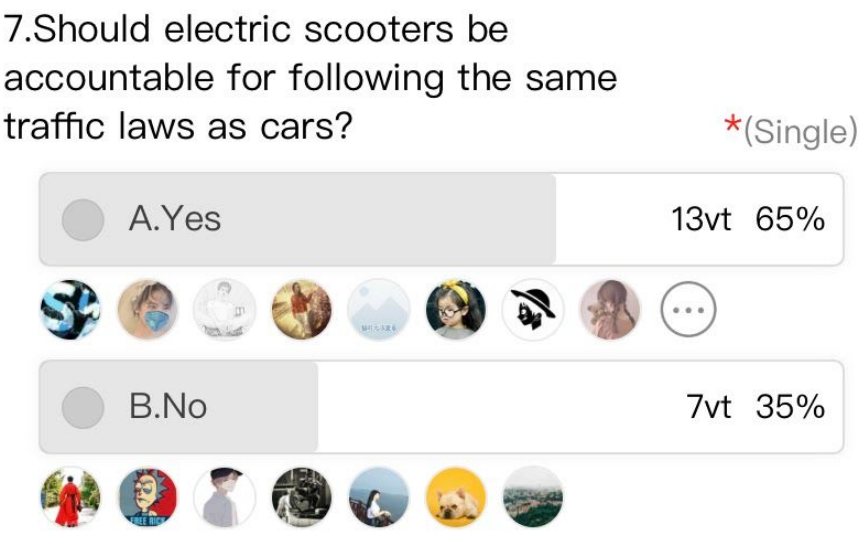


*Figure 2a:* Survey results, using WeChat, from China regarding electric scooters following the same traffic laws as cars

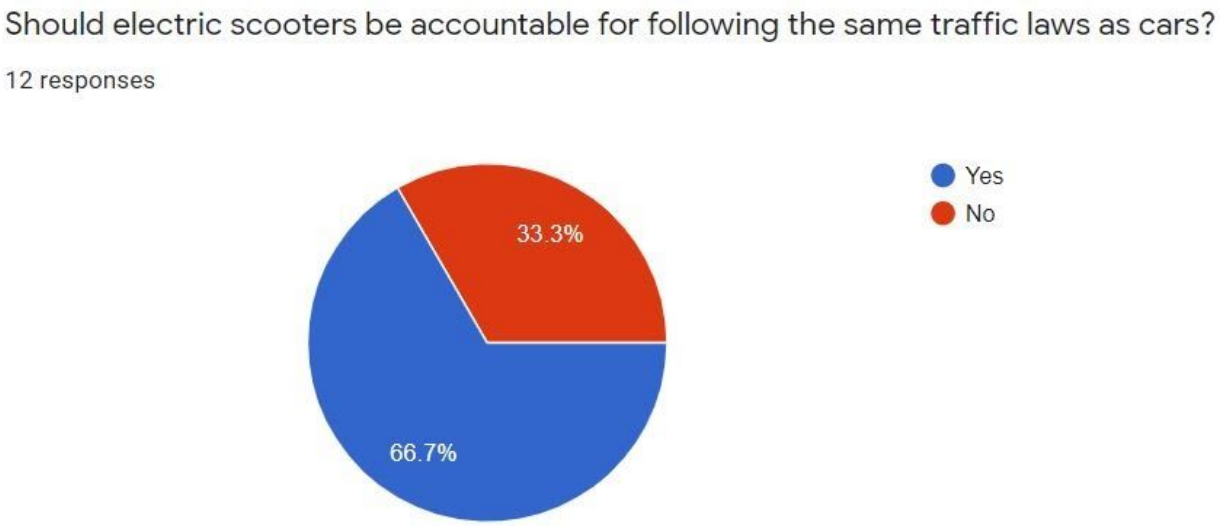


*Figure 2a:* Survey results, using Google Forms, from the United States regarding electric scooters following the same traffic laws as cars

**Interview Analysis**

Interviewee Name: Duyao

Interviewer: Sungwoo Cho

Location: WeChat Voice Call

Date: November 1, 2019 Length in min: 62 minutes

Age: ~ 24 years old

Educational Level: Graduate Student at the Harbin Institute of Technology

Profession: Student

Family Status: Not Married

1. How did the interviewee appear to me?
- N/A, the interview was done via voice call only

2. Atmosphere/Location
- The interview took place in my room on call with Duyao

3. Disposition to talk/ Motivation to take part on the interview
- Duyao was very motivated to take part in the interview. He provided very detailed insight on the situation regarding the ban of electric bicycles in Shenzhen and was very interested in my study of electric scooters.

4. Gestures, eye contact, non-verbal signals
- N/A, the interview was performed via voice call

5. Interaction during the interview/ difficult passages
- The interaction went smoothly between the two of us. There were some language barriers, but with the use of google translate, all questions were able to be answered.

6. The (three main) points that the interviewee made
- The three main points Duyao made included: the ban of E2Ws in Shenzhen was justified since they were the leading cause of transportation related injuries in the area, the level of government involvement is the most important aspect when it comes to implementation, and his belief that the implementation of electric scooters in China will be slower than other technologically advanced cities due to the population being already accustomed to the use of public transportation, bicycles, and walking.

Interviewee Name: Sun Hao

Interviewer: Sungwoo Cho

Location: WeChat Video Call

Date: February 24, 2020 Length in min: 122 minutes

Age: ~ 23 years old

Educational Level: Graduate Student at Zhejiang University

Profession: Student studying Environmental Engineering

Family Status: Not Married

1. How did the interviewee appear to me?
- The interviewee looked like someone around the age of a college student. He is a graduate student in China and looked very kind.

2. Atmosphere/Location
- The video call took place in our respective rooms. The atmosphere of the interview with the location was very casual but informative.

3. Disposition to talk/ Motivation to take part on the interview
- Sun Hao was very motivated to take part in the interview. He had many questions to ask regarding my topic of study and also questions regarding cultural aspects of the United States in general. Sun Hao and I had been communicating through messages so the interview felt as if I was just interviewing one of my friends.

4. Gestures, eye contact, non-verbal signals
- Sun Hao made great eye contact throughout the interview and showed no gestures that were unprofessional.

5. Interaction during the interview/ difficult passages
- There were some language barriers during the interview, but Sun Hao utilized a translation app to solve this issue. The interaction during the interview was very good. Sun Hao was very understandable although he wasn't speaking in his native tongue.

6. The (three main) points that the interviewee made
- The three points he made during the interview included the monopoly that big electric bike companies have in China, the culture of transportation in China, and the difference of cultures between the United States and China regarding technology (WeChat, education, etc.)

Interviewee Name: Jane Byun

Interviewer: Sungwoo Cho

Location: Facetime Video Call

Date: February 28, 2020 Length in min: 100 minutes

Age: 20 years old

Educational Level: Undergraduate student at Hanyang University

Profession: Student studying Computer Engineering

Family Status: Not Married

1. How did the interviewee appear to me?
- The interviewee was a female undergraduate student in South Korea. She was very nice, easy to relate to, and willing to communicate her opinions.

2. Atmosphere/Location
- The interview took place in our respective rooms as it was performed through a video call.

3. Disposition to talk/ Motivation to take part on the interview
- She was very intrigued with the topic of electric scooters. Since the technology was only recently implemented in South Korea, she was curious on how the implementation has affected the United States.

4. Gestures, eye contact, non-verbal signals
- She made eye contact throughout the whole interview and did not perform any unprofessional gestures.

5. Interaction during the interview/ difficult passages
- She was fluent in English, so the interview went flawlessly. She was also very personable and being around the same age as me, it was very easy to communicate ideas and relate to each others opinions.

6. The (three main) points that the interviewee made
- The three main points she made during the interview included: the difficulty of implementing electric scooters in the South Korean traffic infrastructure due to the already existing density of cars and people, a law requiring a valid driver's license to operate shared and public electric scooters unlike China and the United States, and the cultural aspects of transportation in South Korea where most community members take buses and subways due to accessibility.