This document will explain ride hailing drivers' perspectives on current ride hailing service and electrification program.

Road Map and Timetable of Two-Wheeler Electrification in Greater Jakarta

Report of Current Perspectives on Ride Hailing Service and Electrification

30/09/2021

Table of Contents

List of Figures

List of Tables

1. Introduction

Since its introduction in 2015, online two wheelers (2W) ride hailing have become one of the preferred modes of transport in Indonesia. In fact, based on research by Tania (2016), online 2W ride hailing services rank first as the preferred mode of public transportation in Greater Jakarta, ahead of Commuter Line, TransJakarta, and conventional taxis. This was due to its affordable price, easiness to order, and faster travelling times (Tania, 2016). Moreover, online 2W ride hailing companies, such as Gojek and Grab, do not only offer passenger transportation service. They offer foods and instant goods/parcel delivery as well, which makes them integral for the society, in particular during the pandemic where people's movements are severely limited.

Looking at this importance, it is likely that the 2W ride hailing industry will continue to grow bigger in the future. It was further shown by the launching of two new 2W ride hailing services earlier this year (Burhan, 2021; Setyowati, 2021). Although they are currently only offering food delivery service, there is some possibility that they will go into passenger transports and goods delivery service as well in the future.

However, it should be noted that 2W ride hailing service is not the most sustainable mode of transport. Based on research by Syafrizal et al. (2014), motorcycles emit a relatively high amount of CO and HC compared to other road based modes of transport, such as passenger cars, bus, and trucks. They are also not the most space efficient mode of transport. Unlike other mass transport modes, such as buses, they could only take one passenger at the time. Thus any shifting from a more sustainable mode of transport might lead to an increasing overall GHG emission and might result in more traffic congestion.

Table 1 Road Space Efficiency of Motorcycles and Buses

Vehicle Type	Occupancy Rate	PCU Factor	Occupancy Rate/PCU Factor
	(JICA and Indonesian Ministry of Transportation, 2012)		(Column 2/Column 3)
Motorcycles	1.342	0.25	5.368
Small Bus	7.7	1.2	6.417
Medium Bus	22.3	1.5	14.867
Large Bus	51.4	2.0	25.700

One form of improvement that could lead to a better future is the electrification of ride hailing fleets. Based on our previous report, ride hailing electrification in Greater Jakarta could reduce CO2 emission by half a million tons per year using lifecycle comparison between conventional and electric 2W. It could also reduce 1.25 billion litres of gasoline, which equalled 8.4% of national

gasoline imports in 2020. This reduction of gasoline consumption would also lead to savings on fuel subsidy which could reach IDR 2.5 trillion, or 4.6% of Indonesia's national fuel subsidy budget (Ridwan, 2020).

However, 2W ride hailing electrification presents its own set of barriers. Lack of public charging infrastructures, low public awareness of electric vehicles, and lack of supporting policies are the examples of barriers towards electrification. However, the most important barrier that hinders 2W ride hailing electrification is that currently electric 2W are considerably more expensive than conventional 2W. Coupled with the fact that the current business model requires ride hailing drivers to purchase their own vehicle, and the fact that majority of ride hailing drivers came from lower groups of income, electric 2W might be unattractive for ride hailing drivers.

Therefore, this report was composed with the objective of getting a better understanding of drivers' perspectives on ride hailing electrification efforts. This would be necessary so that any recommendations produced from this project would be suitable and could be implemented by all related parties, including ride hailing drivers. This report will be divided into 2 parts, the first part will explore the operational pattern and issues regarding current ride hailing service and electrification plan from drivers' perspectives, while the second part will explore more on the electric 2W market analysis in Indonesia and benchmarking market analysis from other countries with high electric 2W penetration.

2. Perspectives on Current Ride Hailing Services and Electrification

As mentioned briefly above, understanding characteristics of each actor on ride hailing electrification would be beneficial in producing an implementable recommendation. Looking at the current business model of 2W ride hailing service, one of the main actors of 2W ride hailing electrification in Indonesia is ride hailing drivers. As they are currently required to purchase the vehicles themselves, they hold the ability to choose, or not to choose, electric 2W as their operational vehicles. Therefore, it is important to understand their perception towards electrification of ride hailing vehicles. To make the analysis more comprehensive, this chapter would also look at their current operational patterns and financial capabilities so that any disruptions caused by electrification efforts could be minimized and they would be more supportive of the program.

Moreover, 2W ride hailing electrification might present an opportunity to address current issues on ride hailing service. Therefore, this report would also elaborate more on any concerns from ride hailing drivers regarding current ride hailing service and/or future electrification plan. The possibility of addressing these issues through electrification could then be explored further on future activities. More issues being addressed by the electrification program would result in more support from other related parties, such as ride hailing drivers.

2.1. Methodology

The methodology of this report is as follows:

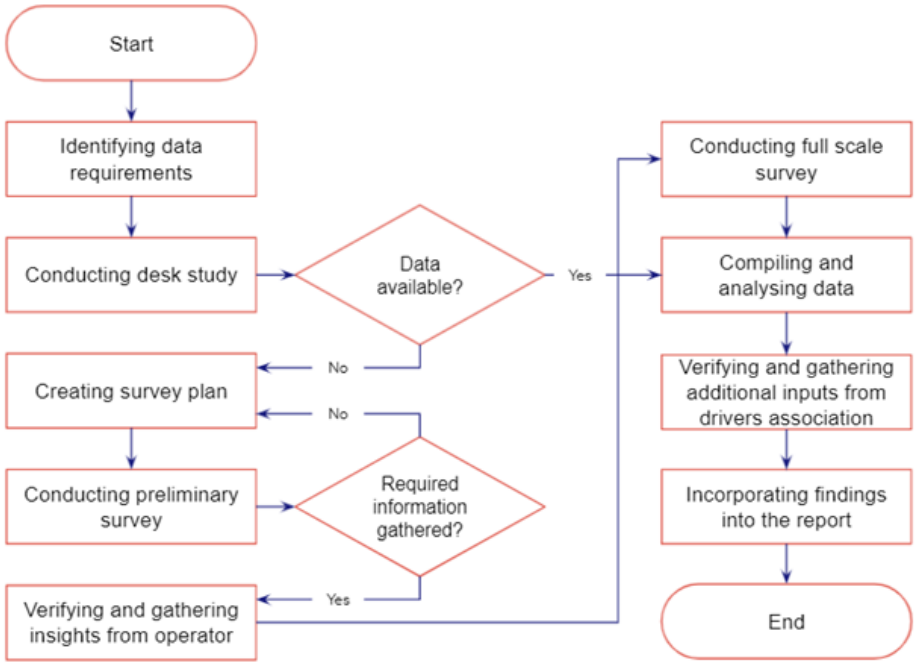

Figure 1 Methodology

1. **Identifying data requirements**: This activity would start at identifying all the data needed to understand drivers' perspectives on current ride hailing service and ride hailing electrification plan. These data include demographics data (age, household characteristics, etc.), operational data (daily average kilometres travelled, operational hours, etc.), drivers' financial data (daily average earnings, purchasing price and scheme of current vehicle, etc.), and other related data.

2. **Conducting desk study**: After identifying each data needed to compose this report, initial desk study was conducted to see whether the aforementioned data is already available on public sources. Data that is already available would be directly compiled and analysed. On the other hand, data that were not available from public sources would be captured through field surveys.

3. **Creating survey plan**: Survey plan was created to capture all data needed in this report that were not available yet on public sources. This activity includes determining survey objectives, number of samples, survey locations, survey questionnaire, etc.

4. **Conducting preliminary survey**: A small scale survey with the initial survey plan was conducted to see whether the initial survey plan could already capture all the information needed. Adjustment would be made where necessary to capture all the information needed.

5. **Verifying and gathering insights from operator**: The final survey plan, including survey objectives, number of samples, and survey location would then be presented to ride hailing operators to gather insights on those aspects. Final adjustment to the survey plan would be made where necessary before continuing to the next step.

6. **Conducting full scale survey**: A full scale survey to gather all the information needed to compose this report.

7. **Compiling and analysing data**: Data gathered from the survey would then be compiled and analysed to produce several findings that would be presented in this report.

8. **Verifying and gathering inputs from drivers' association**: Initial findings would then be presented to several drivers' associations to gather additional inputs on why those are happening. Additional inputs that were not captured through the survey would also be obtained through this activity.

9. **Incorporating findings into the report**: All the findings from the survey, including all the inputs from drivers' association would be incorporated and presented through the next section of this report.

2.2. Findings

2.2.1. Demographics

- Drivers come from various age groups, with drivers in their 30s being the most common occurrence
- Majority of drivers are married with 3 dependents
- Almost a third of current drivers were forced to become one due to various circumstances, most notably companies' layoffs and businesses' bankruptcy
- Most of the drivers work as full time 2W ride hailing drivers

It was found that the majority of current 2W ride hailing drivers are in their 30s with 38.10% of all 2W ride hailing drivers. The youngest respondent in this survey was 18 years of age while the oldest respondent was 66. All working age (15-64) groups are represented, except that there were no women respondents from over 50 and under 20 age groups captured in this survey as shown by Figure 2. This will be kept in mind that their perspectives might not be represented throughout this study, although their population might also be much lower than the other age groups.

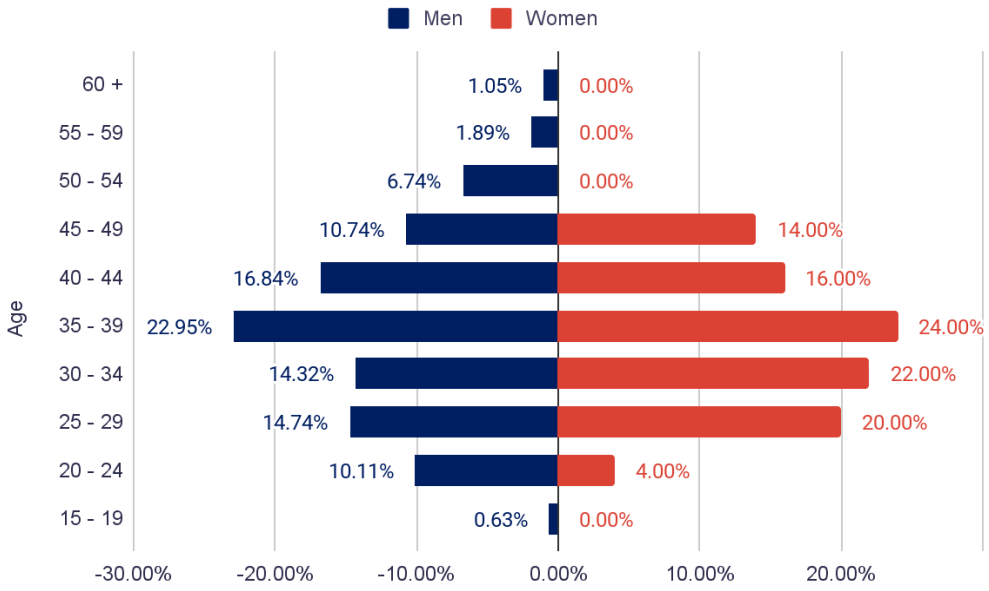

Figure 2 Age Distribution by Gender

Regarding their marital status, it was found that over 75% of current ride hailing drivers have been married. It was also found that, regardless of their marital status, the majority of 2W ride hailing drivers currently need to provide livings for 3 other people.

Table 2 Distribution on Number of Dependants

Dependants	Respondents	%
0	91	17.33%
1	39	7.43%
2	131	24.95%
3	**154**	**29.33%**
4	83	15.81%
5+	27	5.14%
Total	525	100.00%

Although the majority of single drivers currently do not have any dependents, some of them already act as their family's breadwinner. In fact, these drivers tend to have an up to 20% higher number of dependents than married or divorced/widowed drivers.

Before becoming a ride hailing driver, the majority of them (65%) were employees, followed by Freelancer with 22% of them. Reasons for switching into ride hailing drivers vary from looking for a more flexible job (33%), higher income (28%), and also because of lack of other employment options (32%). The last reason was commonly encountered from people who were forced to leave their previous position due to failed ventures, layoffs, end of employment period, etc. They felt that they did not have any feasible options other than becoming 2W ride hailing drivers to sustain their lives. This might be due to their lack of advanced educational backgrounds as stated in a research by Walandouw et al. (2018), thus limiting their employment options.

Last but not least, it was found that almost 80% of 2W ride hailing drivers in Greater Jakarta do not have any other job and rely on this job as their source of income. For those who have other jobs, 41% of them work as a freelancer. This is somewhat an expected result considering freelancer is another type of occupation with flexible work schedule.

2.2.2. Operational Pattern

- Passenger transportation is the most popular types of service, while goods delivery is the least popular
- On average, goods delivery service drivers travel longest distance daily but has the least number of trips daily

- On the contrary, food delivery services travel the shortest distance daily but has the most number of trips daily
- Food delivery service with electric 2W travel only less than 60% of distance travelled by conventional 2W for food delivery service
- Drivers spend time 30.4 minutes on average, waiting for the next order
- Drivers also need to wait at the pickup location with food delivery services taking the most time, over than 2.5 times from the others
- Commercial area and transport hub are the most favourite waiting location for ride hailing drivers
- Honda is the most owned conventional 2W (76.99%) with Honda Beat and Honda Vario the most popular model, followed by Yamaha with Mio model
- Price and vehicle specifications are the most determining factors of brand and model choice
- On average, ride hailing drivers spend a litre of gasoline for travelling 20 km
- Generally, passenger transportation services consume more fuel while goods delivery services consume the least
- Selis Mandalika is the most used electric 2W model at the moment and considerably more efficient compared to by Viar Q1

Out of 525 drivers surveyed, 88.5% of drivers use conventional 2W with almost 40% coming from Grab, 37% from Gojek, and the rest are working for more than one operator. Only less than 12% of the drivers use electric 2W, with a total of 60 respondents of which 24 of them have prior experience with conventional 2W in ride hailing service. Currently, Grab is the most dominant operator in electric 2W ride hailing service up to 96% of it but limited to certain types of services.

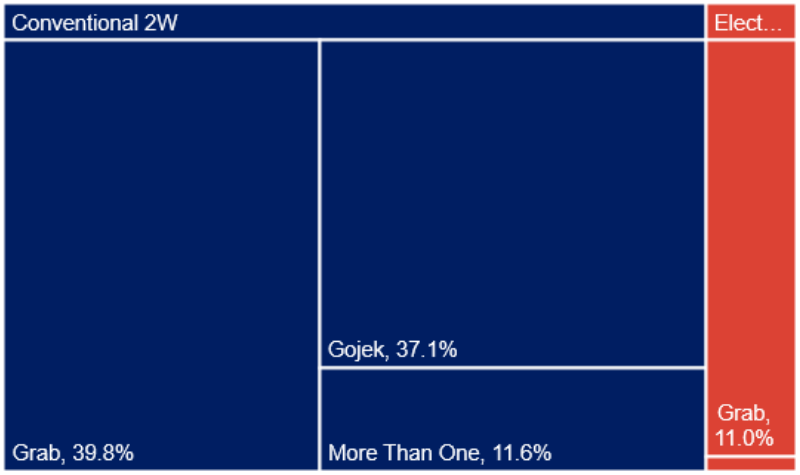

Figure 3 Type of 2W Used by Drivers of Grab, Gojek, and Combination of Both or Others

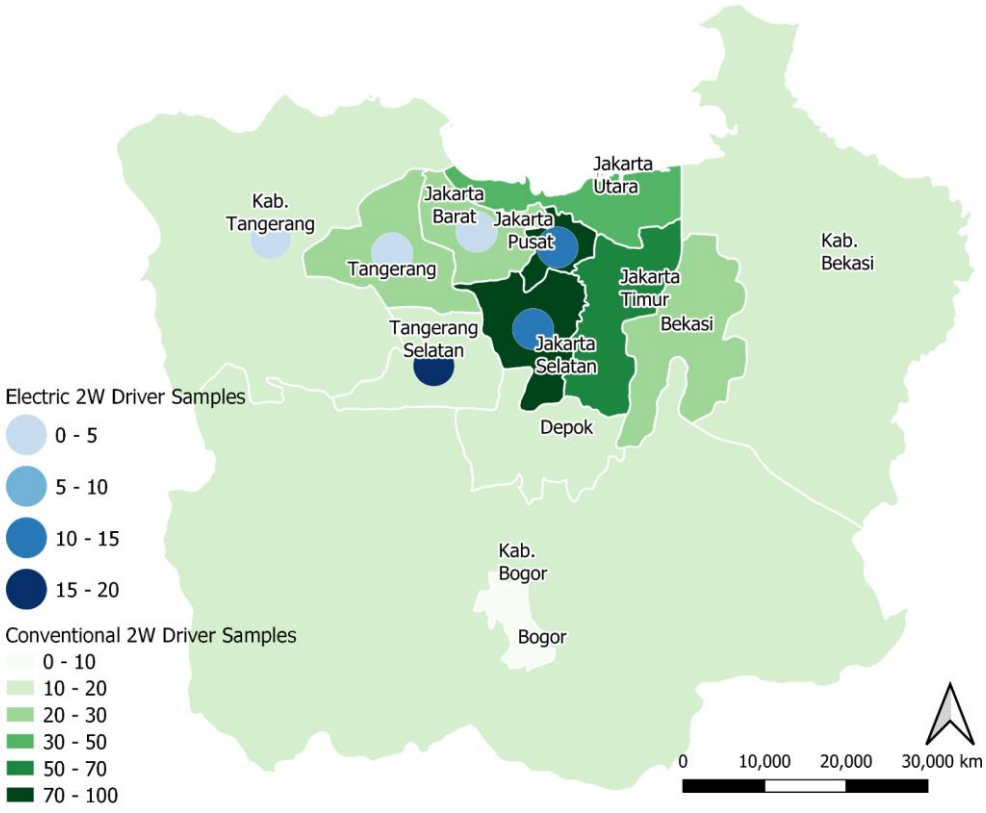

Figure 4 Drivers' Operational Area

Conventional 2W driver samples are collected in all areas of Greater Jakarta. Although mostly collected in Central Jakarta, South Jakarta and East Jakarta, all other areas have been represented with the fewest being Bogor City with 9 samples. Unlike the conventional 2W, the electric 2W is operated on a certain area only, with the most is in South Tangerang followed by South Jakarta and Central Jakarta. Some also operate in Tangerang, both city and regency, and West Jakarta.

In conventional 2W configuration, most of the drivers take a combination service of passenger ride hailing, food, and goods delivery (32%) followed by food delivery service only (10%), passenger service only (7%), and the least popular goods delivery service (1%). Please keep in mind that the sample size of goods delivery service (only) drivers is limited so the results may not correctly represent the actual condition.

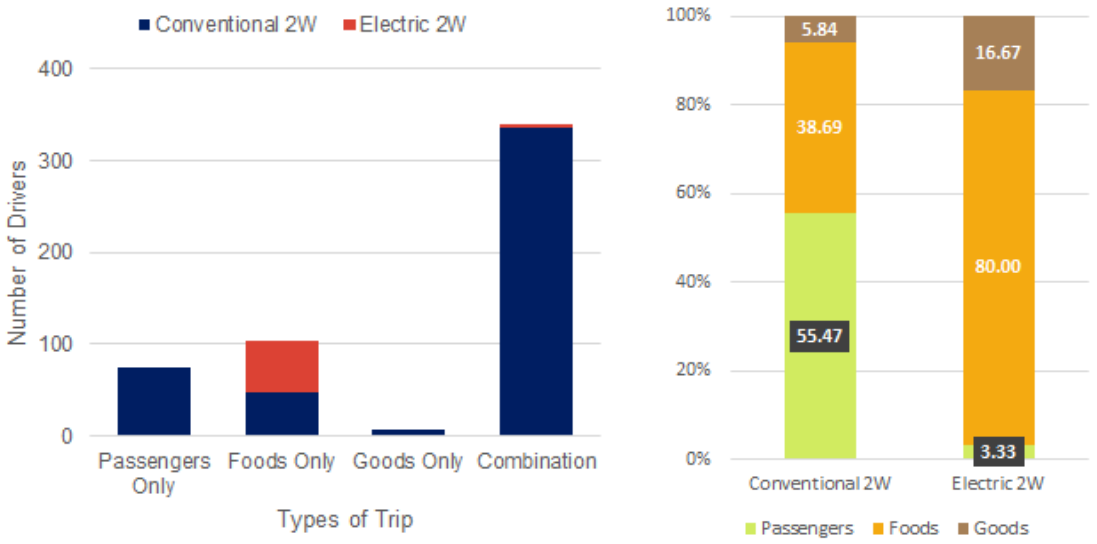

Figure 5 Types of Service Population (left); Composition of Combination Service (right)

As seen on Figure 5, electric 2W trips are still dominated by food delivery service, capturing almost 99% of electric 2W in ride hailing service. Although no electric 2W drivers dedicate themselves exclusively for passenger or goods delivery service, there is a small part of drivers that do passenger ride hailing and goods delivery service as seen on the combination trip composition (Figure 5-right). Still, it is not a popular choice of services compared to food delivery.

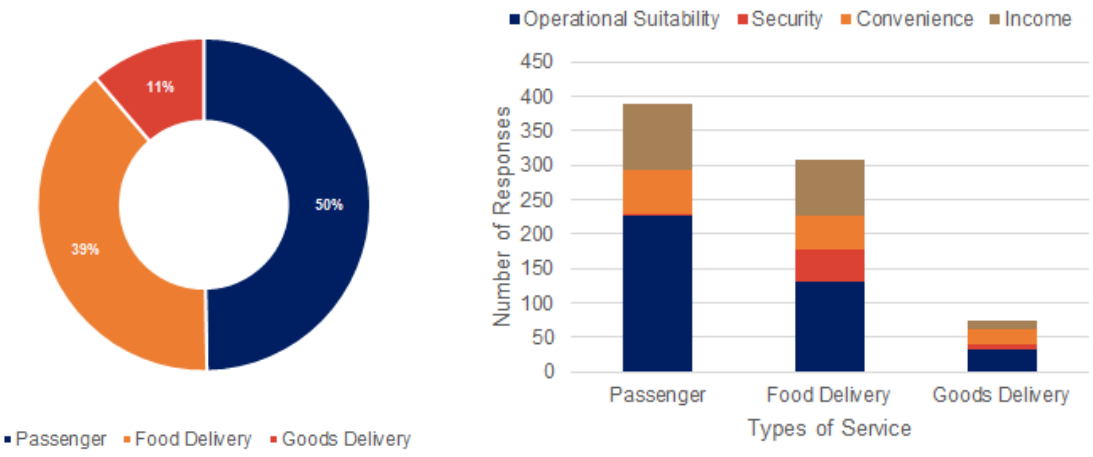

Figure 6 Drivers' Most Preferred Type of Service (left); Reasons Composition (Right)

Apart from the vehicle technical issues, it is found that drivers more favour passenger service up to 50% of it (Figure 6), while goods delivery service is the least preferred. Based on the reasons by the drivers, one of the main issues is operational suitability. Drivers feel that the passenger is more suitable for their operation, mainly because of shorter waiting time, shorter trip distance, and suitable operational area. Other than that, drivers' income also favours passenger service due to more trips and generates higher income per trip. Drivers' income based on service types, might strongly affect drivers' choice so this would be discussed in another part.

Goods and delivery services are the most disliked types of service (Figure 7), therefore drivers who take only goods delivery service are the fewest. Goods delivery service is not favoured mainly because of the operational unsuitability including longer waiting times, longer travel distance, fictive order potential, and distant pickup area. Another main reason is the generated income. However, drivers found that food delivery service more unsuitable compared to goods delivery, probably due to longer waiting time as shown at Figure 7 below.

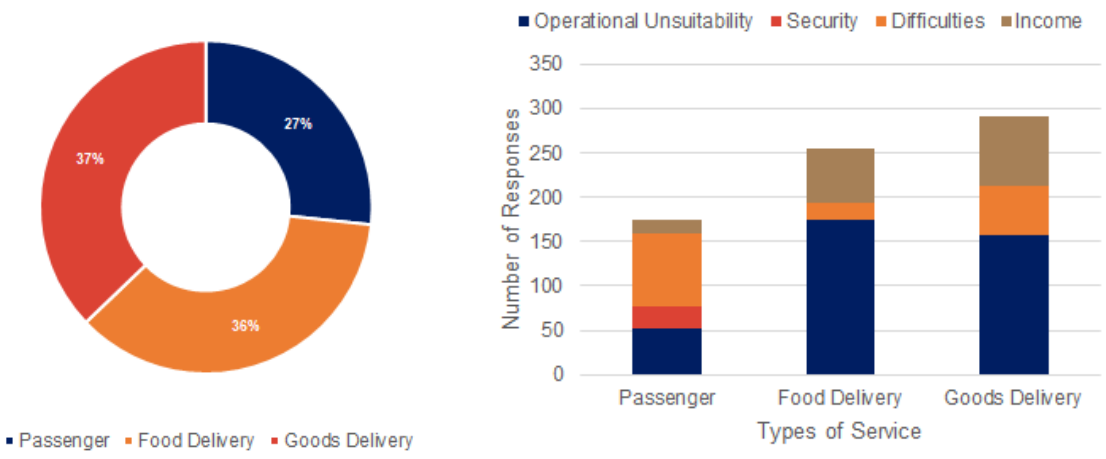

Figure 7 Drivers' Least Preferred Type of Service (left); Reasons Composition (Right)

On an aggregate level, conventional 2W ride hailing service has an average of 9.1 trips per day with 76.3 km total distance travelled each day. Electric 2W, on the other hand, averaged only 44 km of total daily distance travelled with an average of 10.3 trips per day. With a shorter distance range of electric 2W, it might be prioritized for shorter distance trips, hence the shorter average daily distance.

Table 3 Average of Daily Distance, Number of Daily Trip, and Distance per Trip

Types of Trips	Types of 2W	Average of Daily Distance (km)	Differences with Overall Average (%)	Average Number of Daily Trip	Estimated Distance per Trip (km)
Passenger Only	Conventional	84.2	10.3%	8.45	9.96
	Electric	-	-	-	-

Types of Trips	Types of 2W	Average of Daily Distance (km)	Differences with Overall Average (%)	Average Number of Daily Trip	Estimated Distance per Trip (km)
Food Delivery Only	Conventional	72.7	-4.7%	9.50	7.66
	Electric	43.5	-1.1%*	10.50	4.15
Goods Delivery Only	Conventional	95.5	25.1%	6.75	14.15
	Electric	-	-	-	-
Combination	Conventional	74.7	-2.2%	9.16	8.15
	Electric	50.5	14.8%*	8.00	6.31

(Notes: *Compared to the average of overall electric 2W instead, which is 44 km)

Based on the types of service, conventional goods delivery average the longest daily distance travelled, even over 10 km further than passenger transportation service. As seen on Figure 8, goods delivery samples travel more each day compared to conventional food delivery drivers who averaged the shortest daily distance travelled among other types of service. Passenger transportation only, on the other hand, is relatively more evenly distributed in daily distance travelled compared to other types of service. This might be due to various types of passenger transportation trips resulting in varied distance travelled.

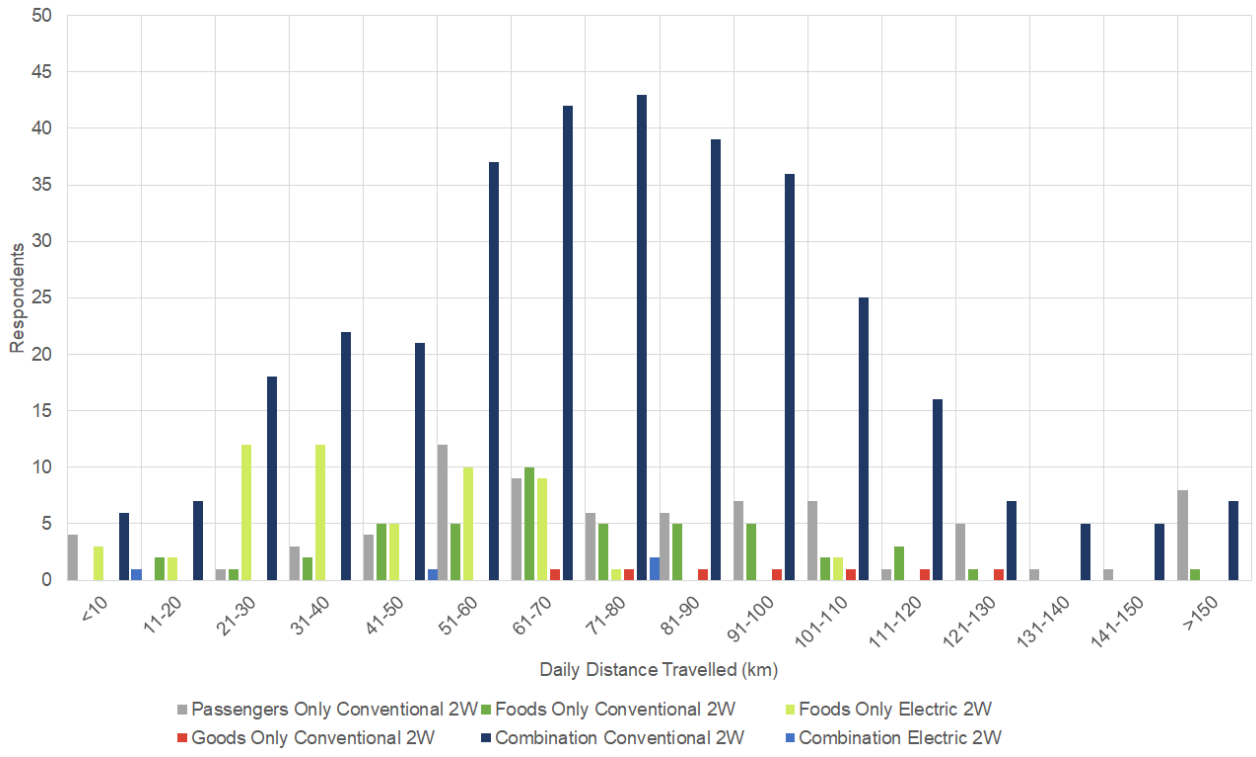

Figure 8 Daily Distance Travelled Distribution Based on Types of Service

By comparing average daily distance travelled and daily number of trips, distance per trip could be estimated. As expected, food delivery service has the shortest distance per trip, almost half from goods delivery service's. Typically, goods delivery service has the longest distance per trip and has the least average number of daily trips. Considering the longer distance travelled, it takes more time to complete a single trip. This might influence the driver's choices of service types since it would affect their incomes.

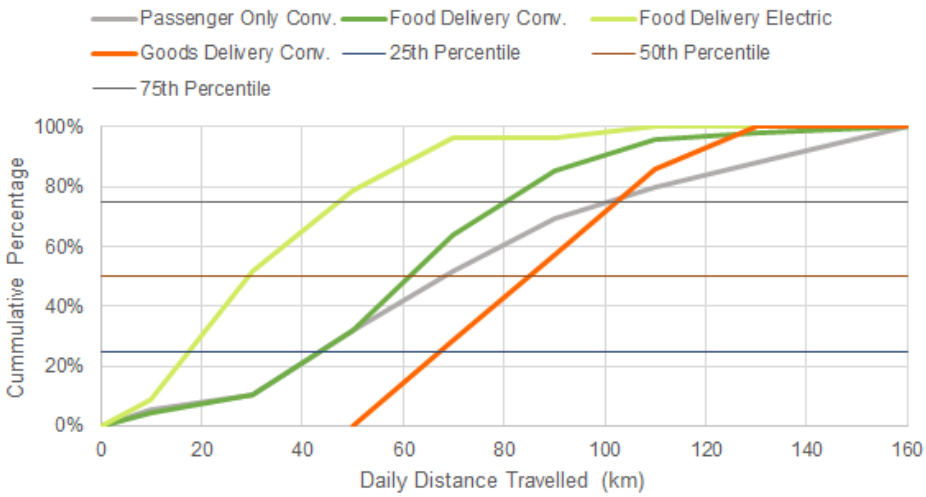

Figure 9 Cumulative Distribution of Drivers' Daily Distance Travelled

Conventional food delivery has the shortest average daily distance travelled and as seen on Figure 9, it generally covers more trips compared to other conventional services with shorter daily distance travelled. For example, to cover 75% of the conventional ride hailing service, it needs 80 km for food delivery whereas it needs more than 100 km for passenger transportation and good delivery service. To cover 50%, conventional food delivery service only needs 60 km, enough with a single charge for Viar Q1 (although it is only on paper). Passenger service needs almost 70 km and goods delivery needs up to 90 km. With travel distance limitation of electric 2W, it is reasonable to put electric 2W to food delivery service first.

However, the estimated distance per trip of current electric 2W for food delivery is still only 54% of the conventional food delivery service. It has to be further considered whether the electrification strategies would involve another type of service first or to expand the travel distance of food delivery service first. Fuel consumption on conventional 2W based on service types would be discussed further below.

It is found that passenger service has the longest average working hours considering being the second longest distance travelled daily and second most number of trips daily apart from combination service (Table 3). On the contrary, food delivery service has the least amount of working hours even though it has the highest number of daily trips. Electric 2W in food delivery service has slightly longer working hours compared to the conventional one. This is possibly due to

more daily trips on electric 2W, since every trip has a time factor such as idle time and waiting on pick up location time.

Table 4 Average of Drivers Daily Working Hours Based on Type of Service

Service Types	Types of 2W	Average Daily Working Hours (minutes)	Average of Duration per Trip (minutes)	Average of Duration per Trip Excluding Waiting Time (minutes)
Total	Conventional Electric	710.8 680.0	39.7 28.8	31.1 9.3
Passenger Only	Conventional Electric	746.0 -	47.1 -	42.6 -
Food Delivery Only	Conventional Electric	663.8 681.4	29.3 28.5	13.4 8.8
Goods Delivery Only	Conventional Electric	668.6 -	64.6 -	58.4 -
Combination	Conventional Electric	710.4 660.0	39.4 33.7	30.4 16.6

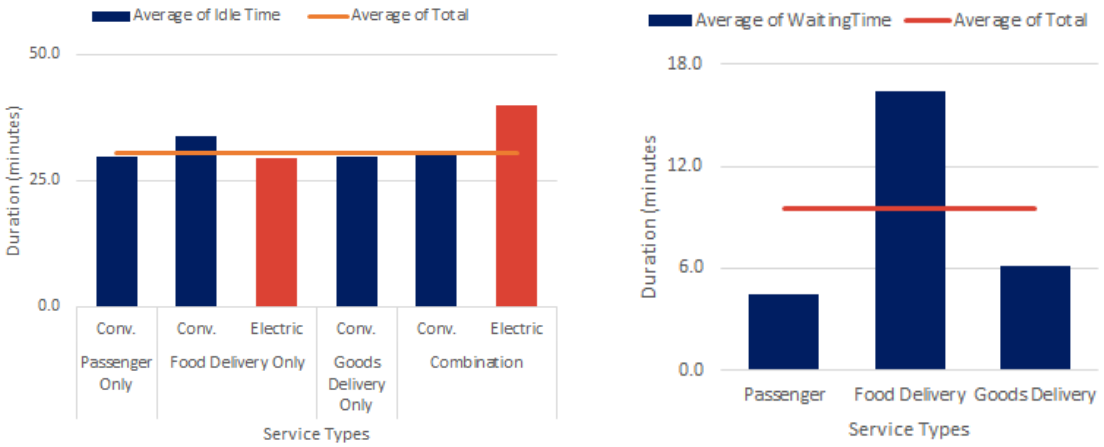

Figure 10 Idle Time Between Each Trip (left); Waiting Time at Pick Up Location (right)

After completing a trip, usually drivers would wait for some time before the next order comes. In general, the more trips drivers get daily, the more cumulative idle time they have. Should the idle time be considered as ineffective working hours, shorter idle time would be better. The idle time on average is 30.4 minutes for all kinds of services. It is found that in food delivery service, electric 2W has a slightly shorter idle time compared to the conventional one, with 29.4 minutes

compared to 33.7 minutes. It might be the result of electric 2W drivers prioritization as suggested by the drivers that would be discussed on the electrification part. For current or prospective electric 2W, this window of time could be an opportunity to fast charging or battery swapping at the minimum.

Drivers usually have to wait at the pickup location, whether it's passenger, food delivery, or goods delivery service. Food delivery has the highest waiting time (16.4 minutes) since it includes food preparation. Goods delivery and passenger service has a shorter waiting time, 6.2 and 4.5 minutes respectively. Waiting time, especially for food delivery, could be a chance for at least battery swapping for electric 2W. It would be reasonable to build battery swapping infrastructure near the commercial area, especially restaurants.

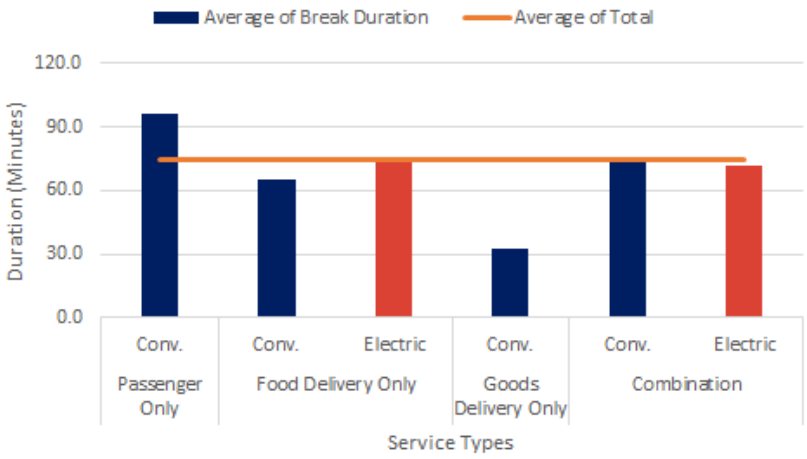

Figure 11 Drivers' Lunch Break Duration Based on Type of Service

Other than idle time and waiting time, the most convenient period to recharge an electric 2W battery would be during the lunch break. On average, drivers' lunch break is under 75 minutes. A fast charging would be ideal for drivers charging the battery while having a break lunch.

With a window of time during the working hours in idle and lunch break time, current and prospective electric 2W could use it for battery charging or at least battery swapping. Therefore, battery charging or swapping facilities should be established at the location where most drivers are waiting for orders. Figure 12 showing five most conventional 2W drivers' favourite waiting locations based on service types. It shows that drivers that only do passenger trips tend to wait at transport hubs such as train stations or bus stations while food delivery only drivers tend to wait at commercial areas. It turns out that commercial areas and transport hubs are also popular for drivers that do combination trips. Other locations include residential area, street, and office area.

From 1052 inputs where each driver can submit more than one, it is found that their waiting location choice is because that's the frequent order location (41.5%), many friends at the location (26.4%), many kiosk or food stall (17.2%), mobile phone charging outlet (7.1%), and others (7.8%).

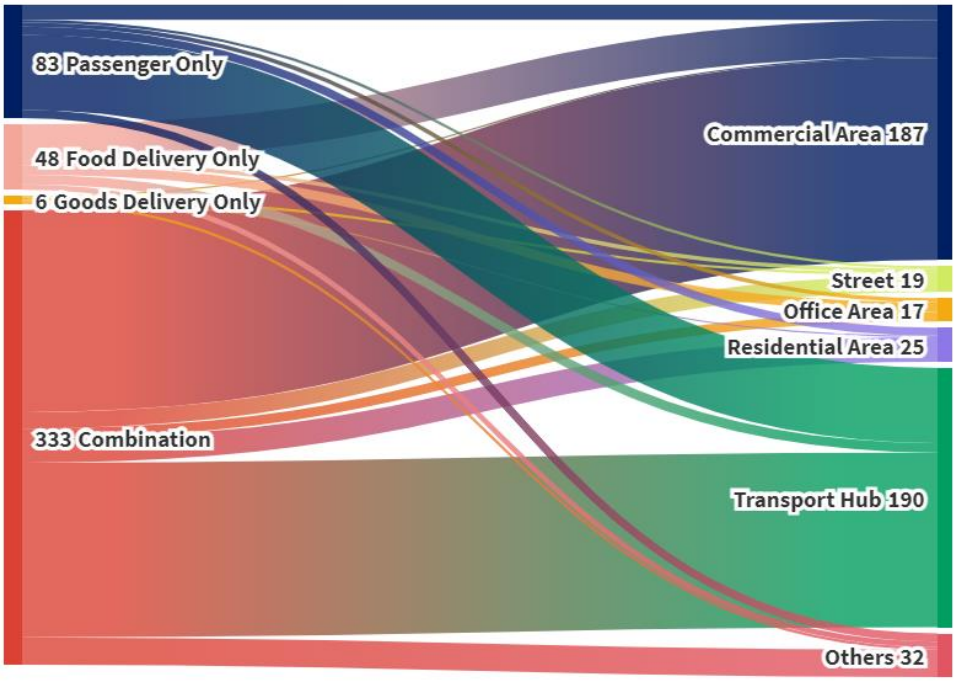

Figure 12 Drivers' Five Most Favourite Waiting Location Based on Type of Service for Conventional 2W

Not much of a difference, most favourite waiting location for electric 2W drivers is commercial areas followed by transport hubs. Since electric 2W is dominated by food delivery service only, commercial areas take almost 87% of the waiting location. The reasons for waiting location choice is also similar from the conventional ones with frequent order location (58.1%), friends at the location (18.1%), kiosk or food stall availability (6.7%). However, there's a slight difference where the waiting location choice reasons also includes proximity to shelter or charging facilities where the drivers could charge or swap batteries (10.5%).

Where possible, to accelerate electric 2W ride hailing service, future battery charging or swapping facilities should be located at or near the most favourable waiting location by the drivers. This would effectively utilize their idle or break time for battery charging or swapping.

There are three major brands of conventional 2W that are used by the ride hailing drivers: Honda, Yamaha, and Suzuki. Honda being the most popular one, more than three times bigger proportion than the closer competitor, Yamaha. In engine size, 110 cc still dominates the market, followed by 125 cc and 125 cc respectively. There are some other variants such as 100 cc, 115 cc and 135 cc but significantly less user than the engine size mentioned prior.

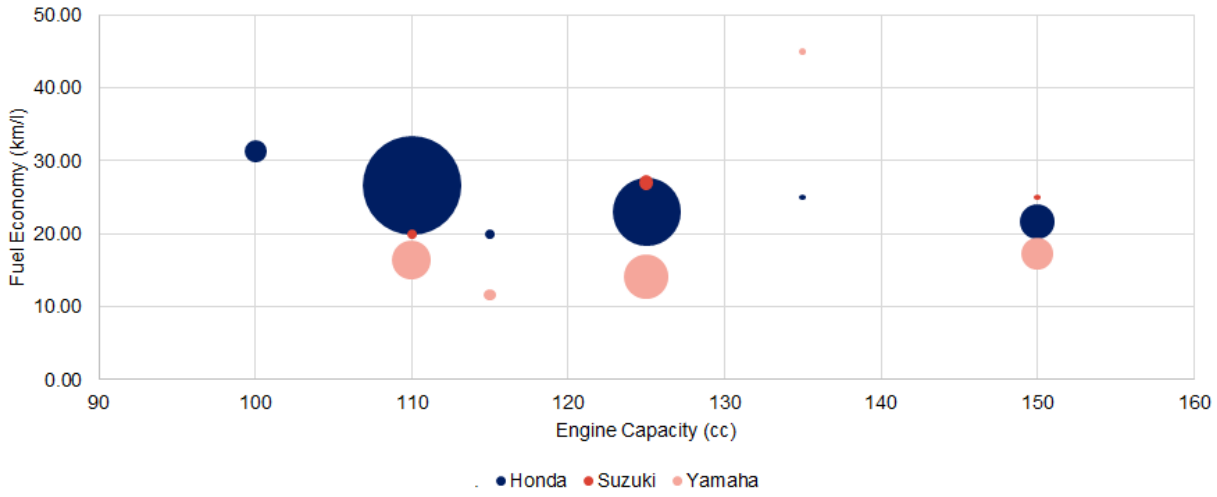

Figure 13 Conventional 2W Fuel Consumption Segregated by Engine Size and Brand

By calculating the drivers daily spending for fuel, type of fuel, and distance travelled daily, Figure 13 shows the fuel consumption of each brand and each engine size and it was found that Honda 2W are far more efficient than Yamaha in almost all engine sizes owned by the drivers. This might explain why Honda ownership is over three times more than Yamaha. Other reasons for popular conventional 2W would be discussed below. Engine size also affects fuel consumption, the bigger the engine size, the lower the fuel economy. However, type of transmission, engine technology and driving style would also affect the fuel efficiency.

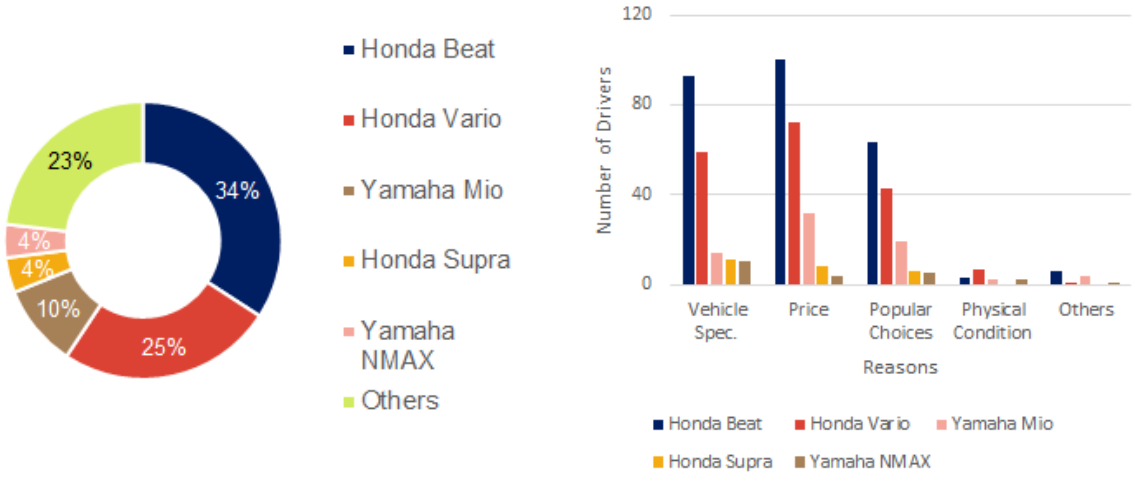

Figure 14 Five Most Used Conventional 2W Models (left); Reasons (right)

Figure 14 shows five most popular types of conventional 2W owned by the drivers. Honda once again leads the ownership with three models, two automatic types (Beat and Vario) and one cub type (Supra). Yamaha with Mio and NMAX variants fill the third and fourth position (tied). Divided by the types of service, Honda Beat and Honda Vario are still the most popular types. Those two, at minimum, are the third most popular vehicle for every service type (Table 5). There are some

criteria from the drivers when buying the vehicle, with the most significant being vehicle specification, price and popularity.

Table 5 Most Used Conventional 2W Model Based on Type of Service

Service Types	Most Used Vehicle	Second Most Used Vehicle	Third Most Used Vehicle
Passenger Only	Honda Beat	Honda Vario	Yamaha Mio
Food Delivery Only	Honda Beat	Honda Vario	Honda Supra
Goods Delivery Only	Yamaha Mio	Honda Beat	Honda Vario
Combination	Honda Beat	Honda Vario	Yamaha Mio

Honda Beat, a low-entry scooter, is leading on almost every single criteria stated by the driver, especially the price. In 2021, the price of a new Honda Beat starts from IDR 16,665,000, being the cheapest from other models. Despite the lack of helm in feature, by being the lightest from others (89 kg), Honda Beat has the best fuel consumption on the paper up to 60.6 km/l with maximum power of 9.0 PS at 7,500 RPM, Honda Beat would be enough for ride hailing service in urban areas.

Honda Vario, a higher level scooter than Honda Beat, has two types of engine size, 125 cc and 150 cc. With higher engine size and better features and performance, Honda Vario price sits higher than Honda Beat, starting from IDR 21,000,500 for the 125 version. It has fuel consumption of 59.5 km/l and helm in feature, unlike Honda Beat. With 125 cc engine size, Honda Vario has maximum power of 11.1 PS at 8,500 RPM. Both Honda Vario and Honda Beat, as well as Yamaha Mio, the third most popular 2W, are an automatic scooter that features a low deck model and might be easier for drivers to do food or goods delivery service. Further conventional 2W design and specification analysis should be conducted to understand better the drivers' preference and so to be implemented at future electric 2W.

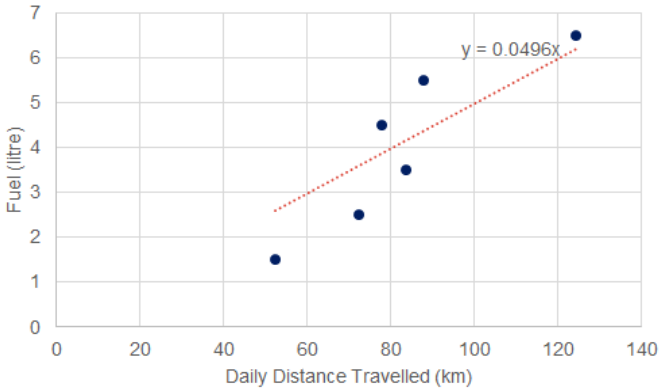

Figure 15 Fuel Consumption of Conventional 2W Used as Ride Hailing Service

On average, drivers spend almost 0,05 litre of gasoline per km travelled or a litre for every 20 km travelled. This, of course, would vary for every type of vehicle and types of service due to trip characteristics and loads carried by vehicle. Figure 16 explains the difference of fuel economy between different types of service.

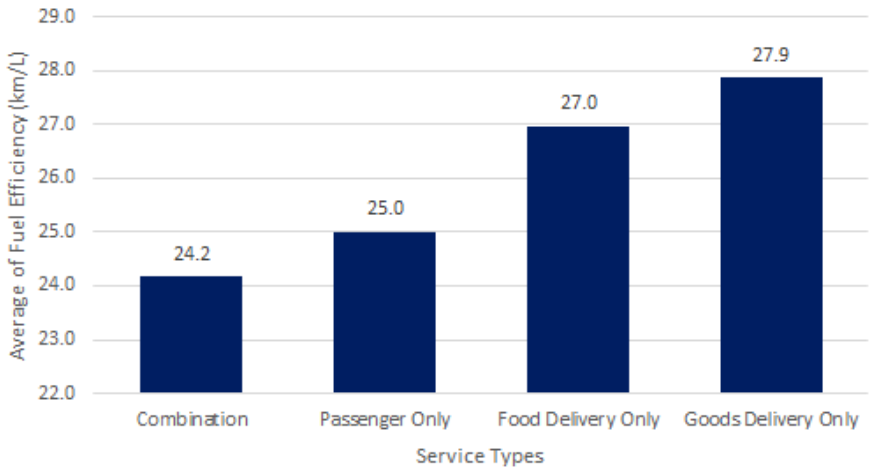

Figure 16 Fuel Efficiency Based on Type of Service

Based on the service types, on aggregate level, combination trips resulted in the lowest fuel economy at 24.2 km/l. Accordingly, drivers with passenger only service have the second lowest fuel economy. It is reasonable since passengers weigh more than food or goods so consuming more fuel. On the other hand, goods delivery services have the highest fuel economy of 27.9 km/l. With long distance trip characteristics resulting in less disrupted and more constant trips, it is reasonable to see goods delivery service on the top of fuel economy ranks. Please note that this average is on aggregate level and the results may vary in segregated level, depending on engine capacity or vehicle model.

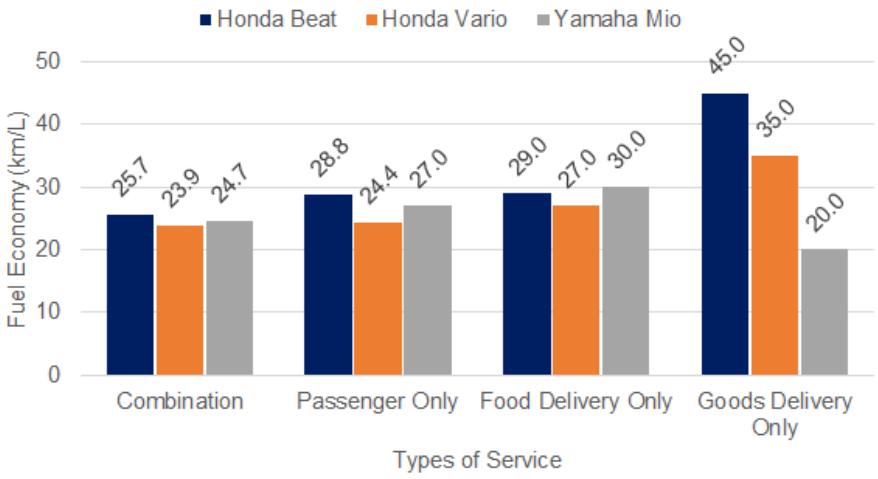

Figure 17 Fuel Economy of Three Most Used Models Based on Type of Service

To look further into types of service and fuel economy, Honda Beat, Honda Vario, and Yamaha Mio as the three most popular conventional 2W, selected to give a more balanced comparison. Although the difference might not be as clear as Figure 16, Figure 17 generally also suggests that combination trips and passenger trips are types of service with lowest fuel economy. Moreover, goods delivery also shows as the highest fuel economy trip, except for goods delivery only with Yamaha Mio that shows otherwise. This might be due to limited samples of two for this class.

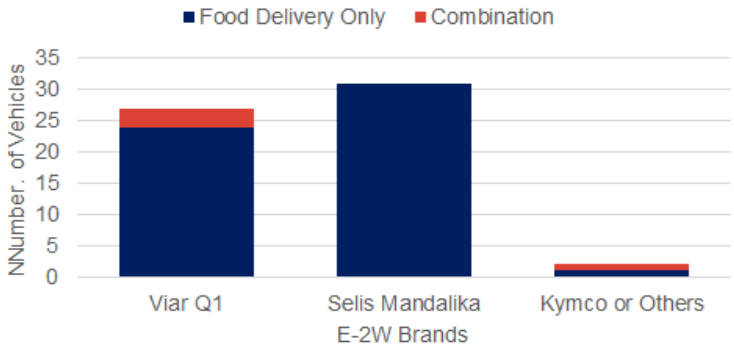

Figure 18 Electric 2W Models Currently Used by Ride Hailing Drivers

There are mainly two major electric 2W brands that dominate the ownership which are Viar with Q1 model and Selis with Mandalika model. While Viar Q1 is an electric scooter, Selis Mandalika should be classified as an electric bike or electric moped. Both companies have collaborated with Grab to provide electric 2W for ride hailing service. Viar Q1 has a battery capacity of 1.38 kWh that could travel up to 60 km before another charge. It has a top speed of 60 km/h, twice faster than the 30 km/h of Selis Mandalika. Categorized as an electric bike rather than electric scooter, Selis Mandalika only has a range of 30 km before another battery swap or charge and has capacity of 0.432 kWh.

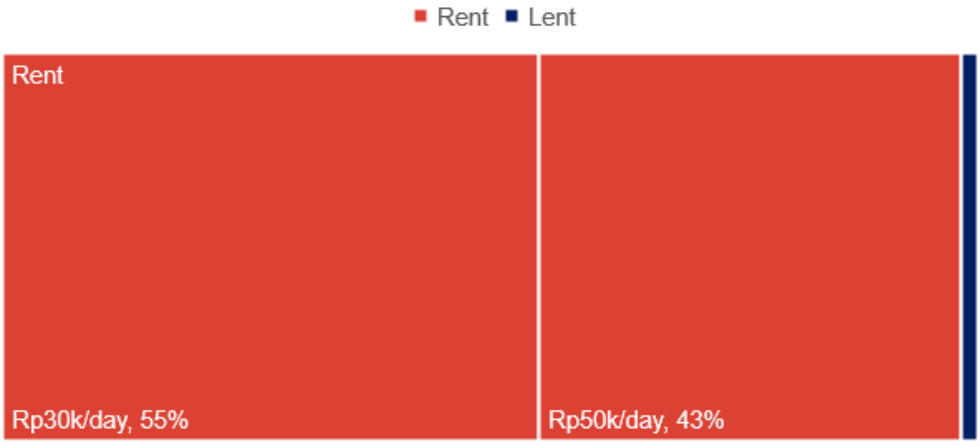

Figure 19 Electric 2W Vehicle Ownership Schemes

It is less than 2% of electric 2W that is lent to the drivers, with the remaining drivers renting themselves to the operator daily. Selis Mandalika cost IDR 30,000/day whereas Viar Q1 cost IDR

50,000/day. On paper, Selis Mandalika has a travel range of 30 km while Viar Q1 could travel 60 km per single charge. Based on the results, Selis Mandalika could be used for food delivery only while Viar Q1 could be used for passenger ride hailing and goods delivery, although food delivery would still dominate.

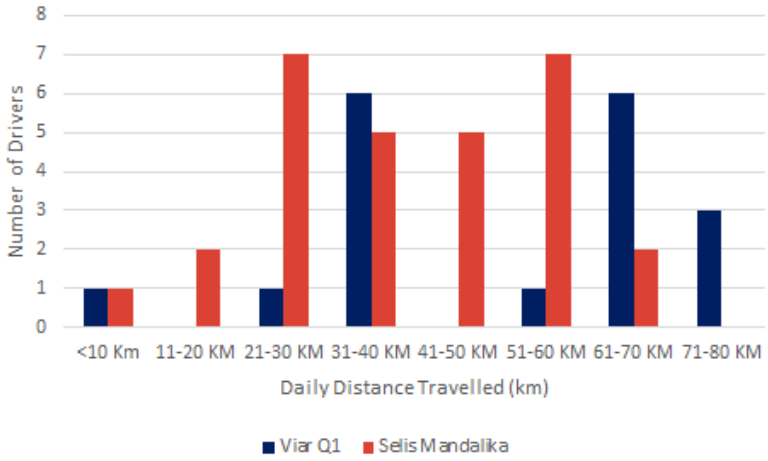

Figure 20 Daily Distance Travelled of Electric 2W

Based on Figure 20, Viar Q1 tends to have longer daily distance travelled compared to Selis Mandalika. With higher battery capacity and speed, it is reasonable to see Viar Q1 travel further than Selis Mandalika. It should be noted that the furthest distance travelled by electric vehicle stated by the drivers is only 80 km daily, almost half of the maximum range of conventional 2W.

Apart from the rent cost, drivers still would have to spend money on charging or battery swapping cost. Currently, charging or battery swapping at the operator's shelter is free. However, drivers are not always charging at the shelter. Other than shelter, drivers also charge their battery at home as well as public or commercial facilities. Electric 2W vehicle power consumption would determine drivers' daily spending for battery charging or swapping.

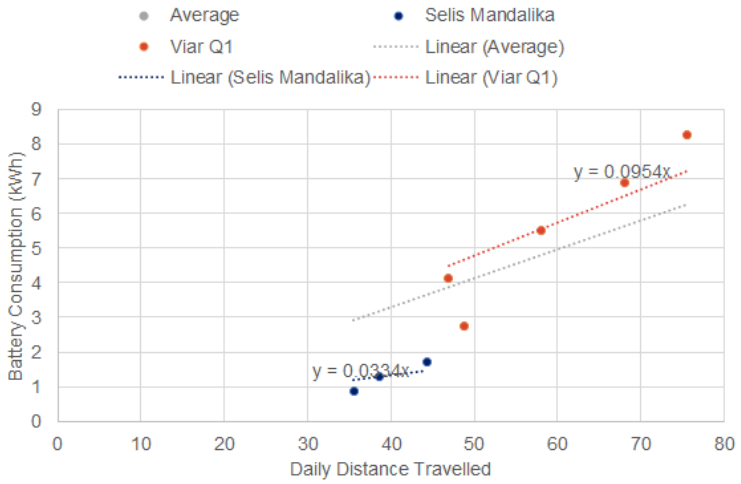

Figure 21 Battery Consumption of Electric 2W Used as Ride Hailing Service

Current electric 2W models, Viar Q1 and Selis Mandalika use different capacities of battery. Viar Q1 uses 60v 23Ah while Selis Mandalika uses a smaller battery capacity of 36v 12Ah. Converted into kWh, Viar Q1 has a total capacity of 1.38 kWh and Selis Mandalika more than 0.3 times smaller, 0.432 kWh. This of course directly affects the travelled distance in a single charge.

Drivers of Selis Mandalika do not bring the vehicle home so battery swapping is only done at the operator's shelter. Viar Q1, on the other hand, could be charged not only at shelter. Based on the number of battery swapping each day, battery consumption is estimated at Figure 21. On average, Viar Q1 could travel 10.48 km per kWh consumed. More efficient, Selis Mandalika could be used for 29.94 km per kWh consumed. Please note that the Viar Q1 data also includes the number of charging and is considered as a single battery swapping even though it is unknown how much power the charging generates. Therefore, the results of Viar Q1 at Figure 21 may not be the actual battery consumption.

Based on the estimation, Viar Q1 has a lower battery consumption compared to Viar Q1. This, however, might be due to the limited data of Viar Q1 battery charging or swapping collected, higher engine power compared to Selis Mandalika, and more varied types of service including passenger transportation, hence consuming more energy from the battery. Figure 21 also shows that Viar Q1 averages more daily distance travelled almost twice compared to Selis Mandalika.

2.2.3. Issues

- Safety and security are the most worried issues by the drivers, followed by customer issues
- On linear scale, electric 2W driver generally less worried compared to conventional 2W driver
- Cancelled order are experienced daily by 44% of the drivers, mostly being cancelled two times daily
- Customer request and location are the most common reasons of cancelled order, although there is fraction due to drivers' physical ability
- Electric 2W drivers who never operate conventional 2W for ride hailing tend to have more difficulties yet more advantage compared to them who used to drive conventional 2W
- More economical and order prioritization are some advantages of electric 2W while battery and speed are some difficulties for electric 2W drivers

Issues discussed in this section would be separated into three main categories, being general issues as drivers, issues of electric 2W, and cancelled order issues.

2.2.3.1 Issues of Ride Hailing Drivers

Having to deal with urban traffic every day, drivers' most mentioned worries are safety issues up to 34% from all worries. This includes worries of being involved in traffic accidents whether being crashed or to crash, weather issues, and health issues including being exposed with Corona. These issues are strongly correlated with road design as well as other road users. With mixed traffic characteristics in Indonesia and minimum traffic law enforcement and obedience such as speeding, it is no surprise that drivers are most worried about safety.

Following safety issues are security issues that are also one of the drivers' main issues. This include worries of being hijacked, stolen vehicle, sexual harassment, mobile phone robbery and security perception especially in night time. Seizure of property crime without violence is the most occurring crime in every year (BPS-Statistics Indonesia, 2020). Based on the same report, Metro Jaya (Jakarta and greater area) are among the top ten of such crimes in 2019. Being riding and parking their motorcycle everyday even until midnight, drivers are vulnerable in their self-security.

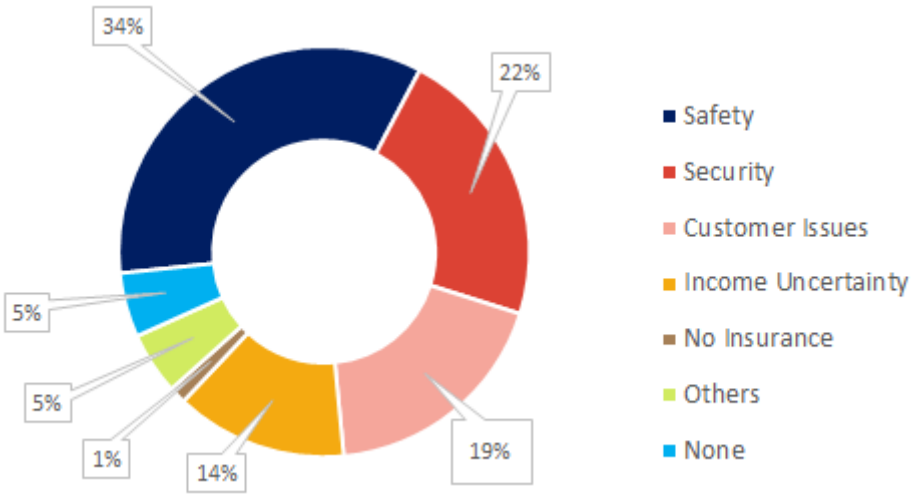

Figure 22 Ride Hailing Drivers' Worries

Issues with customers are another issue that drivers have to deal with. The complaints would be around customers being too complicated, requests that are beyond service, bad ratings from customers, fictive order and cancelled orders. Drivers with goods delivery only are the most worried group with customer issues while surprisingly, food delivery only groups are the least worried. However, this might be due to the limited number of goods delivery only respondents.

Being considered as an informal worker, drivers also worry about income uncertainty, especially with the reducing number of trips due to pandemics and increasing competition between drivers. Some drivers also worry about the absence of insurance. With income uncertainty and facing safety issues every day, insurance or savings for emergency funds should be mandatory.

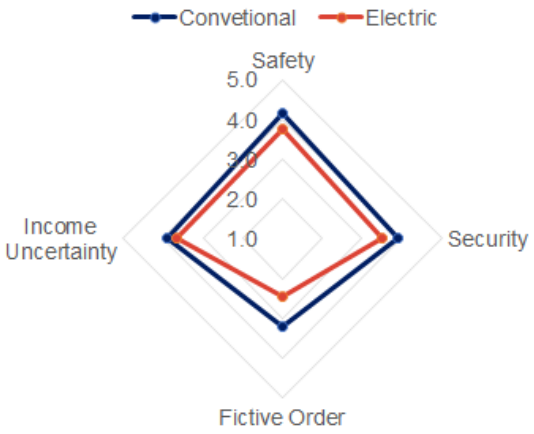

Figure 23 Level of Worries as Ride Hailing Drivers

Wrapped in numbers, drivers put safety issues as the biggest worry up to 4.2 from one-to-five scale with 1 being unconcerned and 5 being very concerned. Both security and income uncertainty scores 3.9 followed by fictive order scoring only 3.2. Electric 2W generally scores lower rate compared to the counterparts. There might be various reasons for it including number of samples, operational area, years of operation, etc.

2.2.3.2 Issues of Electric 2W

With different characteristics than conventional 2W, drivers with electric 2W have two major additional worries including vehicle performance and vehicle cost. Vehicle performance is considered as the most worrying issue for both electric 2W drivers who never and used to operate conventional 2W. Vehicle cost or rent cost to be specific is another difficulty the drivers faced. Hence, income uncertainty also includes drivers' worries their daily income wouldn't meet vehicle rent cost.

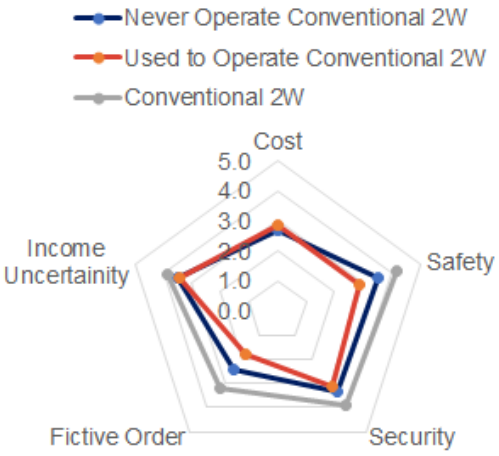

Figure 24 Level of Worries as Ride Hailing Electric 2W Drivers

As suggested on Figure 24, electric 2W drivers tend to be less worried in one-to-five scale, with five being the most worried. However, electric 2W drivers who used to operate conventional 2W scores lower compared to drivers who never operated conventional 2W. Safety issues, although electric 2W is also considered short circuit potential, still less worrying compared to the conventional drivers. This might be due to the lower speed of electric 2W as well as being lighter, so it would be easier to control. Same with safety issues, security issues also lower for current electric 2W drivers. One of the possible reasons is electric 2W is currently less popular so would be unlikely to be hijacked or stolen.

Apart from worries that have been stated before, electric 2W drivers mostly mentioned battery issues as operational difficulties. This also includes limited batteries charging or swapping infrastructure compared to gas stations for conventional 2W. Drivers, especially those who used to operate conventional 2W also find that electric 2W speed, which is lower than conventional 2W, as one of operational difficulties.

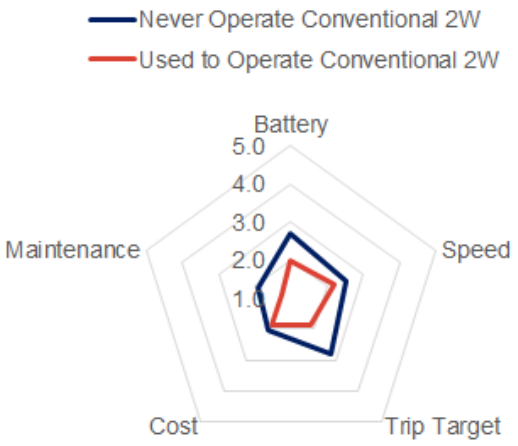

Figure 25 Level of Difficulties as Electric 2W Drivers

On difficulties rating however, on average drivers find that speed and battery is not very troublesome, especially drivers who used to operate conventional 2W. One means don't experience difficulties while five means very experiencing difficulties, so drivers who used to operate with conventional 2W tend to not experience difficulties with electric 2W. This might indicate that, contrary to popular belief, electric vehicle performance is comparable to the conventional. Maintenance difficulties, on average, are almost not experienced by drivers with conventional experience.

Most current electric 2W drivers consider electric 2W has the advantage of being more economical and has order prioritization. Due to free battery charging or swapping at shelter, drivers see it as more economical even though they have to rent the vehicle. While convenience is the third most advantage according to electric 2W drivers who never operate conventional 2W for ride hailing, it is considered as the least advantage for drivers who used to operate conventional 2W. This might indicate that electric 2W is less convenient compared to conventional 2W.

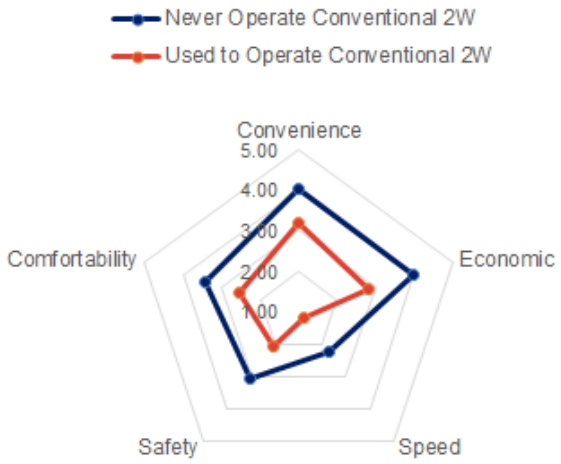

Figure 26 Level of Advantages as Electric 2W Drivers

Figure 26 shows that current electric 2W drivers feel less advantaged when using electric 2W. With 5 being very experiencing advantages, drivers who used to operate conventional 2W tend to find that electric 2W not too advantageous. However, it is still more advantageous compared to conventional 2W except for speed. This indicates that electric 2W, even though not by much, is more advantageous than conventional 2W.

Among five aspects that were questioned, economical reasons and convenience are considered as the most advantageous aspects and speed as the lowest advantageous aspect. With a maximum speed of 30 km/h on Selis Mandalika and 60 km/h on Viar Q1, it is not considered an advantage. However, current model electric 2W maximum speed is more than enough to comply with maximum speed rules in urban areas of 50 km/h and 30 km/h in local or residential areas.

2.2.3.3 Cancelled Order Issue

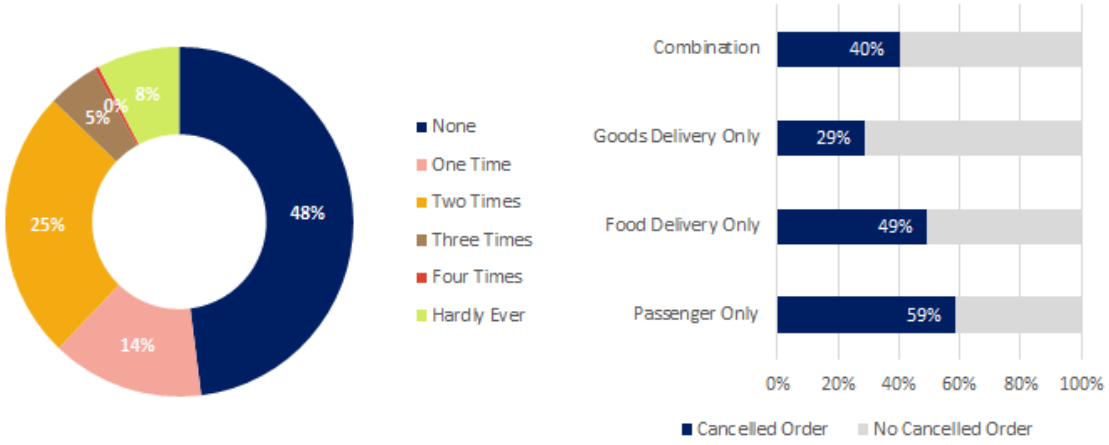

Figure 27 Frequency of Cancelled Order Daily (left); Cancelled Order Occurrence Based on Type of Service (right)

Cancelled order has been mentioned often by the drivers in the worries section. Although most of the drivers don't experience cancelled orders daily (Figure 27), 25% of all drivers experience cancellation twice per day, even 5% of them being cancelled up to three times per day. Drivers who take passengers are more likely to experience order cancellation at least once per day. On the contrary, goods delivery service is more unlikely to be cancelled.

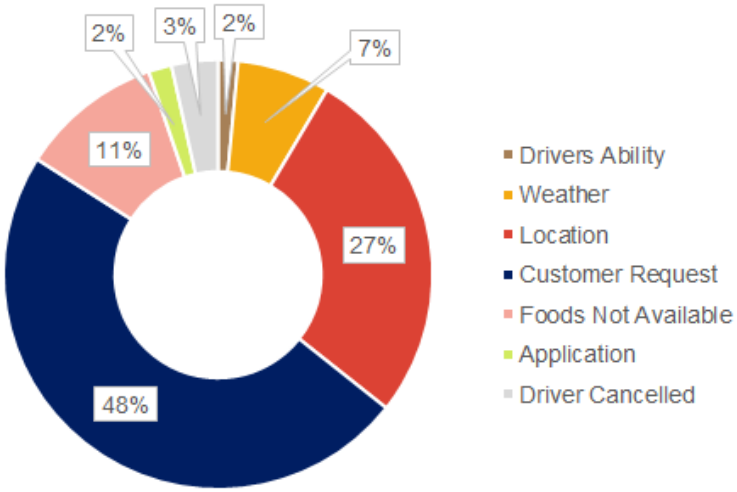

Figure 28 Reasons for Cancelled Order

Figure 28 shows that the primary reason for order cancellation is customer request. This includes customers who don't want to wait, unmatched between registered vehicles in application and actual vehicle, too many requests, order change, etc. The second reason is the location problem, which is that drivers are often too far from the pick-up location or intersect with *ojek pangkalan* that often prohibit ride hailing service to enter. Food availability and weather conditions reasons are the other most common reasons. The Driver's ability also became a reason why the customer cancelled the order. Often it is because the drivers are disabled or related to gender issues, because the drivers are women which are often seen as less reliable. This issue should be tackled to create an inclusive environment in ride hailing service.

2.2.4. Electrification

- More than 25% of ride hailing drivers do not know the availability of electric 2W for ride hailing yet
- Only less than 42% of the drivers who are interested in electric 2W with the majority interested due to operational advantage while the rest find that financing issue make them uninterested in electric 2W
- Most of the drivers estimated that electric 2W cost between IDR 11-20 million, even though they suggested the price to be under IDR 10 million

- Over 30% of the drivers agree and 50% disagree if drivers are obligated to use electric 2W but only 18% agree if drivers are obligated to buy electric 2W
- Generally, drivers of conventional passenger transportation, goods delivery, and combination service are types of service who are reluctant to such electric 2W obligation policies
- Reasons of drivers who support electrification include electric 2W being more economical and eco-friendly while drivers who don't support it are mostly due to financing issues and vehicle performance as well as facilities issues.

2.2.4.1 Drivers knowledge and perspective of electric vehicles

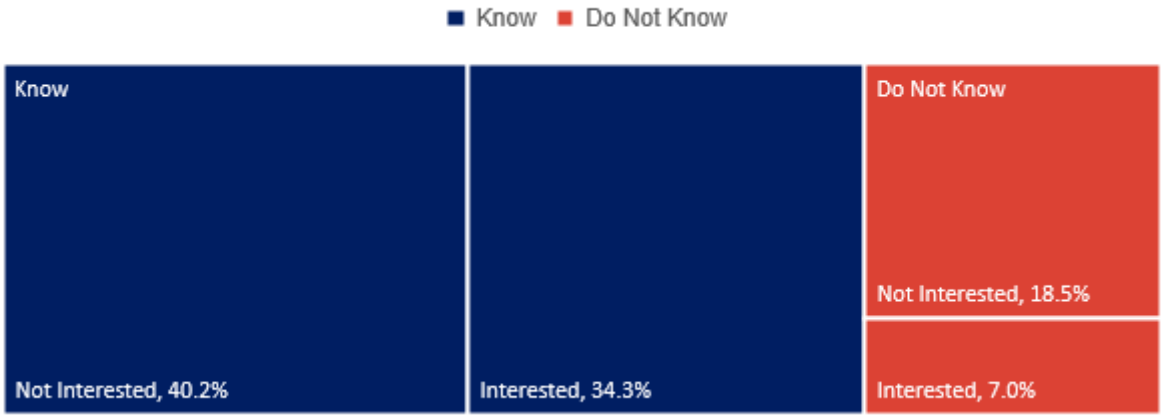

Figure 29 Drivers Knowledge and Interest of Using Electric 2W

On the majority, drivers know the availability of electric 2W for ride hailing service, leaving only 25.5% who don't know. However, transition to electric two-wheelers for ride hailing has not been considered by most respondents as the number of interested drivers to use electric 2W is less than 50%, currently sitting at only 41.3%. Figure 30 and Figure 31 would explain the reasons and the distribution of the reasons among different types of service drivers.

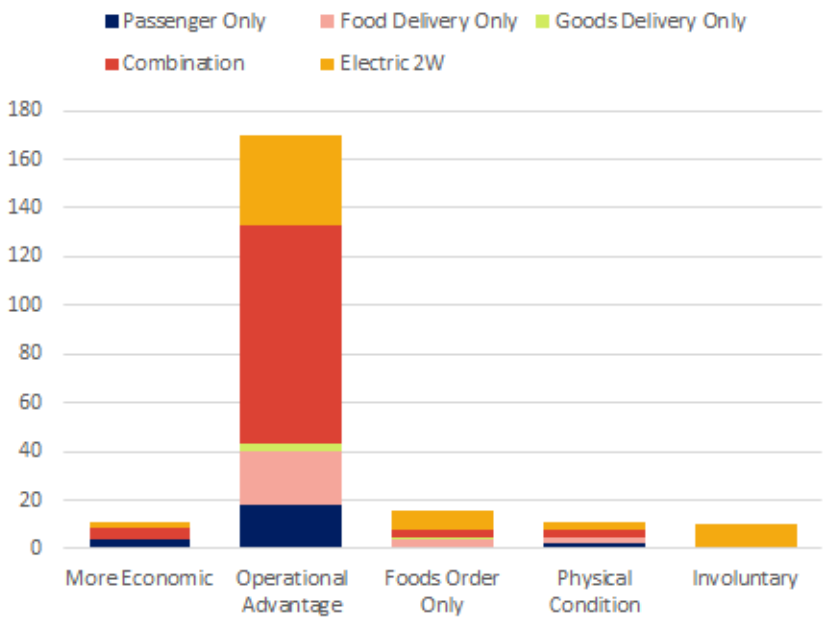

Figure 30 Drivers Reasons of Interest to Use Electric 2W

Over various reasons submitted, operational advantage is the most dominant answer. These operational advantages include more frequent order, vehicle specification advantage, and more eco-friendly. Other reasons tend to be even with food delivery only being the second most mentioned reason. Drivers are interested in electric 2W only for food delivery, possibly due to the perception or knowledge of drivers that current electric 2W is not enough for other services.

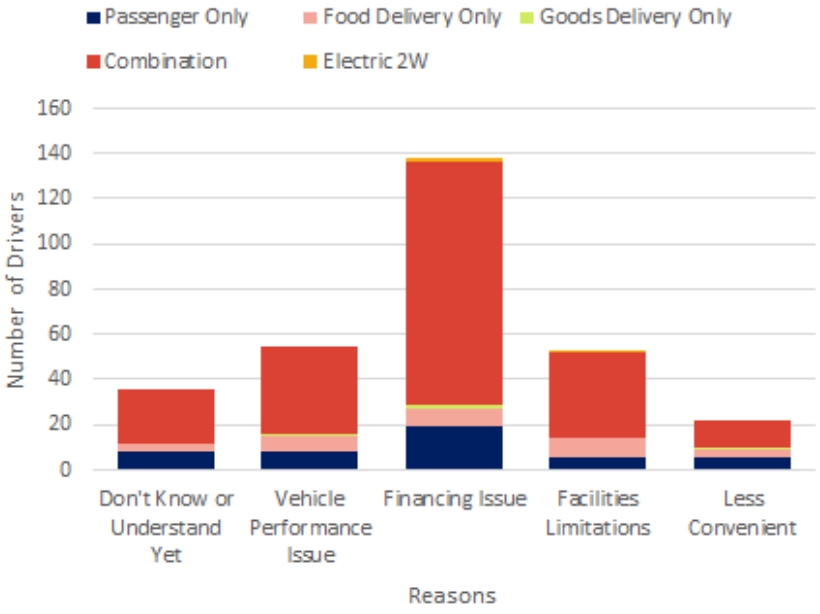

Figure 31 Drivers Reasons of Uninterest to Use Electric 2W

Financing issue is the most dominant reason for drivers' unwillingness to shift to electric 2W. Besides the financial capabilities, drivers' current ownership to conventional 2W also become one of the biggest issues in electric 2W shifting.

Current electric vehicle performance and facilities built were considered not enough to make drivers interested in shifting to electric 2W. This includes the worries of vehicle performance that would limit the types of service that could be done, vehicle speed, and battery capacity and battery charging or swapping station availability. On the other hand, more than 30 drivers mentioned that lack of knowledge or understanding of electric 2W contributes to their low interest.

2.2.4.2 Drivers Willingness to Use Electric 2W

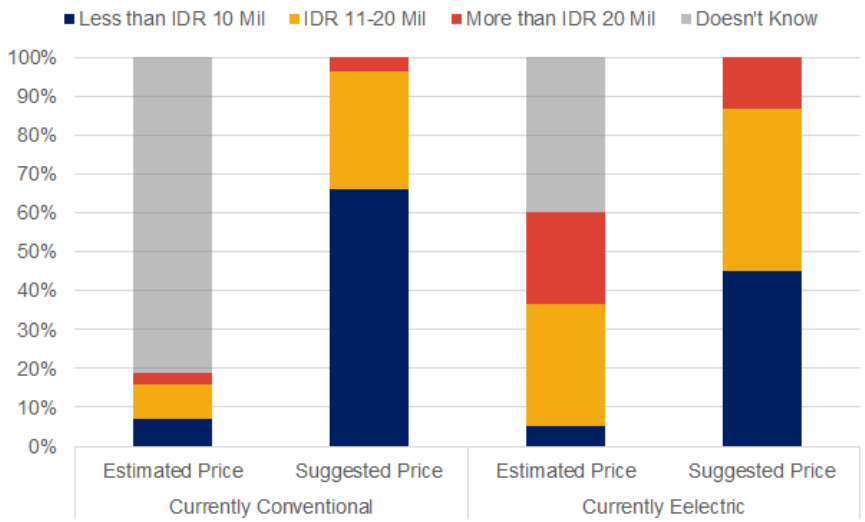

Figure 32 Estimated and Suggested Electric 2W Price by Drivers

Most current conventional 2W drivers, excluding those who don't know the price estimation, estimate electric 2W price for around IDR 11-20 million. On the other hand, the majority of them suggest the price to be less than IDR 10 million. Not too different, current electric 2W drivers also mostly estimate the price in the range of IDR 11-20 million. However, drivers who suggest the price for under IDR 10 million and in the range of IDR 11-20 million are relatively even. This suggested price, although might not represent their financial capabilities, might be considered to be a competitive price.

Drivers' understanding and perspective of ride hailing electrification might affect their interest in shifting to electric 2W. However, it is found that even though the majority of drivers know that electrification is good for the environment, the drivers are still not interested in electric 2W. On the other hand, drivers with the perspective that electric 2W is more economical or for business or profit are tend to be more interested. This suggests that financial issues are strongly affecting driver's interest in shifting to electric 2W. Hence, should incentives be given by the government or operator, it should be more in fiscal incentive form.

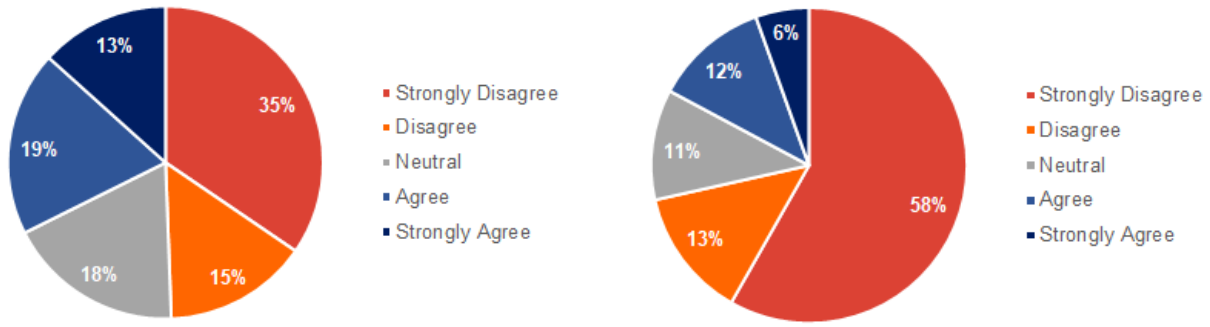

Figure 33 Drivers Response If Drivers Have to Use (left) and to Buy (right) Electric 2W

To require ride hailing drivers to transition to electric two-wheeler, companies need to carry out careful planning and extensive information dissemination. Based on the survey, majority of drivers (50%) disagree or strongly disagree if they are obligated to use electric 2W while 32% of them agree or strongly agree. However, it changes drastically when it comes to having to buy electric 2W. Drivers who disagree and strongly disagree rise up to a total of 71%. This suggests, and as explained before, that buying an electric 2W would be an issue for drivers, mostly due to financing issues.

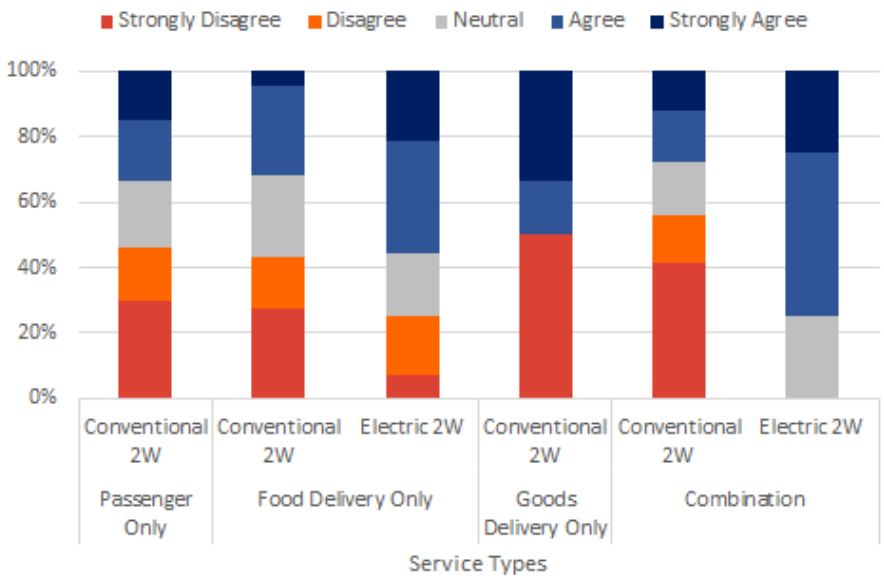

Figure 34 Drivers Response If Drivers Have to Use Electric 2W Based on Type of Service

To look further, the most welcoming type of service is combination trips who currently use electric 2W followed by their ally in electric 2W, food delivery only. Goods delivery only type of service has a relatively balanced proportion and might be due to limited number of respondents. Apart from

goods delivery only, types of service that might be reluctant the most are conventional 2W for passenger transportation only and combination trips that are dominated by passenger trips.

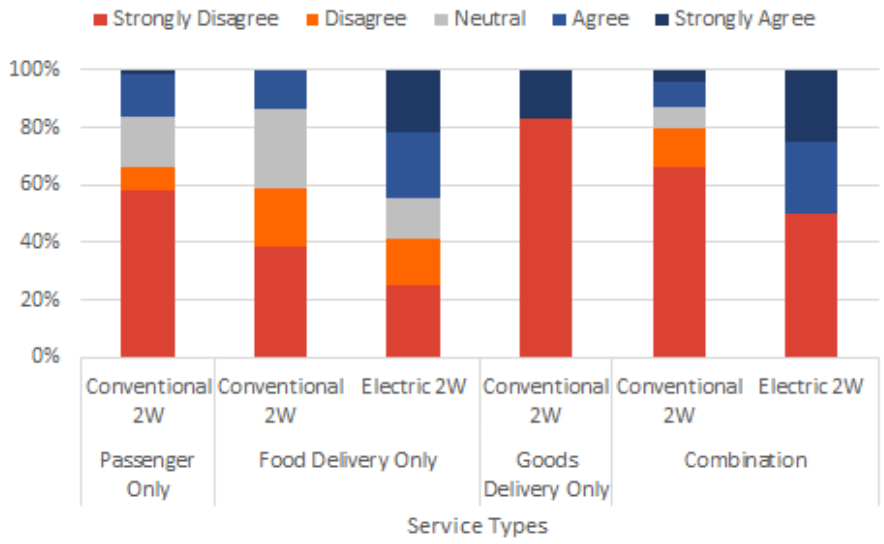

Figure 35 Drivers Response If Drivers Have to Buy Electric 2W Based on Type of Service

Drivers who currently ride electric 2W tend to be more agree or strongly agree if they are obligated to buy electric 2W compared to other types of service. Every type of service has an increase in disagreement or strongly disagrees with food delivery service the least. This might indicate that food delivery is more open to vehicle electrification.

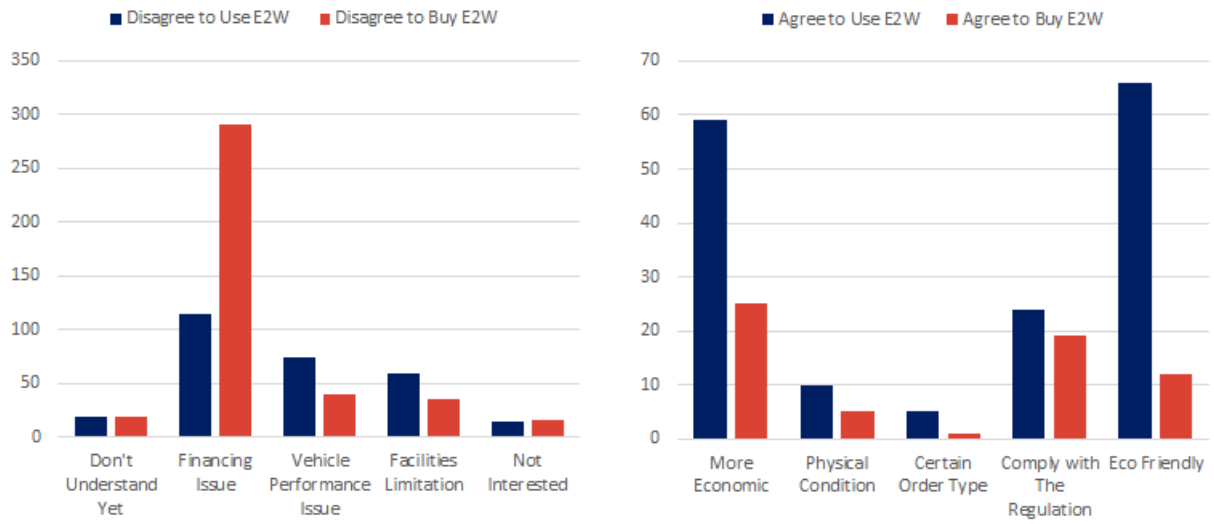

Figure 36 Drivers Five Most Mentioned Reasons of Electrification Disagreement (left) and Agreement (right)

To simplify, terms of strongly agree and agree as well as strongly disagree and disagree as stated before, are put together into agree and disagree. Financing issues dominate the disagreement of obligation to use and buy electric 2W. Other dominant reasons include vehicle performance issues

and facilities limitations. This might explain why passenger trip and combination trip drivers are more reluctant to shift to electric 2W (Figure 35).

On the other hand, drivers agree to use electric 2W mostly because of eco-friendly reasons and more economic. However, when asked to buy, drivers who mentioned eco-friendly reasons significantly dropped, leaving more economic reasons as the highest. This indicates that the economy is still the biggest issue for drivers. Other reasons include willing to comply with the policy, physical condition advantage and agreeing to certain order types only.

2.2.5. Financial Capabilities

- On average, 2W ride hailing drivers in Greater Jakarta receive around IDR 140,000 daily
- Goods deliveries resulted in more revenue than other types of service, followed by food deliveries
- Food deliveries produce the highest revenue/km and revenue/hour
- Most of the drivers acquire their vehicles through credit schemes
- Drivers spend an average of IDR 14 million to acquire their vehicles in cash, or IDR 825 thousand/month on credit scheme
- Food delivery services require the least operational cost, including fuel and maintenance fee

2.2.5.1 Revenue

Based on the survey result, it was found that on average 2W ride hailing drivers received IDR 143,023.81 daily, or potentially they could get a monthly income of a little less than IDR 4.3 million, which is more or less the same with Jakarta's current minimum monthly wage regulated on Jakarta Governor's Regulation No. 103 of 2020.

However, by assessing the distribution of income, it turned out that the majority of drivers receive less than Jakarta's current minimum wage. Looking at Figure 37 and Table 6 below, it was found that 58.25% of current drivers receive less than Jakarta's current minimum wage of IDR 147,206.22. It should be noted that, although ride hailing drivers are considered as informal workers which makes them not applicable for the minimum wage, this analysis was made to give a better idea of how well they are paid currently compared to other occupations in general.

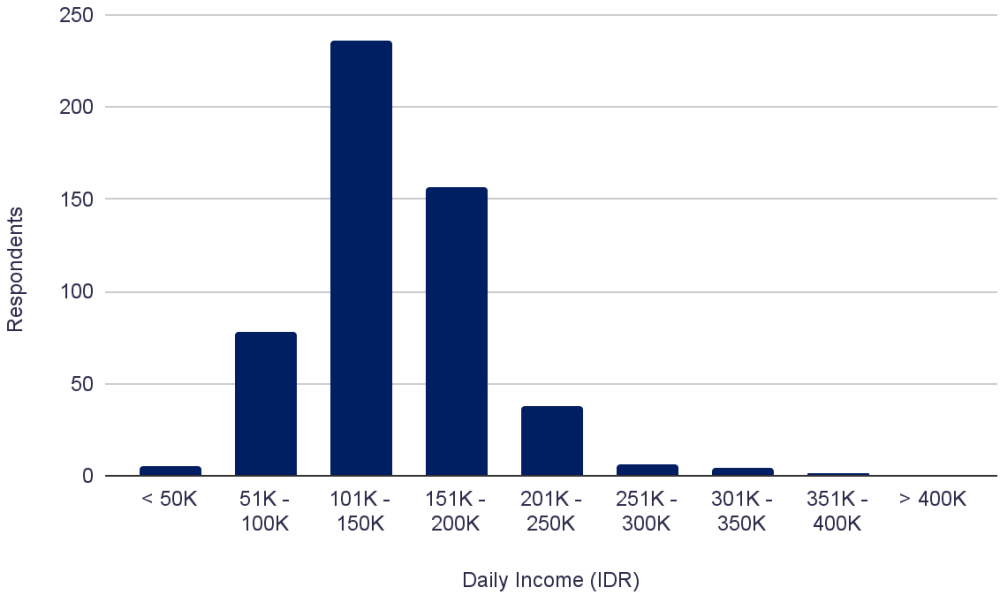

Figure 37 Distribution of Drivers' Daily Income

Table 6 Various Percentile of Drivers' Daily Income

Percentile	Daily Income (IDR)	Monthly Income (IDR)
25	**110,222.46**	**3,306,673.73**
50	**138,029.66**	**4,140,889.83**
58.25*	**147,206.22**	**4,416,186.55**
75	**173,805.73**	**5,214,171.97**

(Notes: *Jakarta's minimum wage)

One of the first financial aspects to look at is if there are any differences in income between drivers from the two ride hailing operators. Should there be a significant difference, all following financial related analysis in this report would be made separately between operators to ensure accurate recommendation in the future. Drivers that were registered on both ride hailing operators would not be included in this analysis. It turned out that there are no major differences on average income between Grab's and Gojek's drivers. Therefore, all financial analysis throughout this report would be done as a whole rather than separated between operators.

The next thing to look at is whether there are any differences on drivers' income level due to their chosen type of service. The survey result suggests that, out of 466 respondents that currently use conventional 2W, almost 40% of them would only take offers from 1 type of service out of the

possible 3 (passenger, foods, or goods delivery) being offered to them. This made it possible to conduct further investigation on whether different types of service resulted in different levels of income for the driver. Table 7 below shows that the average income differs quite significantly depending on which type of service they took. Therefore, all financial analysis in this report would be done separately based on the type of service.

Table 7 Driver's Average Income Based on Type of Service

	Active Conventional Drivers	Combination	Passenger Only	Food Delivery Only	Goods Delivery Only
Samples	465	336	75	47	7
Average Daily Income (IDR)	**142,560.09**	**142,017.86**	**140,833.33**	**146,333.33**	**161,214.29**
Differences (IDR)	-	-542.23	-1,726.75	3,773.25	18,654.20
Differences (%)	-	-0.38%	-1.21%	2.65%	13.09%
Average Income/Km (IDR)*	**1,867.99**	**1,902.02**	**1,673.27**	**2,011.90**	**1,688.11**
Differences (IDR)	-	34.03	-194.73	143.90	-179.89
Differences (%)	-	1.82%	-10.42%	7.70%	-9.63%

(Notes: *Using average daily distance travelled on each type of service on Table 3)

Based on Table 7 above, it was prominent that those who only take goods delivery jobs tend to have higher income, 13.09% more than the others. Although it should also be noted that the lack of samples might have been the cause of this and the reality might be different than what the survey result suggests. However, a good number of samples were identified to only take food delivery jobs. Although not as high as those who only take good delivery jobs, these drivers tend to receive 2.65% more than the average driver.

Limited range is one of the issues of the current available electric 2W models in the market. Generally, their maximum range on a single charge is still below the similarly priced conventional 2W's maximum range on a single refuelling. Therefore, it might be best to know which of the currently available types of service has the highest amount of revenue per kilometre driven. From Table 7 above, it was found that drivers who only take food deliveries tend to have 7.70% higher revenue/km compared to the average of all drivers using conventional 2W. Compared to those who only take passenger or goods delivery, these drivers have an even significantly higher revenue/km, which sits at +20.24% and +19.18% respectively.

Food delivery jobs usually are associated with more time spent waiting for the foods to be prepared. This was shown by Figure 7 above, which proves that most of the drivers that avoid food deliveries do so because of that. However, a further look into average income per working hours shows that food delivery is still producing the most money for the drivers out of all types of services, almost 8% more than the average of all drivers with conventional 2W.

2.2.5.2 Expenses

The next thing to assess on financial analysis is drivers' expenditures pattern. This report will make a separate analysis on capital and operational related expenditures. The first one is regarding capital expenditures. Considering most of current drivers come from lower groups of income, it is as expected that most of them would need some financial help to acquire their own 2W. It was found that only 36% of them purchased their 2W in cash as Figure 38 below suggests. It was also found that more than 70% of those who bought their vehicles on credit schemes have paid off all the instalments. However, it should be noted that this analysis was made towards current conventional 2W drivers. This is due to the fact that those who currently use electric 2W are all under the pilot project of the operator that only enables them to rent their vehicles, thus might not reflect their actual preferences.

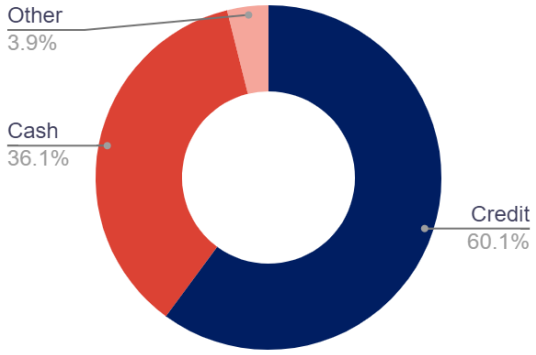

Figure 38 Means of Acquiring Conventional 2W

A further analysis was made to see how much money is being paid by drivers to acquire their current vehicles. It was found that, for those who opted to purchase their vehicle in cash, they spent an average of IDR 14 million. On the other hand, those who acquire their vehicles on a credit scheme spend an average of IDR 2 million up front as the down payment, while their actual monthly instalments stand at IDR 825 thousand on average as could be seen on Table 8 below. It was also found that drivers tend to take a 30-month long credit scheme, although the amount of money needed to be paid might be more influential in affecting drivers' decision on how long the instalment would be.

Table 8 Drivers' Financial Capabilities for Purchasing Conventional 2W

	In Cash	Using Credit Schemes	
	Vehicle Price (IDR)	Down Payment (IDR)	Monthly Instalment (IDR)
Min	1,500,000	500,000	200,000
Max	33,000,000	5,000,000	2,000,000
Average	**14,008,567**	**2,046,429**	**825,661**
25th Percentile	8,777,778	777,778	604,814
50th Percentile	12,884,615	1,500,000	781,056
75th Percentile	17,261,905	2,500,000	957,298

Analysis was also made on the current 25th, 50th, and 75th percentile of the above-mentioned drivers' financial capabilities related to vehicle acquisition. From Table 8 above, it could also be concluded that 25% of current drivers would not pay higher than IDR 604 thousand on monthly instalments to acquire their 2W. These figures might be useful to assess how much drivers could actually afford the currently available electric 2W models based on their price. This figure was made by analysing the current distribution of drivers' capital expenditures that could be found on Figure 39 below.

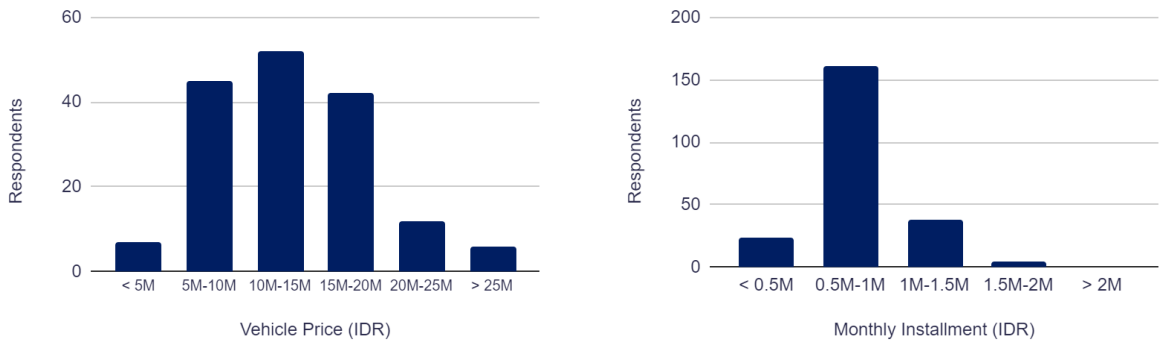

Figure 39 Distributions of Driver's Capital Expenses in Cash (left); in Monthly Instalment (right)

The next thing to assess is the operational expenditure patterns of ride hailing drivers. As operational expenditures would differ depending on the operational pattern of the drivers, a separate analysis between each type of service would be conducted. However, it should also be noted that all operational analysis in this report would only look at current drivers with conventional 2W as those with electric 2W are still in the pilot project of the operator, which

makes them receive special benefits such as free charging and free maintenance that might not be sustainable in the long run.

It was found that those who only take food delivery jobs tend to spend the least amount of money, which is 12.76% less than the others, to operate their vehicles as shown by Table 9 below. This includes the daily fuel expenses and monthly maintenance cost that had been converted into daily basis as well. This might be the reason for why food delivery jobs also produced more money per kilometre as shown by Table 7 above. This lower operating cost was mainly due to food delivery trips being relatively shorter than passenger and goods delivery trips, as suggested by Table 3.

Table 9 Average Daily Operational Expenses Based on Type of Service

	Active Conventional 2W Drivers	Combination	Passenger Only	Food Delivery Only	Goods Delivery Only
Average Daily Fuel Cost (IDR)	25,653.43	25,559.52	27,560.00	22,385.42	32,142.86
Average Daily Maintenance Cost (IDR)	6,523.99	6,249.29	8,122.80	5,687.39	6,734.66
Total Daily Operational Expenses (IDR)	**32,177.42**	**31,808.81**	**35,682.80**	**28,072.81**	**38,877.51**
Differences (IDR)	-	-368.61	3,505.38	-4,104.62	6,700.09
Differences (%)	-	-1.15%	10.89%	-12.76%	20.82%

2.2.6. GESI

- Female drivers tend to earn more than male drivers in a day
- Female drivers tend to have less working hours as drivers than male drivers due to the needs to take care of their household as well
- Female drivers are more concerned about safety and security issues
- All drivers tend to have the priority of using motorcycles in their household, regardless of their gender and disability status
- Gender and disability status actually influence drivers' preferred type of service
- Female drivers are able to spend a larger sum of money to buy vehicles in cash, while drivers with disabilities spend less

- Female drivers and drivers with disabilities tend to pay higher in monthly instalments
- Female drivers and drivers with disabilities tend to spend less on operational cost

Existing gender roles generate differences in women and men's access to the public sphere, including access to participate in paid or productive work. Due to their gender roles, women are less likely to participate in paid work because they tend to carry a disproportionate responsibility for unpaid care work at home. This condition creates unequal distribution of decision-making in the household that in turn limits women's access to resources, mobility and accessibility. Regarding mobility, women faced inequalities in terms of transportation affordability, access to vehicle ownership, and access to vehicle use. It was estimated that only around 10% of all 2W ride hailing drivers in Greater Jakarta are women (Alia and Bestari, 2018). This number was very little compared to ITDP's 2019 traffic count in Jakarta where 39% of all motorcycle drivers were female. This report will try to uncover more on why this happened and whether there are any inequalities between male and female in accessing this job. Apart from that, this report would also explore whether there are any inequalities between people with and without disabilities in accessing this job as well. This needs to be done so that this project could address as many GESI related issues as possible on current 2W ride hailing service within the project's scope.

Apart from that, this report will also try to elaborate on any concerns from marginalized communities, which are female drivers and drivers with disabilities, on the 2W ride hailing electrification plan. This needs to be done so that no one would be left behind during this electrification effort.

2.2.6.1 Drivers' Profile

This survey collected information from 525 ride hailing drivers, including 50 women and 462 men. Approximately 97.5% of the respondents were drivers without disabilities, with 9.5% women, and 88.0% men; and only 2.5% of respondents were drivers with disabilities, all of whom were men (Figure 40). This respondent configuration reflects the real conditions in the ride hailing industry, where the majority of ride hailing drivers are men without disabilities. The number of female drivers and drivers with disabilities are still small, even though the opportunities and access to get these jobs are open and inclusive. The existence of women's double burden, as well as differences in access to resources and access to opportunities for women and persons with disabilities are thought to be behind the limited number of women and persons with disabilities entering the job market, including the ride hailing industry.

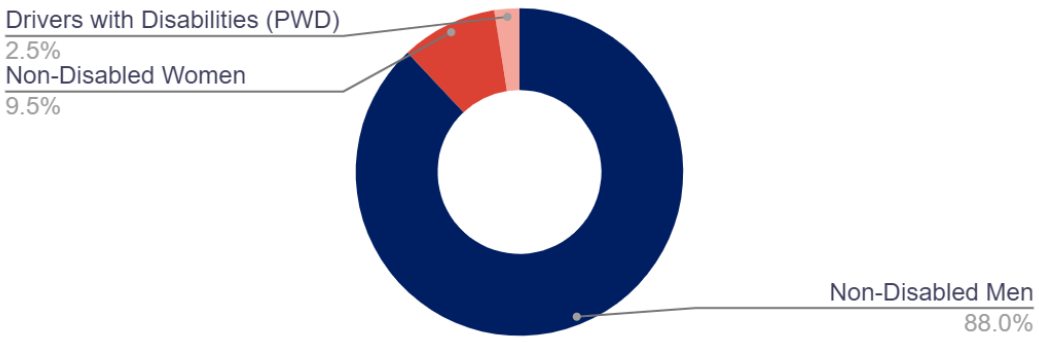

Figure 40 Drives' Profile

2.2.6.2 Reasons for Low Number of Female Drivers

Daily Revenue

One of the characteristics that might influence people's decision on choosing one occupation over another is the potential income it would generate. This was backed by one of the motivations for people to become 2W ride hailing drivers mentioned previously is the possibility of higher income they would get. Therefore, the gap in revenue gathered by male and female drivers might be one of the reasons why currently there are far less female drivers than male drivers. This part of the report would compare the daily revenue between those two groups to identify if there are any gaps in revenue between them.

It turned out that actually female drivers receive more in a day compared to their male counterparts. Although they only receive 4.25% higher than male drivers, it could be concluded that revenue is not the reason why there are less female 2W ride hailing drivers.

Table 10 Average Daily Revenue Based on Gender

	Male	Female
Average	**142,447.37**	**148,500.00**
Differences (IDR)		6,052.63
Differences (%)		4.25%

Working Hours

Knowing that female drivers actually receive more money than male drivers through working as ride hailing drivers, other potential reasons that might explain why there are less female drivers available need to be explored. One of them is regarding their working hours. Generally, people tend to choose an occupation that generates more money with less hours of work. Therefore, it

might be best to see whether there are any significant differences between male and female drivers' working hours.

Although not by much, it turned out that female drivers in Greater Jakarta work 1.45 less hours daily as ride hailing drivers compared to their male counterparts. Coupled with the previous finding in which female drivers receive more money than male drivers, this finding actually further suggests that this job is actually preferable for women. However, as the number of female ride hailing drivers do not reflect this conclusion, a further investigation is needed.

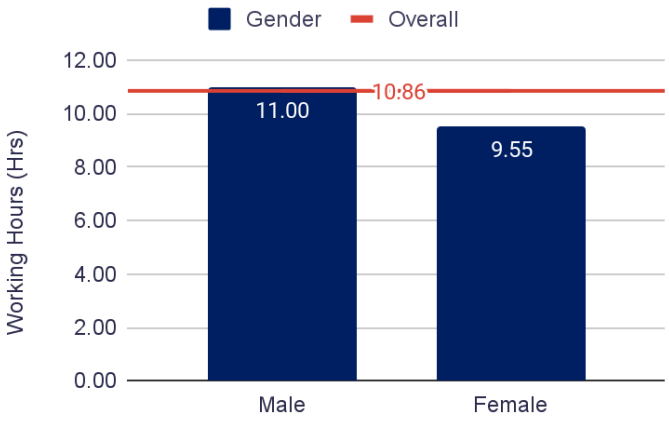

Figure 41 Average Daily Working Hours Based on Gender

To understand better on why this happened, a further look was made into the needs to do other jobs on both male and female drivers, as shown by Figure 42 below. It was found that more than half of female drivers have other things to do besides working as a 2W ride hailing driver, compared to only 16.8% of male drivers that also have other things to do.

For most respondents, women and men, being a ride hailing driver is their main job. However, while most male drivers (83.2%) stated driving as their only job, only 48% female respondents stated driving as their only job, while the rest do have side hustle.

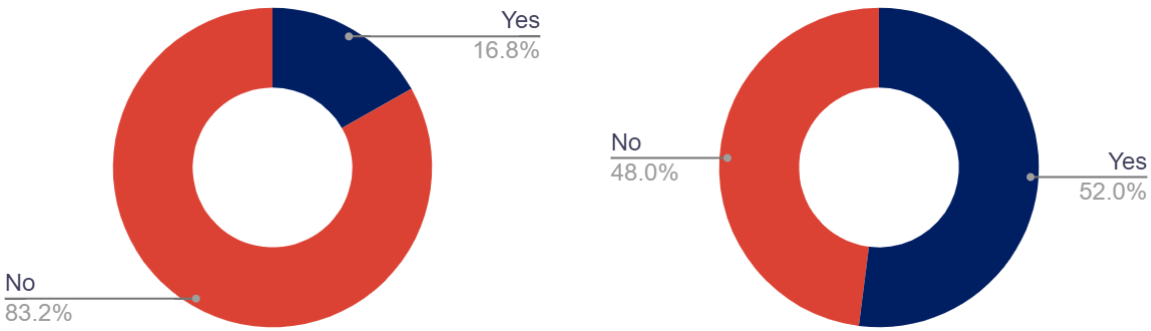

Figure 42 Availability of Other Side Hustle on Male Drivers (left) and Female Drivers (right)

Most female drivers (52%) have side hustle to do, such as being a housewife (80.8%), and freelancer (11.5%). As with other indicators, this condition reflected gender role division in the household, where men are the main breadwinners, while for women working is part of an effort to increase their family income. Thus, this might suggest that currently women tend to have other unavoidable responsibilities that prevent them working longer as ride hailing drivers, or even prevent them from becoming ride hailing drivers in the first place.

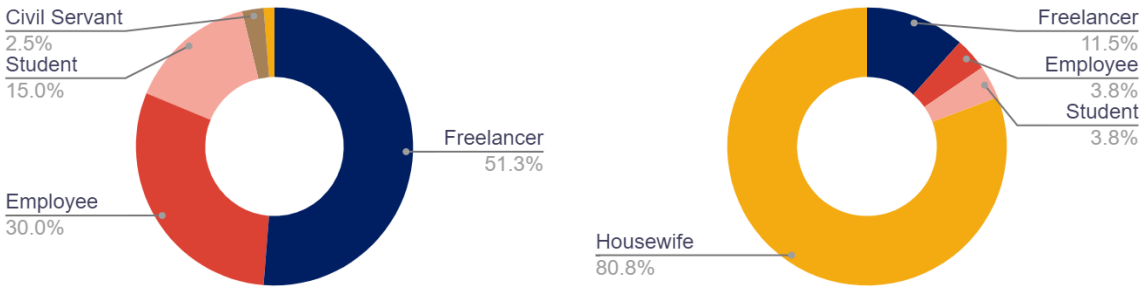

Figure 43 Types of Other Side Hustles on Male Drivers (left) and Female Drivers (right)

Concerns

Another factor that may influence someone's decision to become ride hailing drivers is their perspective on the job itself. In this part of the report, findings on drivers' concerns of their jobs would be further elaborated.

The survey illustrates differences in safety and security considerations between female and male drivers. Given a scale of 1 to 5, or from "Not concerned at all" to "Highly concerned", it was found that female drivers do have a higher level of concerns on safety and security aspects than male drivers as shown by Figure 44 below. On security aspect, besides robbery related concern that affects both male and female drivers, it seems that female drivers are also concerned about sexual harassment risk, thus resulted in a higher score.

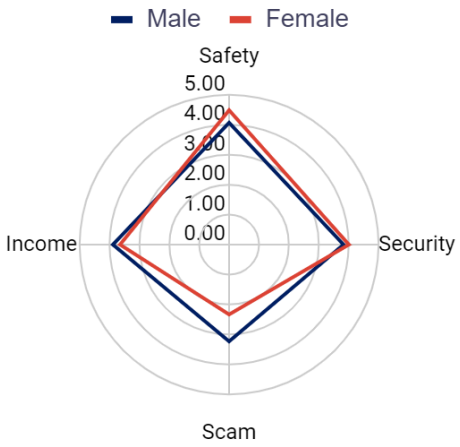

Figure 44 Level of Concerns as Ride Hailing Drivers Based on Gender

It turned out that 82% of female drivers prefer to take food delivery jobs among other types of service offered by ride hailing services. Being asked further on why they have this kind of preference, it resulted in security being the second most cited reason. This finding further strengthens the previous finding in which female drivers are more concerned about security due to additional risks in the form of sexual harassment. A side-by-side analysis between male and female drivers' reasons for preferring one type of service among others shows that security is not one of the main reasons amongst men whereas it seems prevalent on women.

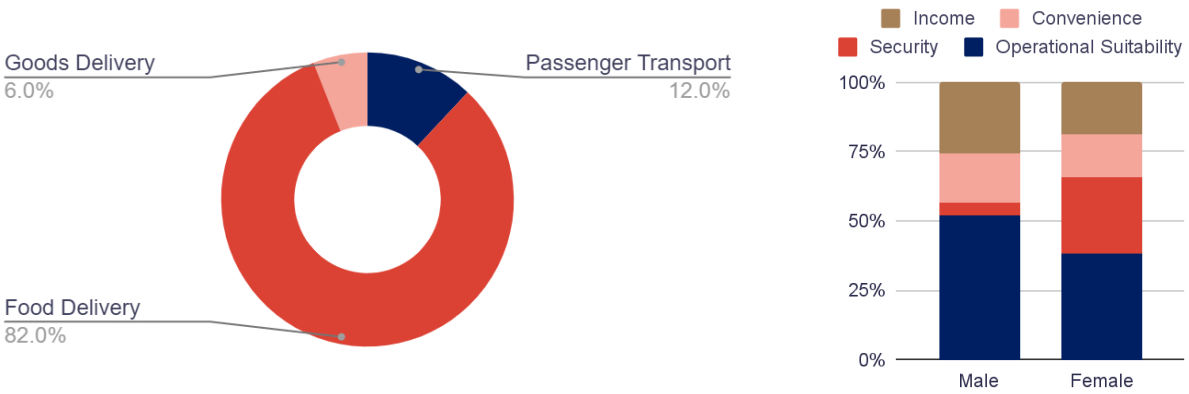

Figure 45 Female Drivers' Most Preferred Type of Service (left) and Reasons Behind (right)

However, it should also be noted that female drivers are less concerned about the uncertainty of income and the risk of being scammed by customers as Figure 44 further suggests. This is in accordance with the male gender role as the main breadwinner of the family which makes them concerned more about money. This is further backed by the finding shown in Figure 46.

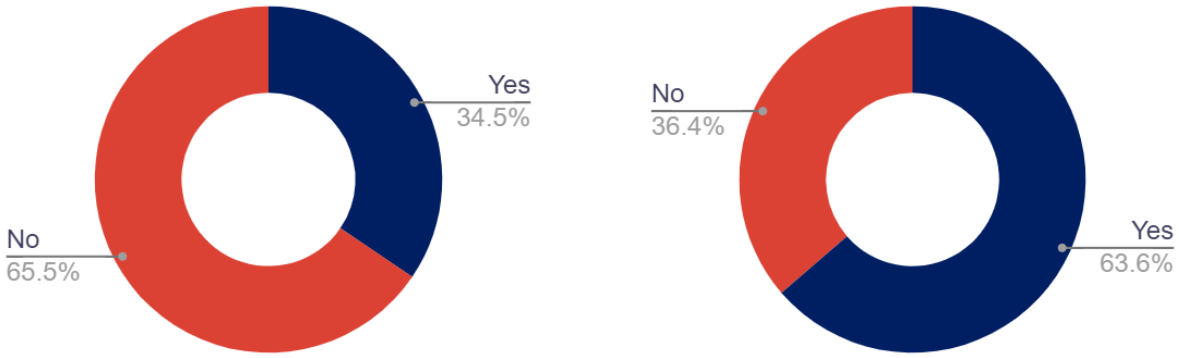

Figure 46 Availability of Other Working Family Members on Male (left) and Female Drivers (right)

Access to Motorcycles

The next thing to assess is the opportunity of accessing family-owned motorcycles for women, especially in a 1-motorcycle-household. A study by Weningtyas and Wibowo (2014) suggests that men tend to have the priority over women in the same household to use their motorcycle. As

currently ride hailing drivers need to provide the motorcycle themselves, this might be the reason why there are less female 2W ride hailing drivers on the road.

However, differ from what had been thought before, it turned out that both male and female drivers do have the priority to use the motorbike they use for ride hailing over other family members. This indicator is in line with respondents' answers that being a ride hailing driver is their main job and main activities.

Conclusion

A conclusion could be drawn from those four aspects elaborated above, which are daily revenue, working hours, concern, and access to motorcycles. The findings from this section have been summarized into Table 11 below.

Table 11 Summary of Findings among Potential Reasons for Low Number of Female Drivers

Revenue	Working Hours	Concerns	Access to Motorcycles
No inequality found towards female drivers	Female drivers currently are still expected to hold responsibility of their household's domestic duties	Female drivers currently being more concerned on security aspect, mainly due to sexual harassment risks	Inconclusive as the survey only asked current drivers who already got an access to use motorcycle

As could be seen on Table 11 above, it could be concluded that currently there are some sort of inequalities between male and female drivers in terms of working hours and concerns.

On the working hour aspect, it seems like it is closely related to current views on women's roles in society. Thus, it might not be feasible to overcome this issue inside the project's scope. However, one effort that could be made to ensure equalities between men and women in this job is to prioritize female drivers in getting orders that require less hours, which is food delivery services as suggested by Table 4 above. By doing this, female drivers could work as a driver while still taking care of their household. This kind of recommendation would be elaborated more on other related outputs of this project.

On the concerns aspect, it was suggested that there might be potential female drivers who were discouraged to be a driver due to perceived higher sexual harassment risks. This could be mitigated, for example, by assigning female drivers to only food or goods delivery services, which minimizes any contact with other people. However, it should also be noted that there are also sizable male drivers who prefer to take food and goods delivery jobs as well that might be discouraged by this measure. Another improvement that could be taken is by implementing a female-friendly service that has been initiated by both of the operators (Hastuti, 2020; Astutik, 2019). This would allow female drivers to only receive passenger transport orders from female customers, thus reducing concerns of sexual harassment for current and prospective female drivers.

2.2.6.3 Reasons for Low Number of Drivers with Disabilities

Daily Revenue

A similar approach with the previous section will be taken to see if there are any inequalities regarding revenue between non-disabled drivers and drivers with disabilities. It was found that drivers with disabilities actually receive more in a day compared to non-disabled drivers, which might suggest that there are no apparent differences on opportunities given to make a living through this job to non-disabled drivers and drivers with disabilities.

Table 12 Daily Revenue Based on Disability Status

	Non-Disabled Drivers	Drivers with Disabilities (PWD)
Average	**142,980.47**	**144,730.77**
Differences (IDR)	-	1,750.30
Differences (%)	-	1.22%

Working Hours

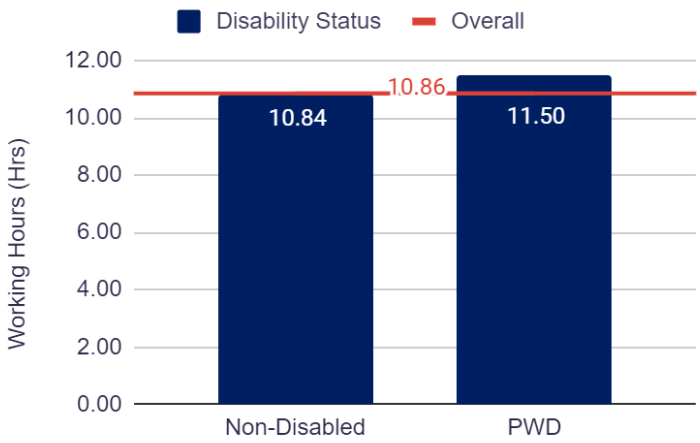

Figure 47 Average Daily Working Hours Based on Disability Status

Based on Figure 47 above, it was found that drivers with disabilities tend to work 0.66 hours longer than non-disabled drivers. However, a further look into the availability of side hustles for them did not show any significant difference with non-disabled drivers. It only might suggest that drivers with disabilities indeed tend to work more diligently as suggested in a report by ILO (2016).

Concerns

It was found that drivers with disabilities have lower levels of concern on every aspect listed in Figure 48 below. This might mean that this job is actually suitable for people with disabilities (PWD) as they tend to have lesser amount of concern than the others.

Figure 48 Level of Concerns as Ride Hailing Drivers Based on Disability Status

Access to Motorcycles

Not differ from what have been seen on female drivers, all drivers with disabilities that were captured in this survey have the priority to the motorcycles in their household. Further research on persons with disabilities that are currently not a 2W ride hailing driver would be needed to see whether they actually have priority to use motorcycles in their household.

Conclusion

Table 13 Summary of Findings among Potential Reasons for Low Number of Drivers with Disabilities

Revenue	Working Hours	Concerns	Access to Motorcycles
No inequality found towards drivers with disabilities	No inequality found towards drivers with disabilities	No inequality found towards drivers with disabilities	Inconclusive as the survey only asked current drivers who already got an access to use motorcycle

To conclude, it seems like currently there are no significant findings suggesting that there is an inequality towards drivers with disabilities to access this job. The low number of drivers with disabilities might only be the reflection of the low number of persons with disabilities compared to non-disabled people. However, this level of equality would need to be maintained by the implementation of fleet electrifications. Therefore, drivers with disabilities' concerns would also need to be assessed fairly during the creation of any future recommendations in this project.

2.2.6.4 Electrification Willingness and Capabilities

In this part of the report, perspectives related to the effort of electrification would be assessed between male and female drivers, as well as between non-disabled drivers and drivers with disabilities. The findings from this section would be considered further on the ride hailing electrification roadmap that would be produced in this project.

Willingness to Use Electric 2W as Ride Hailing Drivers

The first thing to look at is whether there are any differences between genders and disability status in their interest to use electric 2W as ride hailing drivers. Of the respondents who answered, the majority stated that they were not interested in transitioning to electric two-wheeler. However, although by a small margin, there is a higher percentage of female drivers that are interested in using electric 2W as ride hailing drivers compared to male drivers. This finding proved that women are more likely to embrace changes than men as a report by EUEI PDF (2013) suggests. It was also found that more drivers with disabilities are willing to shift into electric 2W compared to non-disabled drivers as shown in Figure 49.

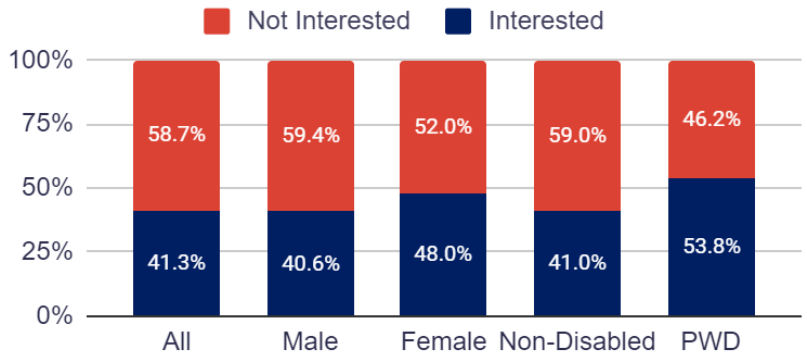

Figure 49 Drivers' Interest to Use Electric 2W Based on Gender and Disability Status

Preferred Type of Service

In general, it was found that ride hailing drivers prefer to take passenger transport jobs among other types of service as mentioned in the previous section as well. However, it was found that it could not be generalised between genders and disabilities. It was found that the majority of female drivers (82%) actually prefer to take food delivery orders, while the majority of drivers with disabilities (53.8%) prefer to take goods delivery orders as shown by Figure 50 below.

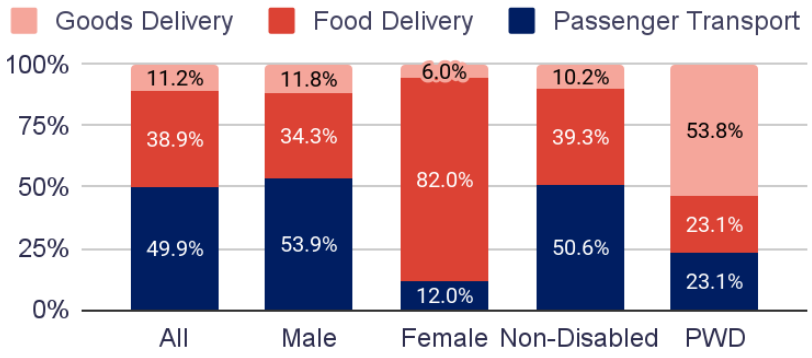

Figure 50 Drivers' Most Preferred Type of Service Based on Gender and Disability Status

This happened due to different reasons between female drivers and drivers with disabilities. As suggested by Figure 45 above, female drivers prefer to take food delivery services due to avoiding higher sexual harassment risks.

In drivers with disabilities however, it was first thought that they prefer to take goods delivery jobs due to avoiding conversation, as passenger transport service requires constant communication with passengers and food delivery service requires ordering and confirming food orders at restaurants and other food merchants. It turned out that the most cited reason of why they prefer to take goods delivery service is due to operational suitability (56.3%). Although avoiding conversation was also mentioned by some, it was only cited in 12.5% of all responses. Shown by the "Convenience" group in the Figure 51 below, non-disabled drivers actually cite this reason 5.2% more often than drivers with disabilities.

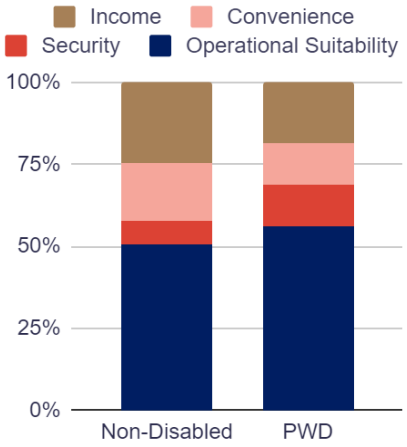

Figure 51 Reasons Behind Preferred Type of Service Based on Disability Status

Battery Charging or Swapping Station Location

For battery charging or swapping station location, driver's preferred waiting (idle) location could be used for consideration. Male drivers are more likely to hang out in transport hubs as well as commercial areas. Female drivers, on the other hand, are not usually stationed at public transport

hubs. This could be accounted for because female drivers are less likely to accept passengers, instead, they prefer to accept delivery orders. This can be seen most female drivers prefer to be stationed near commercial areas. Most drivers with disabilities chose to be stationed at basecamps and also housing areas in comparison to other groups. This occurs due the specific needs that people with disabilities can benefit from being near familiar communities, including basecamps or housing areas.

Concerns, Difficulties, and Easiness of Using Electric 2W

As there are no drivers with disabilities with electric 2W captured in the survey, this section will only elaborate differences on concerns, difficulties, and easiness of using electric 2W between genders only.

Similar to what Figure 44 had shown before, it was found that female drivers are also more concerned about safety and security while using electric 2W. As currently there is not many electric 2W that could be used to transport passengers, this might not be because of female drivers are more concerned on sexual harassment risk, rather it might be because of the tendencies from women to perceive risks higher than men as found in ITDP's survey towards cyclists in 2021.

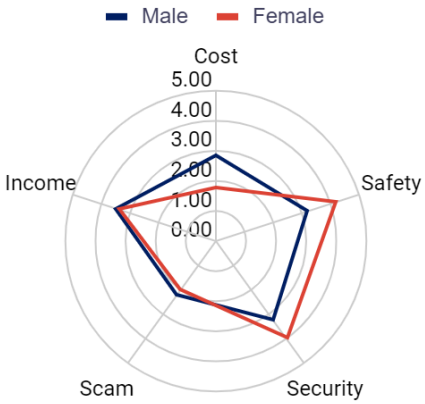

Figure 52 Level of Concerns on Using Electric 2W Based on Gender

However, consistent with the previous Figure 44, female drivers are also concerned less regarding money related risks, as have been mentioned earlier as well.

It was found that female drivers perceive maintaining electric 2W to be more challenging than how it is perceived by male drivers. However, it was also found that female drivers feel that current electric 2W being used is comparable with conventional 2W in terms of driving range and speed, more comparable than what male drivers are perceiving.

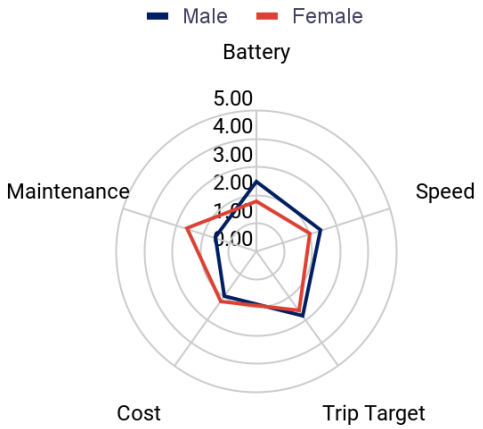

Figure 53 Level of Difficulties on Using Electric 2W Based on Gender

Based on Figure 54 below, it was found that women tend to feel greater about electric 2W compared to men, except for its speed. All-in-all, these 3 findings further proved that women are more willing to make changes to the status quo, as suggested in a study by EUEI PDF (2013). This in turn, would make female drivers the suitable market for electric 2W.

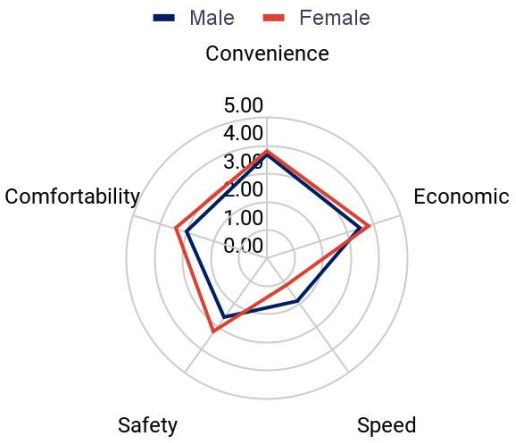

Figure 54 Level of Advantages of Using Electric 2W Based on Gender

Financial Capabilities

As revenue has been analysed separately in previous sections as shown by Table 10 and Table 12, this part of the report will focus more on the expenditure comparison between different types of gender and disability status. Similar to the section 2.2.5.2 above, analysis will be made separately between capital and operational expenses.

Although by not much, a higher percentage of female drivers and drivers with disabilities buy their vehicle in cash, compared to male drivers and non-disabled drivers. More than 40% of them buy their vehicle in cash as Figure 55 suggests, while the majority of them still need to use credit schemes.

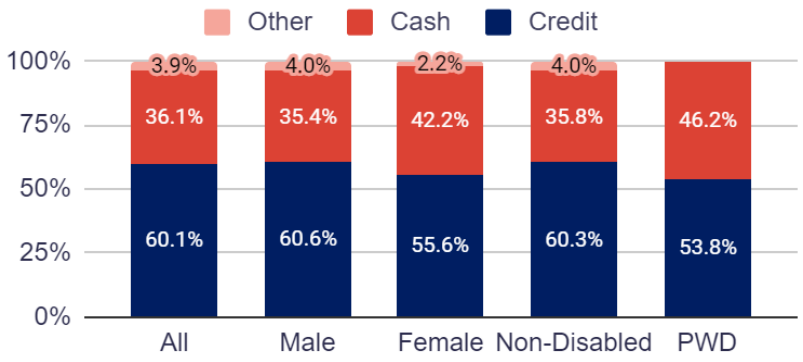

Figure 55 Means of Acquiring Conventional 2W Based on Gender and Disability Status

There are also some differences on the amount they spend to buy the vehicle in cash. Female drivers tend to spend more than their male counterparts by 42.02%, while drivers with disabilities tend to spend 8.07% less than non-disabled drivers as shown by Table 14 below. Knowing the difference between these groups of people, it might be useful to take the minimum amount of money as the benchmark for estimating drivers' capabilities to buy electric 2W in the future.

Table 14 Drivers' Financial Capabilities for Purchasing Conventional 2W in Cash Based on Gender and Disability Status

	Male	Female	Non-Disabled	PWD
Vehicle Price (IDR)	**13,358,310**	**18,971,053**	**14,050,032**	**12,916,667**
Differences (IDR)	-	5,612,742	-	-1,133,365
Differences (%)	-	42.02%	-	-8.07%

Further look into drivers that utilize credit schemes to acquire their vehicle, it was found that female drivers are paying less on both monthly instalments (-10.55%) and down payment (-42.99%) compared to male drivers. Meanwhile, drivers with disabilities are able to pay more on monthly instalments compared to non-disabled drivers (+32.83%) as shown by Table 15 below. However, no available data was available regarding down payment for drivers with disabilities. As mentioned in the previous section as well, this project would consider using the minimum amount of down payment and monthly instalments between each group presented in this report when determining drivers' financial capabilities on purchasing electric 2W so that everyone could shift into electric 2W in the future.

Table 15 Drivers' Financial Capabilities for Purchasing Conventional 2W Using Credit Scheme Based on Gender and Disability Status

	Male	Female	Non-Disabled	PWD
Down Payment (IDR)	**2,292,857**	**1,307,143**	**2,046,429**	**N/A**

	Male	Female	Non-Disabled	PWD
Differences (IDR)	-	-985,714	-	N/A
Differences (%)	-	-42.99%	-	N/A
Monthly Instalment (IDR)	**834,583**	**746,522**	**817,386**	**1,085,714**
Differences (IDR)	-	-88,062	-	268,328
Differences (%)	-	-10.55%	-	32.83%

Regarding operational cost, it was found that female drivers and drivers with disabilities spend less compared to male drivers and non-disabled drivers. One reason for this might be because they currently avoid passenger transport orders, which costs quite a lot based on Table 9, in particular on their maintenance costs. The lowest amount from all of these groups would also be the benchmark figure to be used when assessing drivers' financial capabilities on operational cost and composing recommendations for electric 2W usage scheme so that future ride hailing services using electric 2W would not cost more than current condition.

Table 16 Average Daily Operational Expenses Based on Gender and Disability Status

	Male	Female	Non-Disabled	PWD
Average Daily Fuel Cost (IDR)	25,900.24	23,344.44	25,683.22	24,615.38
Average Daily Maintenance Cost (%)	6,591.51	5,933.61	6,503.22	7,110.33
Total Daily Operational Expenses (IDR)	**32,491.75**	**29,278.06**	**32,186.44**	**31,725.72**
Differences (IDR)	-	-3,213.69	-	-460.72
Differences (%)	-	-9.89%	-	-1.43%

3. Market Analysis

After knowing the operational pattern and financial capabilities of ride hailing drivers, this section will look into available electric 2W models in Indonesia and their specifications. A brief analysis would be done to assess which electric 2W model is suitable to be used as ride hailing vehicles.

Benchmarking analysis will also be done from other countries that have found success in promoting electric 2W usage for the general public or as ride hailing services. Comparison would also be made between conventional and electric 2W's prices and performances, and consumers' financial capabilities, where applicable, in those countries.

3.1. Local Market Analysis

Indonesia is a huge motorcycle country. A report by BPS-Statistics Indonesia (2019) stated that motorcycles are the most common type of vehicle that has been used for urban mobility. With a population of over 112 million, it constitutes 84.4% of all motorized vehicles in Indonesia (BPS-Statistics Indonesia, 2019). As the survey result suggests (Figure 14), currently Honda dominates the market in Indonesia. Based on the Association of Indonesian Motorcycle Industry's (AISI) sales data (2021), over 70% of all motorcycles' sales in 2019 was Honda. Following them was Yamaha with a little over 20%, and other remaining brands such as Suzuki, Kawasaki, etc.

As briefly mentioned above, currently Honda Beat (max speed: 94 km/h, range: 254 km) is the entry point model for Honda which has the lowest price and specification amongst other models (Tyas, 2020). This specification, combined with their low price which starts from IDR 16.6 million or USD 1,100 (Honda, 2021a), makes them the most used 2W models by ride hailing drivers currently. Another low-entry scooter from Yamaha, called Mio Z (max speed: 88 km/h, range: 200 km), is actually cheaper with only IDR 15.8 million or USD 1,050 (Oto, 2021a; Rahadiansyah, 2016). One of the most expensive conventional 2W models that are being used by ride hailing drivers currently is Honda PCX (max speed: 119 km/h, range: 364 km) which starts from IDR 30.8 million or USD 2,050 (Honda, 2021b; Pradopo, 2021; Priyantoro and Ferdian, 2021).

On the other hand, electric 2W has not been adopted in Indonesia as much as its gasoline counterpart. A report in late 2020 suggested that the number of electric 2W registered in Indonesia was still below 2,000 (Sugiharto, 2020). However, the government has already put their eyes on electric vehicles development, and has set an ambitious target of 2.1 million electric 2W usage by 2025 through the implementation of Presidential Regulation No. 22 of 2017 on National Energy Plan (RUEN).

Currently, those big motorcycle brands in Indonesia, such as Honda, Yamaha, and Suzuki, have not launched any of their electric 2W to the market. Therefore, the market is currently filled with some smaller manufacturers, such as Viar, Gesits, and Kymco. One of the most used electric 2W models is Viar Q1 (max speed: 60 km/h, range: 70 km) (Oto, 2021b). Their price currently starts

from IDR 16.2 million or USD 1,080. Another electric 2W model with higher specification is Gesits (max speed: 70 km/h, range: 50 km) which are sold starting from IDR 28.7 million or USD 1,910 (Gesits, 2021; Oto, 2021c). As it can be seen, their range currently could not compete with conventional 2W. However, they could be equipped with an additional battery which costs around IDR 7.5 million (USD 500) that should double their range.

3.2. Benchmarking from Other Countries

One of the countries with high 2W usage is Vietnam. In Vietnam, there are an estimated 45 million gasoline-powered two-wheelers, which is roughly one for every two households in the country. In 2019, there were 3.4 million new motorcycles purchased, and though overall sales declined slightly in 2020, estimates suggest continued market growth. Honda holds an estimated 76 percent of the market share. Other popular brands include Piaggio Vietnam, Vietnam Suzuki Corporation, SYM Vietnam, and Yamaha Motor Vietnam (Nguyen, 2019).

With a range of model options, prices for conventional motorcycles in Vietnam vary. Honda's Wave Alpha 110 (max speed: 69 km/h, range: 209 km) is the company's lowest-priced offering at approximately USD 790, while the midsized Blade 110 (max speed: 110 km/h, range: 222 km) starts at USD 920. The top-of-the-line Future 125 (max speed: 127 km/h, range: 230 km) costs USD 1,350 (Honda, 2019). On the used market, conventional motorcycles can be purchased for around USD 200-400.

Electric motorcycles are steadily gaining popularity in Vietnam. There were approximately 1.35 million registered electric 2-wheelers as of June 2020 (UNEP, 2020b), and the National Traffic Safety Committee estimates the total number of electric two-wheelers on the road to be approximately 5 million vehicles, including both e-bikes and electric motorcycles (UNEP, 2020a). Sales are expected to reach 500 thousand units per year in the coming years, accounting for 20 percent of conventional sales (UNEP, 2020a).

Local manufacturing of electric motorcycles is also growing, led by Vietnamese-founded VinFast, a subsidiary of VinGroup. The company invested USD 3.5 billion in a factory to produce e-motorcycles, e-scooters, e-buses, and e-vehicles. VinFast offers six e-motorcycle models and sold 50,000 units in 2019, and more than 120,000 in 2020. Its Feliz model (2,250W, max speed: 60 km/h, range: 90 km) sells for around USD 1,100, and the top-of-the-line Theon model (7,000W, max speed: 90 km/h, range: 100 km) sells for USD 2,700 (Viet Nam News, 2021).

International players have begun to invest in electric vehicle assembly and manufacturing in Vietnam, with Chinese-based Yadea currently second in sales to VinFast. In 2020, German company Bosch announced a partnership with Son-Ha group to manufacture electric motorcycles priced at around USD 870-1,700 in Vietnam (Phuong, 2020). Finally, Korea-based MBI offers three electric motorcycle models in the country, ranging in price from USD 1,750 to 2,500.

Smaller entrepreneurs are also entering the E2W space in Vietnam. Hanoi-based DatBike raised USD 2.6 million in April 2021 to expand the manufacturing of electric motorcycles across Vietnam, using mostly domestic parts. The company's Weaver model (5,000W, max speed: 50 km/h, range: 100 km) can seat two people and costs USD 1,700 (Shu, 2021). DatBike believes it can bring prices down even further through investing and scaling local manufacturing capabilities.

In total, the estimated capacity of E2W manufacturers and assemblers in Vietnam is around 386 thousand units per year (UNEP, 2020a). While local manufacturing of parts grows and matures, companies are likely to continue to import electric motors, controllers, batteries, and accumulators from foreign manufacturers in Japan, Germany, China, and Taiwan and assemble in Vietnam. Import taxes for parts range from 15-30 percent, creating an incentive for local manufacturers (Shu, 2021).

If projections hold, the UNEP projects that the annual transition rate from conventional to electric vehicles will reach 4 percent by 2024. Bloomberg NEF estimates that 80% of two-wheeler sales in Vietnam will be electric by 2040 (Boudreau and Giang, 2020).

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