RETHINKING URBAN MOBILITY IN INDONESIA:

The role of shared mobility services

MAY 2017

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Shared mobility benefits

If all personal travel shifted to shared modes, including public transport and ridesharing, in Indonesia in 2020:

ECONOMIC EFFICIENCY

Shared mobility could lower time-related commuting costs in Indonesia by

IDR 138 trillion

(US$10 billion) in 2020

Shared mobility could save more than

71 million

car trips from Indonesian roads in 2020

Potential to reduce over

46,000

hectares currently devoted to parking in 33 Indonesian cities

INCLUSIVENESS & WELL-BEING

Potential to reduce cost of mobility by up to

65 percent

versus owning a car

Potential to provide economic opportunities for almost

7 million

Indonesians in ridesharing services in 2020

Over

400,000

Indonesians could be brought into the financial system by 2020 through ridesharing driving

HEALTH & THE ENVIRONMENT

CO_2 emissions from vehicles could be reduced by

159,000 Mt

in 2020 from shared mobility, equivalent to saving 415,000 hectares of land from deforestation

Traffic air pollution could be reduced by

8 percent

in cities by 2020

1

EXECUTIVE SUMMARY

Urbanization is rapidly increasing in Indonesia, with over 30 million more people expected to move to cities by 2030. This shift has traditionally been accompanied by economic growth. In fact, no country has ever climbed from low-income to middle-income status without it. The underlying causes of this include the scale benefits to economies from larger cities, as well as the higher wages that people typically receive as they shift from farming to urban manufacturing and services. Urbanization also poses a series of challenges, however: to inclusiveness, the environment, economic efficiency, and health. How Indonesia designs its cities, particularly their transport systems, will have a significant impact on the country as a whole.

This report describes the potential impacts of technology-based shared mobility services on major aspects of urban life in Indonesia. A multipart analysis was conducted using existing research about Indonesian cities to develop a future scenario in which all personal travel has shifted to shared modes, including public transport and ridesharing. The results are analyzed according to benefits yielded in three major areas – economic efficiency; inclusiveness and well-being; and health and the environment. A fact base of available data on existing transportation infrastructure and travel behavior, data from Uber, and a relatively short outlook period (2020) were used to limit the range of possible outcomes while still providing a platform for understanding the potential benefits of these services.

AlphaBeta's analysis shows that the potential benefits in terms of economic efficiency, inclusiveness and well-being, and health and the environment, are substantial. In the 33 major cities in Indonesia that were studied, the 2020 shared mobility scenario reduced time-related commuting costs by IDR 138 trillion (~US$10 billion); provided income-generating opportunities for almost 7 million Indonesians in shared mobility services; and helped reduce CO2 emissions and air pollution from vehicles, resulting in carbon emissions reductions equivalent to saving 415,000 hectares of land from deforestation.

Shared mobility refers to the shared use of a vehicle, bicycle, or other mode of transport, which enables users to gain short-term access to transportation modes on an "as-needed" basis. In terms of revenue, the mobility sector is one of the fastest-growing segments of the shared economy, which includes activities such as accommodation (e.g. Airbnb), services (e.g. Go-Auto, Go-Glam), and even goods delivery (e.g, Tokopedia). The objective of this report is to provide a robust estimate of the current and potential impact of shared mobility solutions, such as Uber, on Indonesian cities.[1]

Why is understanding the impact of shared mobility on cities important? First, given the rapid growth of ridesharing services such as Uber and Go-Jek in Indonesia, government leaders need to properly understand the costs and benefits of these services as they design regulation.

Second, a rigorous fact base is critical for understanding the impact of shared mobility on a whole range of issues. Take congestion for example. Previous research in cities around the world has shown that ridesharing does not add to congestion.[2] Furthermore, research has shown that ridesharing may actually be doing just the opposite.[3] In our shared mobility scenario, widespread adoption of shared mobility modes of transport translated to 71 million fewer vehicle trips on Indonesian roads by 2020, shedding more light on the need for carpooling and multi-modal opportunities to be considered when discussing congestion and sustainable transportation goals.

Third, shared mobility can have impacts beyond just transport. Our research shows that shared mobility can help achieve broader societal goals such as financial inclusion (through digital transactions to drivers and customers), and tackling air pollution (through reducing CO_2 emissions).

It's important then for city leaders to properly understand that shared mobility is not just a transport issue, but a broader city issue. Finally, given the rapid expected growth in urbanization and demand in vehicles from the growth in the Indonesian consuming class, it is important to design efficient transport choices before Indonesian cities are "locked" into a high congestion pathway. The size of Indonesia's consuming class could increase by more than 90 million people by 2030, and expenditure on transport could reach US$30 billion by 2030 (up from US$13 billion in 2011).[4]

This report aims to address these shortcomings in the existing fact base and develop a foundation for understanding the potential impacts of shared mobility in Indonesia. These impacts are examined in three broad areas: economic efficiency; inclusiveness and well-being; and health and the environment (Exhibit 1).

EXHIBIT E1

The potential impact of shared mobility in Indonesia in 2020 was analyzed across three areas

[1] Note: while "shared mobility" includes public transportation options, the narrower definition of "ridesharing" refers to an arrangement in which a passenger travels in a private vehicle driven by its owner, for free or for a fee, especially as arranged by means of a website or app. This report focuses on "shared mobility", but with particular analysis on the role of "ridesharing" within that. The specific assumptions are described in the appendix.

[2] See for example studies in London (London Congestion Trends, Inrix, May 2016) and New York (For-Hire vehicle transportation study, Office of the Mayor, January 2016).

[3] Ziru Li, Yili Hong, and Zhongju Zhang, "Do ride-sharing services affect traffic congestion? An empirical study of Uber entry", Arizona State University working paper, August 30, 2016.

[4] *The archipelago economy: Unleashing Indonesia's potential*, McKinsey Global Institute, September 2012.

The estimates are based on the overall potential impact of shared mobility solutions, however much of the data is drawn from a combination of Uber's existing activities in Indonesia (in Jakarta, Surabaya, Bandung, and Bali) and international case studies to provide rigorous estimates. The appendix describes the methodology employed in this report in further detail.

The potential benefits that shared mobility solutions could provide are diverse. In terms of economic efficiency, the findings from the 2020 shared mobility scenario include reduced time-related commuting costs in Indonesia in 2020 by IDR 138 trillion (~US$10 billion). A survey of Uber drivers shows that shared mobility is an emerging source of economic opportunities for many Indonesians. In the 2020 shared mobility scenario, increased use of ridesharing services translated into flexible earning opportunities for 7 million Indonesians.[5] Furthermore, the benefits to economic inclusiveness could be particularly large as ridesharing services can provide opportunities for Indonesians who may otherwise have few alternatives. For example, roughly half of Uber driver-partners in Indonesia have migrated from another region in Indonesia and about 43% of Uber driver-partners were previously not in the labor force or were unemployed.

There are also significant potential benefits to financial inclusion. In the 2020 shared mobility scenario, the adoption of digital payments (by drivers engaged in ridesharing services) led to over 400,000 Indonesians becoming more "financially included" (in terms of having a bank account). Finally, there is potential for shared mobility solutions to play an important role in reducing CO_2 emissions from vehicles. Analysis of the 2020 shared mobility scenario showed that the widespread adoption of shared mobility yielded 159,000 Mt of CO_2 saved, equivalent to saving 415,000 hectares of land from deforestation, and reduce traffic air pollution by 8% in cities.

Economic efficiency

The total number of daily commuting trips in Indonesian cities could reach 70 million by 2020 (up from 64 million today). Congestion is already close to unbearable in many cities and can cost as much as 5 percent of national GDP (according to the Asian Development Bank) due to lost time, wasted fuel, and increased cost of doing business.[6] Our analysis estimates that the total time-related cost of commuting in Indonesian cities is currently IDR 498 trillion (US$37 billion) per year and could increase by 41% in 2020.

Shared mobility solutions could help reduce time-related commuting costs in several ways:

- **More efficient trips.** Ridesharing can allow Indonesians to reduce their commute times by creating "door-to-door" services (versus sometimes inefficient or missing public transport options) and through using motorbike services to move through traffic faster than normal vehicles. In many Indonesian cities, public transport networks are either not present, inefficient, or have limited operating hours. Even with planned extensions to public transport, there will still be many Indonesians underserved by public transport. For example, even after the construction of the Mass Rapid Transit (MRT) system in Jakarta scheduled for completion in 2019, we estimate that 39% of Greater Jakarta will still not have viable public transport linkages.[7] Ridesharing services such as Uber complement public transport by providing mobility options when there are no public transport alternatives. For example, in Jakarta, Bandung, Surabaya, and Bali, up to 8% of Uber trips are taken between 11pm and 5am — when public transit runs less frequently or is unavailable. In addition, more than 20% of Uber trips taken in Jakarta begin or end in areas underserved by public transport. Based on a survey of more than 900 uberX users (across Jakarta, Bandung, Surabaya, and Bali), we found that each person saved on average 10% of their regular travel time. For uberMOTOR users, the savings were even larger, estimated at 38% of regular travel time.
- **Savings on time from looking for parking**. In Indonesia, AlphaBeta estimates that over 46,000 hectares of prime commercial and residential land are currently set aside for parking. The 6,645 hectares of commercial land (including retail, office, and on-street parking) currently allocated to parking in the 33 Indonesian cities has a potential annual rental value of IDR 95 trillion (US$7.2 billion), which could be released for more productive uses.
- **Reducing congestion.** Access to convenient, reliable, and efficient transportation is a key component of successful congestion management strategies. Ridesharing services can contribute to efforts to reduce congestion by improving the convenience of carpooling and by supporting the use of public transport in multi-modal journeys. In our shared mobility scenario, widespread adoption of shared mobility translated to 71 million fewer vehicle trips on Indonesian roads in 2020 through better access to carpooling and improved connectivity with public transportation.
  - **Encouraging carpooling**. Carpool services can potentially significantly reduce the number of car trips. uberPOOL now accounts for 20% of all Uber's rides in cities where it is available.[8] Whilst uberPOOL is still nascent in Indonesia, the potential is large. In our shared mobility scenario, we assume that Indonesia achieves the global average of 20% of shared mobility car trips being through carpooling, in effect reducing the number of car vehicle trips on Indonesian roads by 14 million in 2020. It is important to note that reducing vehicle volumes is not a singular solution to congestion. An open and constructive dialog between service providers, planners, and policymakers is necessary in order to avoid issues such as so-called "rebound effects", also known as "induced demand", whereby the lower congestion encourages more personal commuting. We describe ways that cities have approached this issue in the section on policy lessons.
  - **Facilitating multi-modal journeys with public transport**. Many ridesharing users are currently using the service for multi-modal commuting. In our survey of Uber users in Jakarta, 20% said they use Uber in this way. By effectively interfacing with public transport options, the results of the 2020 analysis indicate that there could be 8 billion total multi-modal trips over the course of a year (involving ridesharing and public transport options). Further, ridesharing can reduce the time and cost of building public transport infrastructure for the "last mile" of passenger journeys.
  - **Reducing dependency on personal cars**. Having efficient shared mobility options can reduce dependencies of Indonesians on personal cars. While car ownership among Indonesians is still relatively low by international standards, industry reports forecast strong growth underpinned by the rise in the consuming class.[9] Our survey of over 900 Uber users in Indonesia revealed that 6% no longer use their personal cars; and a further 62% of users say they drive their personal cars less.

Shared mobility can also enable more productive use of commuting time. uberX allows passengers to use their commuting time productively by freeing themselves from driving. This can include business calls, checking emails, etc. Our survey of uberX users revealed 18% of commuters who previously drove are now spending their commute working.

[5] This includes driver-partners who engage in ridesharing services on a part-time, flexible basis. Assumes average working hours of 4 hours per driver per day.
[6] *Transport in Asia and the Pacific: 12 Things to Know*, Asian Development Bank, March 2012.
[7] Viable public transport linkage is defined as the area within a 1.5km radius of a rapid transit station.

[8] "Study: Uber, Lyft carpool services could reduce traffic by 75 percent", The Mercury News, January 3 2017 (accessed at: http://www.mercurynews.com/2017/01/03/study-uber-lyft-carpool-services-could-reduce-traffic-by-75-percent/).
[9] For example, the number of passenger vehicles in Indonesia is estimated to growth at CAGR 6.8% to 2020. For further details, see *Opportunities and Challenges in Indonesia's Automotive industry*, Ipsos Consulting, February 2016.

Inclusiveness & well-being

More shared mobility could have a range of benefits to inclusiveness and well-being in Indonesian cities. These include:

- **Reducing the cost of mobility for Indonesians.** Past academic research in the United States has shown that for each dollar spent by consumers on shared mobility services, about $1.60 of consumer surplus is generated.[10] In Indonesia, the savings in mobility costs could be extremely large. Our analysis shows that the annual costs associated with mobility could be anywhere from between 10 to 65% lower by using ridesharing options, versus owning a car. If the value of more productive use of commuting time was included (as users are freeing themselves from having to focus on driving), additional savings of up to IDR 18 million per user per year could be achieved. The savings from ridesharing are confirmed in our survey of Uber users - over 60% of the respondents say they use Uber because it is cheaper.
- **Opening up new economic opportunities.** More than 15% of Uber users say that Uber has enabled them to get to jobs, helping to expand the range of economic opportunities available for Indonesians.
- **Supporting more secure journeys.** Ridesharing can also enhance personal safety by leaving a "digital trail" of all commutes. Almost 20% of Uber users surveyed say that a primary reason for choosing Uber is for personal safety reasons.
- **Creating flexible, income-generating opportunities for Indonesians.** One of the features of ridesharing that driver-partners value highly is the flexibility it offers. In the survey of Uber drivers-partners conducted as part of this study, 46% indicated flexibility in hours as the major reason they drive on the Uber platform. The findings from the shared mobility analysis indicate that there's great potential to expand these opportunities to even more Indonesians. In the 2020 shared mobility scenario, increased use of ridesharing services translated into flexible earning opportunities for 7 million Indonesians. Furthermore, technological advances enable more efficient matching of passengers and drivers which can reduce the amount of "dead time" during which they do not have passengers, raising their productivity and incomes.[11] In the four cities where Uber currently operates in Indonesia (Jakarta, Surabaya, Bandung, and Bali), we see a significant increase in driver productivity, with "idle" time reduced significantly in the space of just 12 months. Ridesharing services also provide a source of income for Indonesians who have a high risk of otherwise being economically excluded. For example, a large share of current Uber driver-partners have previously migrated to the city where they are driving and hence may have limited networks of contacts 43% of Uber driver-partners were previously not part of the labor force or were unemployed.
- **Supporting digital financial inclusion.** Only 8% of Indonesians used a debit card in the last 12 months. Ridesharing services could promote financial inclusion by providing a means for drivers to establish bank accounts and become accustomed to performing transactions online. 39% of the driver-partners who responded to our survey agreed or strongly agreed that they are more financially active since joining Uber. This could have significant income benefits for these Indonesians. International evidence suggests a potential boost to incomes of anywhere from 5% to 30% from increased financial inclusion.[12] The results of the 2020 scenario analysis provide even more support, with over 400,000 Indonesians brought into the financial system through ridesharing services.

[10] Peter Cohen, Robert Hahn, Jonathan Hall, Steven Levitt, and Robert Metcalfe, "Using Big Data to Estimate Consumer Surplus: The Case of Uber", Working Paper, August 30 2016.
[11] Academic research has found that UberX drivers spend a significantly higher fraction of their time, and drive a substantially higher share of miles, with a passenger in their car than do taxi drivers. For further details, see "Disruptive Change in the Taxi Business: The Case of Uber", NBER Working Paper, March 2016.
[12] *Three paths to sustained economic growth in Southeast Asia*, McKinsey Global Institute, November 2014.

Health and the environment

By reducing congestion, shared mobility can help lower Greenhouse gas emissions as well as air pollution in Indonesian cities. The results of the 2020 shared mobility scenario show that the potential is large. CO2 emissions from vehicles were reduced by 159,000 Mt in 2020 under the shared mobility scenario, equivalent to saving 415,000 hectares of land from deforestation (which is more than 5.5 times the landmass of Singapore, or more than 6 times the landmass of DKI Jakarta). In addition, traffic air pollution was reduced by 8 percent in Indonesian cities through carpooling.

EXHIBIT E2

Lessons learnt on how cities can capture the shared mobility prize

1. Reduce barriers to entry to ridesharing
2. Improve the productivity of for-hire drivers, don't penalize ridesharing
3. Ensure certainty and create a strong fact base
4. Rethink parking
5. Support behaviour change
6. Maximize the interaction with public transport
7. Think about shared mobility as a catalyst for city transformation

An analysis of international approaches on ridesharing and transport solutions suggests seven lessons for Indonesian city leaders in trying to capture this prize:

LESSON 1:

Reduce barriers to entry to ridesharing

When cities make it expensive or time-consuming (or both) to begin driving for Uber or other ridesharing services, drivers have less flexibility and uptake is lowered significantly. Whilst there is a clear need for strong regulatory guidelines to ensure consumer safety, our research finds that there is often a false choice between ensuring strong regulatory safeguards and minimizing driver inconvenience. In many cases, the challenge relates to how regulations are enforced. For example, some cities only have limited locations for drivers to go to in order to comply with vehicle testing requirements, which can be both inconvenient and create delays, resulting in higher entry costs for drivers.

LESSON 2:

Improve the productivity of for-hire drivers, don't penalize ridesharing

There is the opportunity to improve the productivity and competitiveness of the taxi industry, but not through raising barriers to entry for ridesharing. For example, the Australian Capital Territory (ACT) government introduced measures to ease the regulatory burden on the taxi industry through cutting license fees, removing uniform requirements, etc. There could also be opportunities to enhance the productivity of the taxi industry through technology. In Malaysia, some taxi drivers now have the option to utilize e-hailing apps in order to be matched with riders, primarily or in addition to accepting street hails.

LESSON 3:

Ensure certainty and create a strong fact base

Political leadership to establish certainty around shared mobility regulation is essential. The Australian Capital Territory (ACT) is a good example of this. The chief minister (the jurisdiction's prime minister or premier) made clear and early statements of support for reform. A strong fact base is also crucial to ensure that regulators have a complete understanding of the benefits and costs of shared mobility. In New South Wales, the government received more than 5,000 submissions from industry and the public before it introduced its reforms. This helped ensure the government had a complete understanding of how different stakeholders could be impacted.

LESSON 4:

Rethink parking

Over 46,000 hectares of commercial and residential land are set aside for parking in Indonesia, and the implied annual rental value of just the commercial land is over IDR 95 trillion (US$7.2 billion). Academic evidence demonstrates there is the potential to reduce parking requirements by 95% through encouraging shared mobility, and rethinking policies related to parking (e.g., minimum parking requirements, price controls on parking, urban planning processes).[13]

LESSON 5:

Support behaviour change

There are a range of measures that could influence consumer behavior and encourage greater adoption of public transit and ridesharing options. The challenge is often how to support consumers to give ridesharing solutions (and public transport options) a try in the first place. For example, dynamic road pricing can incentivize behavior change. To maximize the benefits from congestion pricing, it should remain dynamic throughout the applicable hours to incentivize drivers to travel at different times, and should discount shared mobility transportation.

LESSON 6:

Maximize the interaction with public transport

Public transit is an important tool in combating traffic congestion and alleviating shortages in parking infrastructure. The challenge is that public transport systems, such as Jakarta's Mass Rapid Transit (MRT) can take significant time and investment to build. Furthermore, in some cases, there will not be a strong economic case to justify full connection of neighborhoods with fixed public transport infrastructure links. As such, it is important to think of ridesharing as a complement (and not a substitute) to public transport. For example, Uber is working with transit apps like Moovit and Citymapper to allow riders to incorporate multiple modes of transportation, including public transit, into their commutes.[14] [15]

LESSON 7:

Think about shared mobility as a catalyst for city transformation

Once shared mobility systems are established, there are a range of additional benefits that a city can potentially leverage. This can include redesigning traffic systems, launching driverless vehicles, transforming logistics systems, and other innovations. Not only will this stimulate productivity and growth, it could have broader benefits.

[13] *Shared Mobility: Innovation for Liveable Cities*, International Transport Forum, May 2016.
[14] https://techcrunch.com/2016/05/03/moovit-transit-app-integrates-with-uber/
[15] https://medium.com/uber-developers/uber-public-transit-by-citymapper-7ed84ad5a2b9#.cjqssel7d

2

ECONOMIC EFFICIENCY

HELPING TACKLE CONGESTION AND SUPPORTING GROWTH

Economic efficiency benefits of shared mobility

Current and potential impacts (in 2020) of shared mobility in Indonesia:

Shared mobility could lower time-related commuting costs in Indonesia by

IDR 138 trillion

(US$10 billion) in 2020

Currently, each shared mobility user saves on average

10-38%

of the time they previously required in transit

Shared mobility could save more than

71 million

car trips from Indonesian roads by 2020

Potential to reduce over

46,000

of hectares currently devoted to parking in 33 Indonesian cities

Ride sharing could support more than

8 billion

public transport trips through multi-modal transport options in 2020

More than

20 percent

of Uber trips taken in Jakarta begin or end in underserved areas for public transport

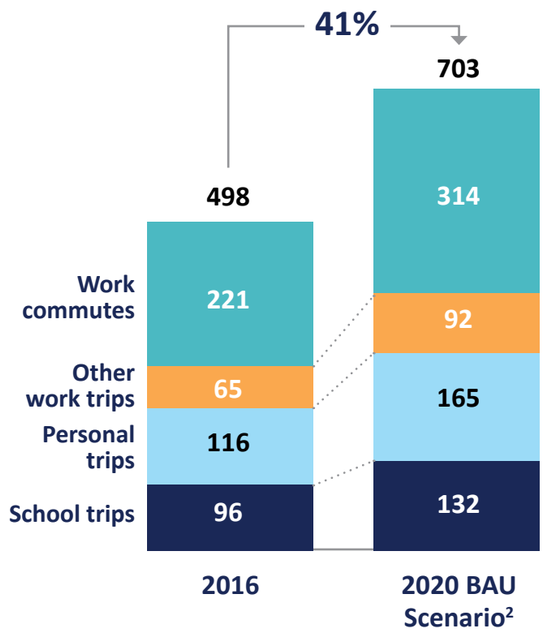
Time-related commuting benefits of shared mobility

According to AlphaBeta's analysis, the total number of daily commuting trips could reach 70 million by 2020 (up from 64 million today). Congestion is already close to unbearable in many cities and can cost as much as 5% of national GDP (according to the Asian Development Bank), by measures such as lost time, wasted fuel, and increased cost of doing business.[16] Our analysis estimates that the total time-related cost of commuting in Indonesian cities is currently IDR 498 trillion (US$37 billion) per year and could increase by 41% by 2020 (Exhibit 1).

EXHIBIT 1

The total time-related cost of commuting in Indonesian cities is currently IDR 498 trillion (US$37 billion) per year and could increase by 41% in 2020

IDR trillions[1]



- Time-related commuting costs are based on average trip times (drawing on digital maps data simulated for thousands of trips for each mode of transport by city) and average wages
- Forecasts to 2020 based on trip estimates (linked to population growth) growth in wage levels by city, and changes in commuting time (linked to correlation between journey times and population)

[1] Analysis covers 33 cities in Indonesia, representing over 20% of Indonesia's current population and 39% of current GDP.
[2] This is the 'business-as-usual' (BAU) scenario which is based on growth in trips based on population growth (and demographic usage patterns) by city; as well as changes in wages and commuting time.
Source: Commuter Surveys; AlphaBeta Sub-National Database

[16] *Transport in Asia and the Pacific: 12 Things to Know*, Asian Development Bank, March 2012.

The benefits of shared mobility were estimated based on how the type of trip could potentially vary with shared mobility (e.g. substituting personal car journeys for shared mobility options). These estimates were based on academic literature17 and relevant benchmarks from more mature Uber markets. Specifically, the 2020 "shared mobility" scenario involves the following assumptions:

- All personal car and motorcycle trips become shared mobility trips.
- The penetration of carpooling is 20% of all shared mobility trips done by car (i.e. 20% of the combined total of shared mobility car and carpooling trips). This is based on the current penetration in Singapore, which is an example of a more mature shared mobility landscape.
- Users could substitute towards slower forms of transport (e.g. we assume personal motorcycle users could substitute towards shared mobility car trips).[18]
- Multi-modal trips are defined as a journey which involves multiple modes of transport, of which one is a public transit option.

These assumptions, combined with data obtained from the Uber user surveys, allow us to construct a breakdown of the modes of transportation in 2020. Note – taxis are included as part of shared mobility options for this analysis. The overall breakdown for Indonesia is presented below in Exhibit 2. Note that each of the 33 Indonesian studies vary significantly in terms of their modal share, reflecting factors such as differences in car ownership and prevalence of public transport options. Further details on the approach can be found in Box 1 ("Calculating time saved from shared mobility") and the appendix.

EXHIBIT 2

Mode of transport breakdown: Indonesia average

Mode of transportation		Business-As-Usual (BAU) Scenario (% of trips in 2020)	Shared mobility Scenario (% of trips in 2020)
Personal mobility	Personal motorcycle	47%	0%
	Personal car	5%	0%
Shared mobility	Public transport	27%	22%
	Multi-modal[1]	21%	32%
	Shared mobility car[2]	1%[3]	2%
	Shared mobility motorcycle	0%	43%
	Carpool	0%	1%

[1] Refers to trips that combine any mode of transport with public transport.
[2] Includes taxis.
[3] Based on registered taxis. Assumed that taxis account for the same share of total trips in each city as they for Jakarta (where data is available). Estimates exclude other shared mobility vehicles.
Note: Percentages may not sum to 100% due to rounding.

[17] Shared mobility: Innovation for liveable cities, International Transport Forum (ITF), 2016. See link: http://www.itf-oecd.org/sites/default/files/docs/shared-mobility-liveable-cities.pdf
[18] For example, a car trip could be more comfortable than a motorcycle trip.

BOX 1

Calculating time saved from shared mobility

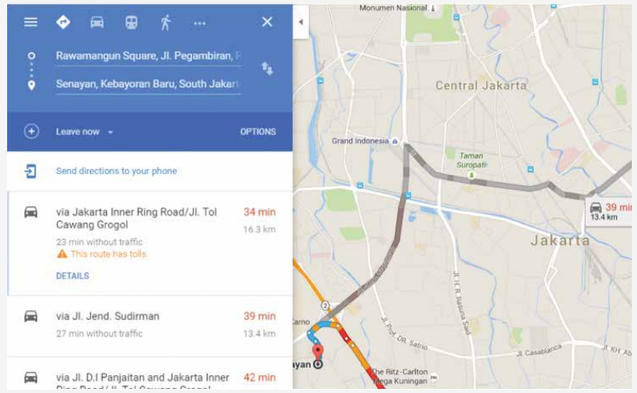
To calculate the time savings from shared mobility, the first step was to estimate the number of trips taken in each Indonesian city, broken down by type (e.g. commuting, personal, etc). This was based on commuter surveys conducted in key cities (e.g. Jakarta and Surabaya), which were then extrapolated to other cities based on the age profile of the local population (which is a key driver of different trip types). Commuter surveys were also used to understand the means of transportation (e.g. car, motorcycle, bus, etc), which were extrapolated to other cities based on data of ownership rates of cars and motorbikes. The average time required for these trips was then simulated for thousands of trips in each city (for cars versus public transport) using an AlphaBeta algorithm which pinpoints key destinations in a city representative of different trip types. For example, for commuting trips, a series of potential trips were identified based on key residential and commercial areas in each city. For personal trips, key points such as markets and shopping centers were used. This was then translated into a monetary figure based on local wage rates.

Time-related commuting costs in each city were calculated using three steps

STEP 1: Identify common trip routes within a city

- Common trip routes were identified within a city based on commuter surveys, which break down trips by type (eg. commuting, personal, etc).
- Key landmarks were then identified in each city to be representative of each trip type (eg. residential to commercial areas; residential areas to shopping centres, etc).

STEP 2: Measure average commute times



- An AlphaBeta web crawler was used with Google Maps to generate thousands of unique trips based on common trip routes within a city
- The average commuting time was assessed based on different times of the day (eg. peak hour and off-peak) and for different transport types (eg. public transport versus car)

STEP 3: Calculate the cost

- The "opportunity cost" of this travel was calculated by multiplying the time requirements for travel by local wage rates

*Source: Openstreetmap; Google Maps; AlphaBeta analysis

These costs were extrapolated to 2020 based on estimated growth in trips (based on population growth), changes in local wages, and changes in commuting time (based on analysis of how commuting time changes with city size).

The benefits of shared mobility were then estimated based on estimating how the type of trip could potentially vary with shared mobility (e.g. substituting personal car journeys for shared mobility options) based on the academic literature[19] and relevant benchmarks from more mature Uber markets. Specifically, the 2020 "shared mobility" scenario considers a full replacement of personal car and motorbike journeys by ridesharing and public transportation options. The savings were then estimated separately for each type of congestion savings noted in the text. The specific methodology and data sources are described in further detail in the appendix.

[19] Shared mobility: Innovation for liveable cities, International Transport Forum (ITF), 2016. See link: http://www.itf-oecd.org/sites/default/files/docs/shared-mobility-liveable-cities.pdf

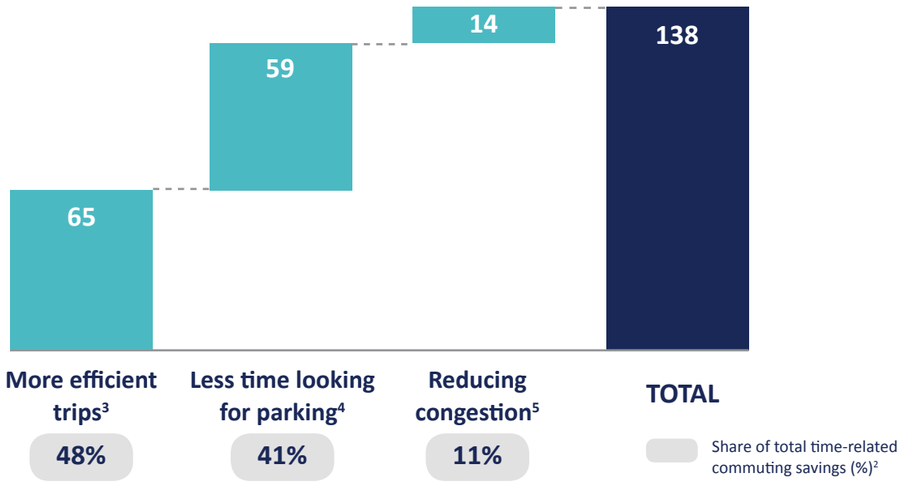
Shared mobility solutions could help reduce time-related costs of commuting in several ways. The findings from the shared mobility scenario demonstrate that time-related commuting costs could be reduced by up to IDR 138 trillion (US$10 billion) in Indonesia in 2020 (Exhibit 3). This is based on a forward-looking speculative exercise that aims to describe the impacts on Indonesian cities if all personal car and motorcycle trips become ridesharing and public transportation trips by 2020.[20] It is worth noting that it is possible that shared mobility could generate "new" trips, which could be driven by a range of factors from the lower cost of transportation in a shared mobility scenario to a reduction in congestion resulting in faster travel times for private commuting. This effect, referred to as "induced demand", could have implications for time saved, as well as the number of cars on the road. Given the uncertainty of these impacts, we have not modelled them in this study, but doing so could change some of the impacts explored below. In Chapter 5, we explore some of the policy levers available to tackle these induced demand effects, including dynamic road pricing.

EXHIBIT 3

Shared mobility services could reduce time-related commuting costs in Indonesia by up to IDR 138 trillion (US$10 billion) in 2020

Reduction in time-related commuting costs supported by shared mobility in Indonesia

IDR trillions[1]



[1] Rounded to nearest IDR trillion.
[2] May not sum to 100% due to rounding.
[3] Based on comparison of shared mobility journeys versus the previous commuting option (drawing on surveys of Uber users).
[4] Reflects the savings from users not having to park their private vehicles. Applied only to work commute and business-related trips.
[5] Reflects sime saved due to the reduction in car trips due to increased carpooling and increased multi-modal trips with public transport.
Source: Data in exhibit is estimated by AlphaBeta useing a range of original and third party sources.

[20] The analysis also contains some additional assumptions related to multi-modal trips and car-pooling, which are described in detail in the Appendix.

The congestion savings include:

- **More efficient trips.** Ridesharing could allow Indonesians to reduce their commute times by creating "door to door" services (versus sometimes inefficient or missing public transport options) and through using motorcycle services to move through traffic faster than normal vehicles. In many Indonesian cities, the public transport networks are either not present, inefficient, or have limited time availability. Even with the planned extensions to public transport, there will still be a large share of communities that are underserved by public transport. For example, even after the construction of the Mass Rapid Transit (MRT) system in Jakarta in 2019, we estimate that 33% of Jakarta (and 39% of Greater Jakarta) will still not have viable public transport linkages.

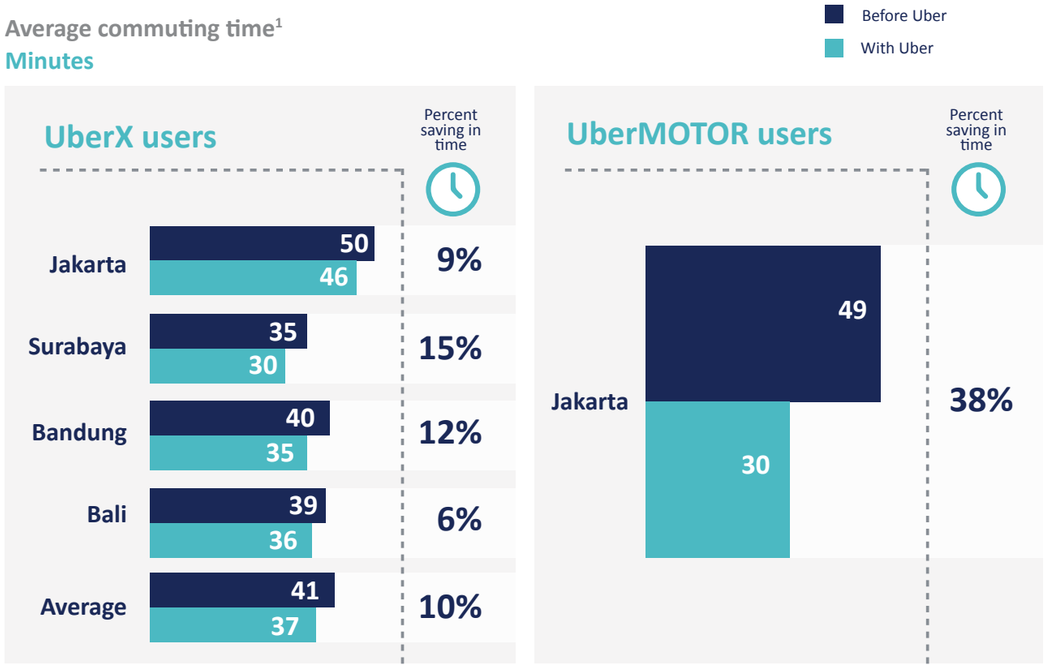
Ridesharing services such as Uber complement public transport through providing mobility options when there are no public transport alternatives. For example, in Jakarta, Bandung, Surabaya, and Bali, up to 8% of Uber trips take place between 11pm and 5am — when public transit runs less frequently or is unavailable. In addition, more than 20% of Uber trips taken in Jakarta begin or end in underserved areas for public transport.[21] Based on a survey of uberX users (across Jakarta, Bandung, Surabaya, and Bali)[22], we found that each person saved on average 10% of their average journey time, or a total of 200 million hours per year in 2020. For uberMOTOR users, the savings were even larger, with a 38% potential saving in commuting time (Exhibit 4).

EXHIBIT 4

Ridesharing users can now significantly reduce their travel time through more efficient routes

Average commuting time[1]

Minutes



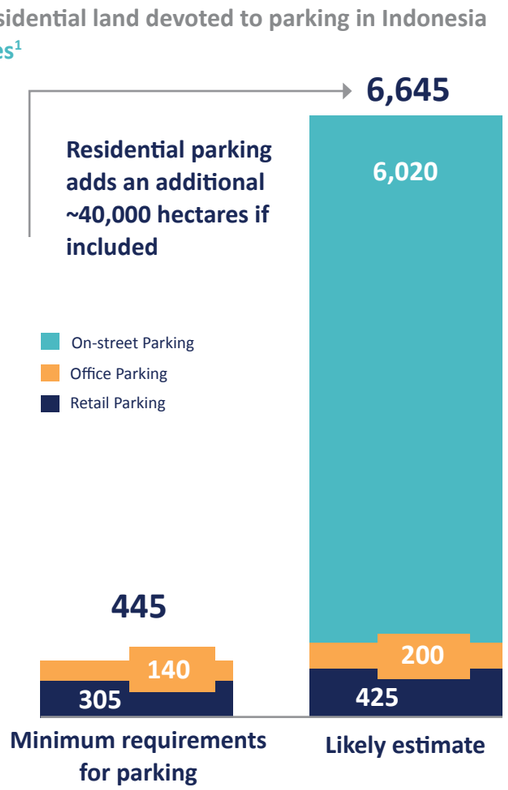
[1] Based on survey of 971 uberX and uberMOTOR users.
Source: Survey of Uber users; AlphaBeta analysis.

[21] Based on Uber internal data.
[22] The survey covered 971 uberX and uberMOTOR users.

- **Savings on time from looking for parking (and land productivity).** In the United States, the average car spends 0.8% of its total time looking for parking (96% of the time it is parked; 2.6% driving; and 0.5% spent in congestion).[23] A survey of Uber users who previously drove revealed that they formerly would spend on average 10 minutes per journey looking for parking.[24] Shared mobility services can avoid the necessity of finding parking, which not only can save up to 2 billion hours of travel time by 2020, but also release significant amounts of land that are currently taken up by parking. Researchers recently determined that 14% of all land in Los Angeles County is taken up by parking. Even in Copenhagen, one of the world's most bike-friendly cities, there are three parking spaces for every car.[25] In Indonesia, AlphaBeta estimates that over 46,000 hectares of space is currently used for parking privately owned vehicles – accounting for 5% of land in Indonesian cities (Exhibit 5).[26] 6,645 hectares of this land is prime commercial land, with an implied annual rental value of over IDR 95 trillion (US$7.2 billion), which could be captured if land was released for more productive uses (Exhibit 6).

EXHIBIT 5

Over 46,000 hectares of space in Indonesia is used for parking privately owned vehicles – accounting for 5% of land in Indonesian cities



- Low-end estimate based on minimum legal parking requirements for office and retail
- "Likely estimate" based on total vehicle trips, parking patterns, and estimates of actual parking space in sample of retail and office complexes
- If include land set aside for residential parking (eg; personal garages) then adds 40,000 additional hectares
- Represents around 5% of land in Indonesian cities

[1] Analysis covers 33 cities in Indonesia, representing over 20% of Indonesia's current population and 39% of current GDP. Hectares are rounded to the nearest 5 hectares.
Source: Pedomanparkir (1998); Colliers International Reports (Q3 2016 Jakarta;, H1 2016 Surabaya); AlphaBeta Analysis

[23] *Resource Revolution: How to Capture the Biggest Business Opportunity in a Century,* Stefan Heck and Matt Rogers, 2014.
[24] Based on a survey of roughly 1,000 Uber users across Jakarta, Bandung, Bali and Surabaya.
[25] https://medium.com/uber-under-the-hood/the-hidden-pitfalls-of-parking-a0c483c9c679#.hmobtuvf5
[26] See the appendix for further details on the methodology.

EXHIBIT 6

The annual implied cost of non-residential land set aside for parking is over IDR 95 trillion (US$7.2 billion)

Rank	City	Land used for parking (hectares)	Average "lost" rental value (IDR Billions)
1	DKI Jakarta	2,175	56,661
2	Surabaya	700	13,328
3	Bandung	265	3,416
4	Medan	280	3,081
5	Semarang	230	2,344
6	Tangerang	250	2,210
7	Batam	180	1,741
8	Palembang	180	1,473
9	Bekasi	300	1,340
10	Makassar	95	1,206
11	Pekanbaru	125	1,005
12	South Tangerang	165	871
13	Depok	240	804
14	Malang	125	737
15	Balikpapan	60	670
16	Cilegon	45	670
17	Denpasar	160	536

Rank	City	Land used for parking (hectares)	Average "lost" rental value (IDR Billions)
18	Surakarta	65	469
19	Bogor	105	402
20	Bandar Lampung	110	402
21	Padang	55	402
22	Yogyakarta	45	335
23	Pontianak	55	268
24	Banjarmasin	35	201
25	Serang	70	201
26	Jambi	55	201
27	Manado	20	201
28	Cirebon	30	201
29	Mataram	30	134
30	Palu	30	134
31	Banda Aceh	20	134
32	Sukabumi	30	67
33	Kendari	10	67

In total, implied annual cost of lost rental value of land tied up in parking is IDR 95.98 trillion (US$7.2 billion)

[1] Analysis covers 33 cities in Indonesia, representing over 20% of Indonesia's current population and 39% of current GDP. Based on estimates of land dedicated to parking in each city, multiplied by annual rental values for land in each city. Hectares are rounded to the nearest 5 hectares.
Source: Pedomanparkir (1998); Colliers International Reports (Q3 2016 Jakarta;, H1 2016 Surabaya); AlphaBeta Analysis

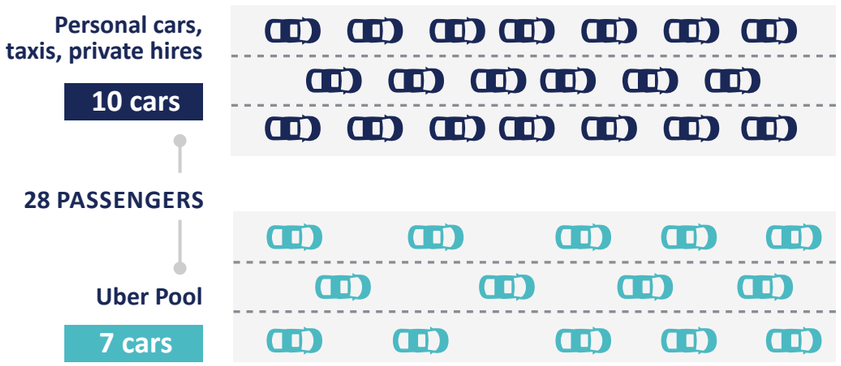
- **Reducing congestion.** Ridesharing can reduce congestion by encouraging carpooling and increasing the use of public transport as part of multi-modal journeys. In a model city (which simulates the daily mobility patterns of Lisbon, Portugal), academics at the International Transport Forum found that a shared mobility scenario could require a car fleet only around 3% of the current fleet size.[27] In our shared mobility scenario, widespread adoption of ridesharing services translated to 71 million fewer vehicle trips on Indonesian roads by 2020. It should be noted however that to avoid induced demand (e.g., lower congestion encourages more commuting by personal car), it is crucial to ensure there are supporting policy levers that creates disincentives for personal car commuting.[28]

Specific opportunities in Indonesia include:

- **Encouraging carpooling.** Carpool services can potentially significantly reduce the number of car trips. For example, in the first seven months of 2016, it is estimated that if riders had traveled separately instead of choosing uberPOOL, it would have generated an additional 312 million miles driven, which is the equivalent of 6 million gallons of gas, and 55,000 metric tons of CO2.[29] uberPOOL now accounts for 20% of all Uber's rides in cities where it is available.[30] Whilst the uberPOOL service is still nascent in Indonesia, the potential is large. In our shared mobility scenario, if Indonesia could achieve the global average of 20% of shared mobility car trips being through carpooling, this could potentially reduce the number of car vehicle trips on Indonesian roads by 14 million in 2020 (Exhibit 7).

EXHIBIT 7

Carpooling services such as uberPOOL could potentially reduce the number of car vehicle trips on Indonesian roads by 14 million in 2020



If carpool services could represent 20% of total shared mobility car trips (similar to current rate in Singapore) by 2020 in Indonesia, this could remove **14 million car vehicle trips** from Indonesian roads

Source: AlphaBeta analysis

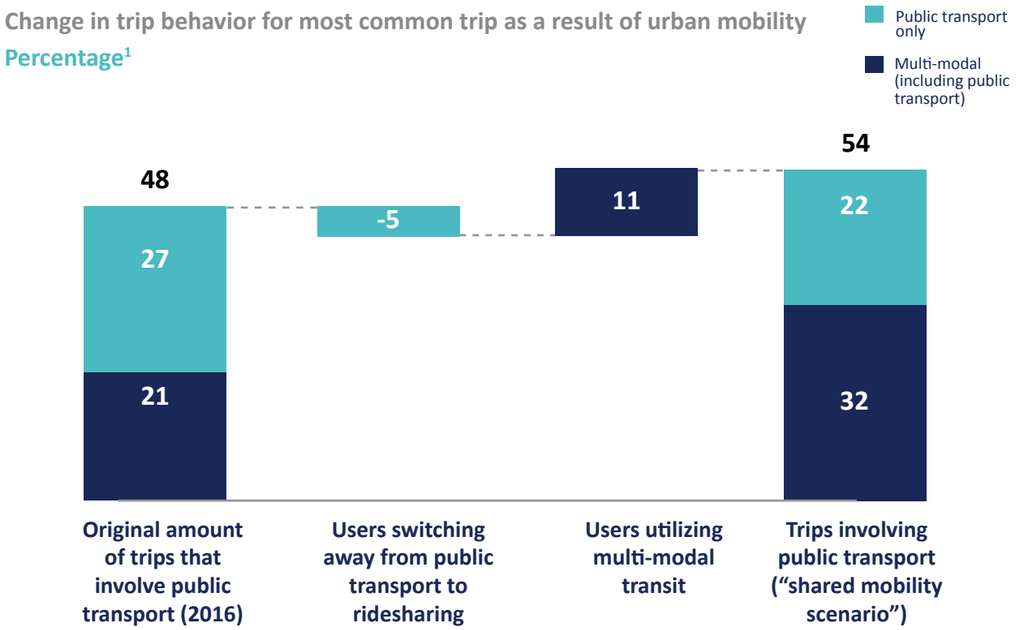
[27] *Shared Mobility: Innovation for Liveable Cities,* International Transport Forum, May 2016.
[28] Potential policy levers are described in Chapter 5 of this report.
[29] "Study: Uber, Lyft carpool services could reduce traffic by 75 percent", The Mercury News, January 3 2017 (accessed at: http://www.mercurynews.com/2017/01/03/study-uber-lyft-carpool-services-could-reduce-traffic-by-75-percent/).
[30] "Study: Uber, Lyft carpool services could reduce traffic by 75 percent", The Mercury News, January 3 2017 (accessed at: http://www.mercurynews.com/2017/01/03/study-uber-lyft-carpool-services-could-reduce-traffic-by-75-percent/).

- **Facilitating multi-modal journeys with public transport.** Many ridesharing users are using the service to do multi-modal commuting. For example, in Jakarta and Bandung, we find that 4% and 15% of Uber trips respectively start or end within 200 meters of a major public transport hub. In our survey of Uber users in Jakarta, 20% said they now use Uber as part of a multi-modal commuting strategy (whereas previously they were using a single mode of transport). By 2020, the total number of multi-modal trips (involving ridesharing and public transport) could reach 8 billion. Furthermore, by effectively interfacing with public transport options, ridesharing can reduce the time and cost of building public transport infrastructure for the "last mile" of passenger journeys.

It should be noted however that ridesharing services could result in some users migrating from public transport. Whilst this may shorten their commute times (as described earlier), it may lead to increased cars on the road. Based on the survey of Uber users we find that roughly 5% of commuters may switch their most common trip from public transport to ridesharing. However, this is more than offset by the increase in commuters now using public transport as part of a multi-modal transport strategy (Exhibit 8). In addition, it should be noted that this question only focuses on the most common trip of commuters, rather than all usage. Past research has found that overall public transport usage has increased significantly with ridesharing.[31]

EXHIBIT 8

Public transport usage does not appear to be adversely impacted by ridesharing services



[1] Percentage is calculated through Uber survey results applied to the "Business-as-Usual" and "Shared Mobility" scenario modal shares.
Source: Uber ride survey; AlphaBeta Analysis

[31] *Shared mobility and the transformation of public transit,* American Public Transport Association (APTA), March 2016.

- **Reducing dependency on personal cars.** While car ownership among Indonesians is still relatively low by international standards, industry reports forecast strong growth underpinned by the rise in the consuming class.[32] Having efficient shared mobility options can reduce dependencies of Indonesians on personal cars. A survey of Uber users in Indonesia[33] revealed that 6% no longer use their personal cars; and a further 62% of users say they drive their personal cars less (Exhibit 9).

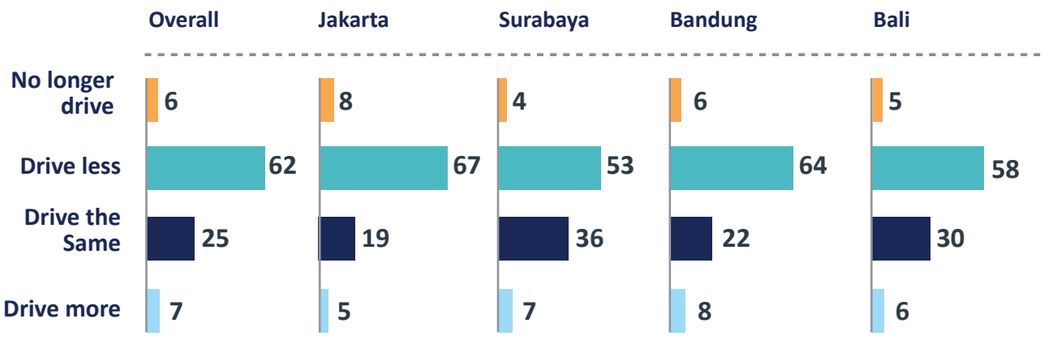
Shared mobility can also enable more productive use of commuting time. uberX allows passengers to use their commuting time productively by freeing themselves from driving. This can include business calls, checking emails, etc. Our survey of uberX users revealed 18% of commuters who previously drove themselves to work are now spending their commute time working (Exhibit 10).[34]

EXHIBIT 9

Since using Uber, over 60 percent of users say they drive less; 6 percent say they no longer drive

If you own a car, how has your usage changed since you started using the Uber App? [1]

Percentage



[1] Sample size was 577 uberX and uberMOTOR users who indicated they owned cars.
Source: Uber ride survey in Indonesia

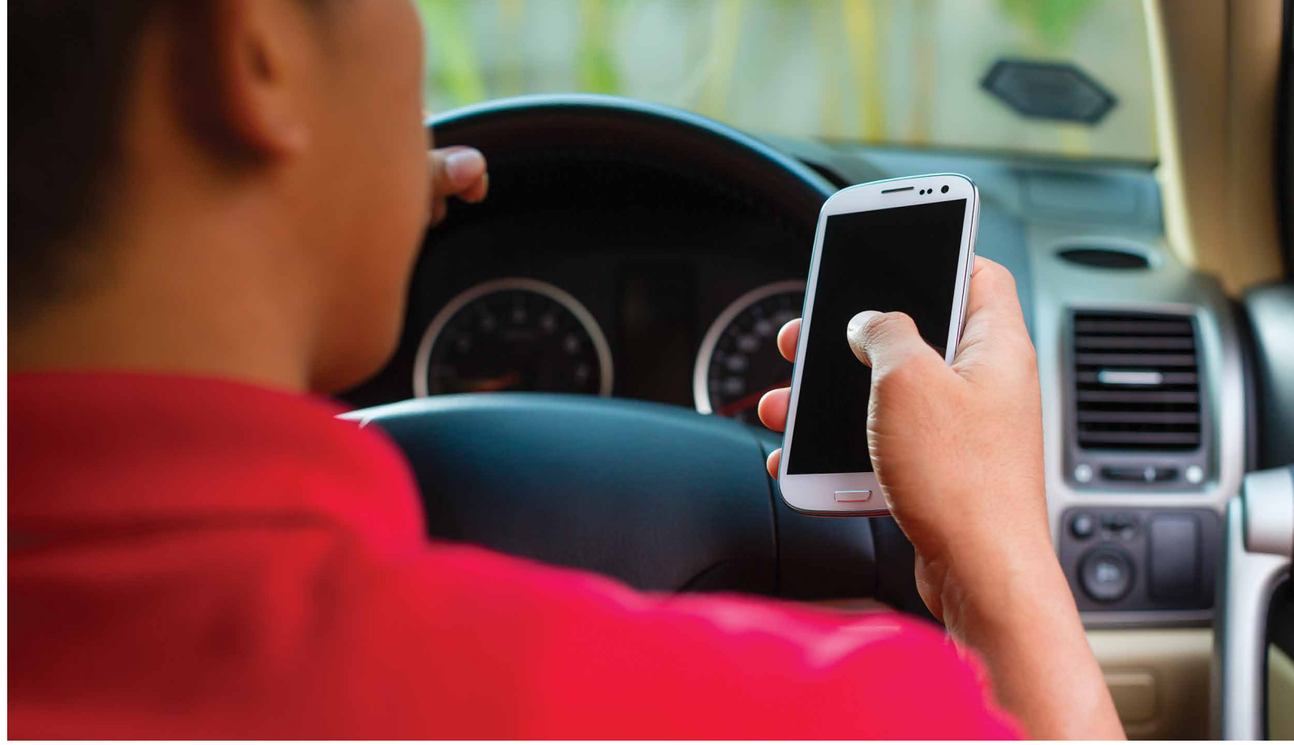


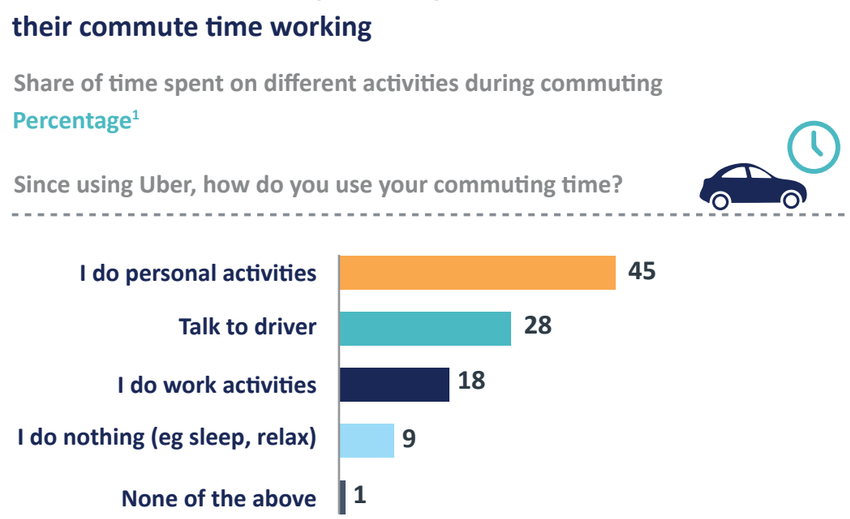
EXHIBIT 10

18% of commuters who previously drove themselves to work are now spending their commute time working

Share of time spent on different activities during commuting

Percentage[1]

Since using Uber, how do you use your commuting time?



[1] Based on survey of 377 uberX users who drove their personal car prior to using shared mobility services.
Source: Survey of Uber users; AlphaBeta analysis

[32] For example, the number of passenger vehicles in Indonesia is estimated to growth at CAGR 6.8% to 2020. For further details, see *Opportunities and Challenges in Indonesia's Automotive industry,* Ipsos Consulting, February 2016.
[33] Sample size was 577 uberX and uberMOTOR users who indicated they owned cars.
[34] Based on survey of 377 uberX users who drove their personal car prior to using shared mobility services.

The benefits by city

Whilst the overall benefits to transport efficiency from shared mobility are significant, how does this vary by city? Clearly, given commuting patterns, commuting times, and local wages, the benefits could be expected to vary significantly across cities in Indonesia. The evidence supports this (Exhibit 11). Whilst there are large differences across Indonesian cities, it is important to note that all the Indonesian cities we examined could experience significant benefits to time-related commuting time efficiency from shared mobility. The largest beneficiaries in 2020 will clearly be cities with a larger population and which tend to commute from longer distances.

EXHIBIT 11

The benefits of shared mobility to congestion vary significantly across Indonesian cities

Rank	City	Province	Expected Population (2020)[1]	Total Daily Trips (2020)[1]	Time Savings from Shared Mobility (IDR Billion, 2020)[2]
1	DKI Jakarta	Jakarta	11,048,000	15,492,000	77,615
2	Surabaya	East Java	3,022,000	4,249,000	15,225
3	Medan	North Sumatra	2,325,000	3,225,000	5,745
4	Bandung	West Java	2,585,000	3,597,000	5,005
5	Tangerang	Banten	2,508,000	3,504,000	4,160
6	Batam	Riau Islands	1,657,000	2,240,000	3,530
7	Semarang	Central Java	1,867,000	2,617,000	3,445
8	Palembang	South Sumatra	1,736,000	2,396,000	2,285
9	Makassar	South Sulawesi	1,612,000	2,221,000	1,995
10	Cilegon	Banten	471,000	654,000	1,940
11	Pekanbaru	Riau	1,272,000	1,747,000	1,845
12	Bekasi	West Java	3,194,000	4,479,000	1,705
13	South Tangerang	Banten	1,740,000	2,443,000	1,695
14	Depok	West Java	2,668,000	3,703,000	1,365
15	Malang	East Java	887,000	1,238,000	1,290
16	Denpasar	Bali	1,125,000	1,654,000	1,125
17	Balikpapan	East Kalimantan	704,000	973,000	1,065
18	Bandur Lampung	Lampung	1,118,000	1,550,000	965
19	Surakarta	Central Java	512,000	716,000	810
20	Padang	West Sumatra	954,000	1,322,000	755
21	Bogor	West Java	1,118,000	1,549,000	620
22	Serang	Banten	773,000	1,066,000	580
23	Yogyakarta	Special Region of Yogyakarta	399,000	559,000	540
24	Pontinak	West Kalimantan	681,000	940,000	540
25	Jambi	Jambi	663,000	917,000	525
26	Palu	Central Sulawesi	418,000	579,000	345
27	Benjarmasin	South Kalimantan	722,000	1,002,000	320
28	Manado	North Sulawesi	430,000	600,000	310
29	Cirebon	West Java	293,000	405,000	300
30	Banda Aceh	Aceh	285,000	391,000	250
31	Kendari	Southeast Sulawesi	437,000	597,000	175
32	Sukabumi	West Java	326,000	447,000	175
33	Mataram	West Nusa Tenggara	520,000	716,000	170

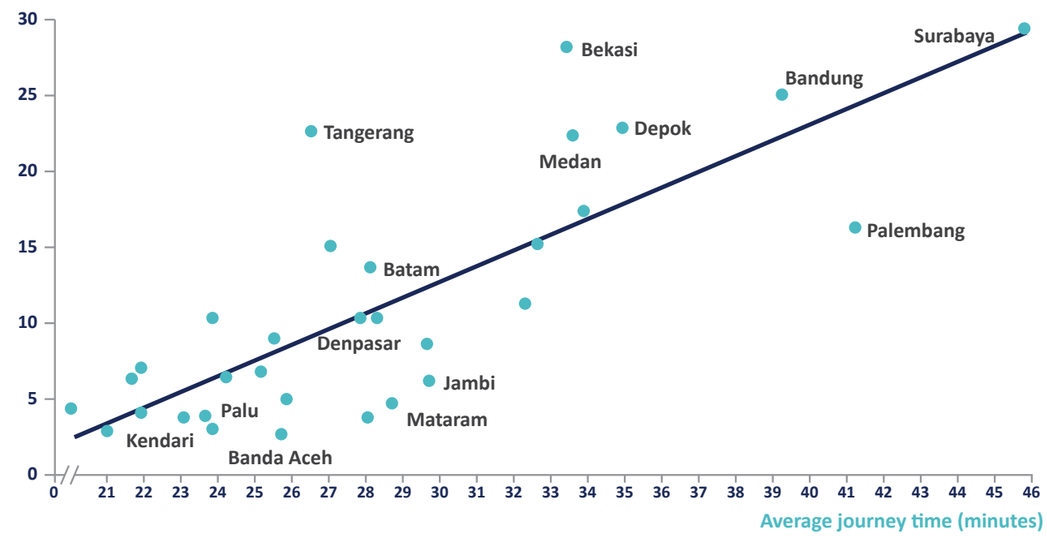
[1] Rounded to the nearest thousand
[2] Rounded to the nearest 5 billionIDR

That said, given the rapid growth of so-called "middle-weight" cities in Indonesia (with populations of 800,000 to 2 million), the benefits of shared mobility are likely to grow rapidly in these cities, and now is an important time to think through design of transport system services before congestion becomes more problematic. Our analysis shows that the average journey time increases by around 1.9 minutes (equivalent to about 4% of the average commute time) for every 100,000 increase in the city size (Exhibit 12).

EXHIBIT 12

Average journey times are closely linked to population size of city - hence, important for growing cities to put in place sound policies asap!

Average journey time and city size[1]



An increase in population of 100,000 people will increase average travel time by 1.9 minutes

[1] Analysis covers 32 cities in Indonesia, representing over 20% of Indonesia's current population and 39% of current GDP. Analysis is restricted to one specific journey type (daily work commutes), and excludes Jakarta for comparibility purposes
Source: Commuter surveys; AlphaBeta

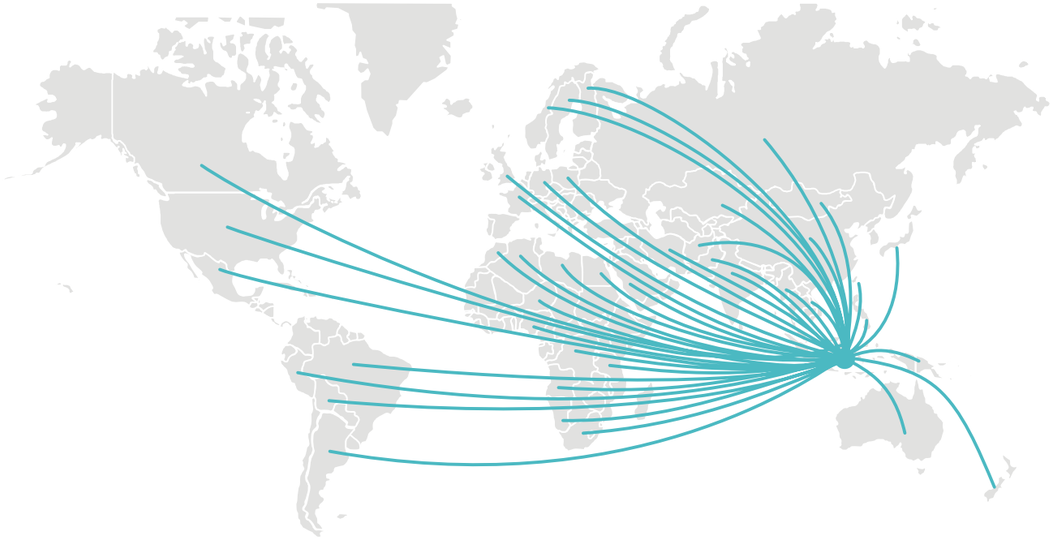
Other economic efficiency benefits of shared mobility

Ridesharing services such as Uber can provide a range of benefits to other sectors. International tourism represents 4% of Indonesia's total economy today and the Indonesian government has set ambitious growth goals. By 2019, Indonesia is aiming to double that to 8% of GDP.[35] This is also important for employment in Indonesia given that 9% of the nation's workforce is employed in a job directly related to tourism. Shared mobility can help Indonesia meet these goals by connecting tourists from across the globe to destinations throughout the nation. Tourists benefit from shared mobility options as it reassures them they are taking the most efficient route, ensuring their safety, and providing a cashless payment system to conserve local currency. In Indonesia, we see that travelers (for both business and tourism purposes) are actively using Uber to help them navigate the country (Exhibit 13).

[35] http://www.indonesia-investments.com/business/industries-sectors/tourism/item6051

EXHIBIT 13

Uber is used in Indonesia by visitors from all corners of the world



Which tourists use Uber the most in Indonesia?

1	2	3	4	5	6	7	8	9	10
Singapore	USA	Malaysia	Australia	UK	China	India	Russia	France	Thailand

Note: Data is for completed trips only, from September 2016 to November 2016

Source: Survey of Uber users: AlphaBeta analysis

The benefits of shared mobility can also extend to other sectors related to mobility, including logistics and food delivery. UberEATS is an on-demand meal delivery service powered by the Uber app. The online food ordering service partners with local restaurants in selected cities around the world and allows customers to order meals using the Uber smartphone application. Although not yet available in Indonesia, its potential benefits could be significant by helping consumers avoid long commutes that would otherwise be required in purchasing food. In addition, shared mobility can be used to enhance logistics. UberRUSH is a pilot initiative of Uber to support logistics. The impact on Indonesia could be particularly large given the high cost of logistics.

3

INCLUSIVENESS AND WELL-BEING

CREATING ECONOMIC OPPORTUNITIES AND BOOSTING FINANCIAL INCLUSION

Inclusiveness & well-being benefits of shared mobility

Current and potential impacts (in 2020) of shared mobility in Indonesia:

Potential to reduce cost of mobility by up to

65 percent

versus owning a car

over

60 percent

of ridesharing users do so because it provides a cheaper mobility option to their alternative

Potential to provide economic opportunities for almost

7 million

Indonesians in ridesharing services by 2020

Ridesharing services can create opportunities for Indonesians with fewer outside opportunities.

43 percent

of Uber driver-partners in Indonesia were previously not in the labor force or unemployed

39 percent

of Uber driver-partners agree or strongly agree that they are more financially active since joining Uber

Greater financial inclusion could potentially boost the average incomes of these individuals by

5-30 percent

over

20 percent

of Uber users surveyed say that a primary reason for choosing Uber is for personal safety reasons

46 percent

of Uber driver-partners indicated flexibility in hours as the major reason to work for Uber

Higher shared mobility could have a range of potential benefits to inclusiveness and well-being in Indonesian cities. These include benefits to consumers from a lower cost of mobility; benefits to drivers from finding flexible sources of income (particularly for those with limited outside opportunities); and broader benefits related to creating new economic opportunities for Indonesians by being able to access jobs that were previously unavailable due to inefficient transport links, and boosting financial inclusion.

Lowering mobility costs for Indonesians

Consumer surplus is an economic measure of consumer benefit, which is calculated by analyzing the difference between what consumers are willing and able to pay for a good or service relative to its market price, or what they actually pay for the good or service. A consumer surplus occurs when the consumer is willing to pay more for a given product than the current market price. Past academic research in the United States has shown that for each dollar spent by consumers, about $1.60 of consumer surplus is generated, creating potentially $6.8 billion of total consumer surplus across the United States.[36]

For Indonesians who previously drove their own car, the savings in mobility costs could be extremely large. Our analysis shows that the annual costs associated with mobility could be anywhere from 10-65% lower by using ridesharing options, versus owning a car (Exhibit 14).[37] This is estimated by comparing the relative costs of owning a car versus using ridesharing options. The assumptions include 14,000 kilometers traveled annually and the estimated savings are deliberately conservative by assuming no accident or mechanical failure during the car's lifespan. A range of estimates was produced based on the choice of car (two popular car types in Indonesia - Toyota Avanza and Toyota Corolla - were chosen to provide a range of vehicle costs), and the residual value of the vehicle after 10 years. The detailed assumptions can be found in the appendix.

If the value of more productive use of commuting time was included (as users are freeing themselves from having to focus on driving), additional savings of up to IDR 18 million per user per year (on average across the 33 Indonesian cities) could be achieved under the shared mobility scenario in 2020. This is based on estimates of the average commuting time and the local wage levels in each of the 33 cities. The savings from ridesharing are confirmed in our survey of Uber users - over 60% of the respondents say they use Uber because it is cheaper (Exhibit 15).[38]

[36] Peter Cohen, Robert Hahn, Jonathan Hall, Steven Levitt, and Robert Metcalfe, "Using Big Data to Estimate Consumer Surplus: The Case of Uber", Working Paper, August 30 2016.
[37] See the Appendix for details on the methodology.
[38] Based on survey of 971 uberX and uberMOTOR users across Indonesia (Bali, Bandung, Jakarta, and Surabaya).

EXHIBIT 14

Ridesharing can provide a more cost efficient mobility solution than owning a car, saving up to 65% of mobility costs

Annual costs per person
Million IDR

10-65%[5] saving of ridesharing option versus owning a car

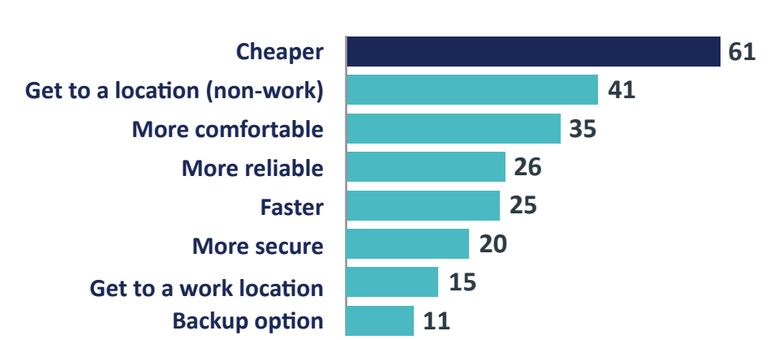
	Annual asset cost[1]		Upkeep costs[2]		Commute costs[3]		TOTAL COSTS
OWNING A CAR	30-78	+	6-7	+	12	=	**48-97**
RIDESHARING[4]	0	+	0	+	33-43	=	**33-43**

[1] Amortization of the cost of the asset over its useful life (assumed to be 10 years), including vehicle cost, loan repayment (at 6.5% rate), VAT and vehicle registration. Low-end estimate based on a Toyota Avanza and high-end based on a Toyota Corolla (two of the most popular car models in Indonesia).
[2] Reflects annual maintenance costs of the vehicle, including insurance.
[3] Includes fuel and parking costs (for own vehicle); Cost of fares, including surge pricing (for shared mobility option).
[4] Based on 14,000 km traveled a year as a direct substitute to a car. Low-end estimate based on uberPOOL and high-end based on uberX.
[5] Rounded to nearest 5 percent.
Source: Toyota Indonesia Price List (2016); Duitpintar.com; Uber Fare Estimate; Colliers International (Parking Rate Survey 2011); AlphaBeta Analysis

EXHIBIT 15

Over 60% of the respondents use Uber because it is cheaper

Why do you use Uber?[1]
Percent of responses (select all applicable)



[1] Based on survey of 971 UberX and UberMOTOR users across Indonesia (Bali, Bandung, Jakarta and Surabaya).
Source: Uber rider survey in Indonesia

Opening up new economic opportunities

The indirect employment effects of shared mobility services include employment associated with additional services offered (e.g. food services), as well as the benefits to employment from creating new transport routes that enable people to take jobs which poor public transport links would otherwise have blocked.

"Transport poverty", whereby individuals do not have affordable access to transport, has been linked to income inequality through channels such as lack of access to education and healthcare, as well as job opportunities.[39] More than 15% of respondents in our survey of Uber users say that Uber has enabled them to get to jobs, helping to expand the range of economic opportunities available to them.[40] This is consistent with past academic evidence that shows that shared mobility scenarios could help ensure that 75% of jobs within a city are reachable within a 30-minute commute time.[41]

Supporting more secure journeys

Ridesharing can also enhance personal safety by leaving a "digital trail" of all commutes. Almost 20% of Uber users in our survey state that a primary reason for choosing Uber is for enhanced personal safety.[42] Ridesharing options can be particularly beneficial to women. Especially in emerging markets, women confront safety risks, constraints on using certain modes of transportation (e.g. in some places, traditional apparel does not lend itself to cycling), limits on the proportion of household income allocated for female travel, and other barriers.[43] Ridesharing options can potentially be particularly helpful for the economic empowerment of women, enabling them more freedom of movement.

Creating income-generating opportunities for drivers

As millions of Indonesians move from remote farms into the metropolitan cities each year, many struggle to find suitable work due to language, skill, and cultural barriers. What is needed are work opportunities that require minimum skills, have low start-up costs, are flexible, reliable and facilitate local social integration. Ridesharing can be an ideal fit. This is borne out from the survey of Uber driver-partners.[44] For example, a large share of current Uber driver-partners have previously migrated to the city where they are driving (and hence may have limited networks of contacts), and 43 percent were previously unemployed or were not part of the labor force (Exhibit 16).

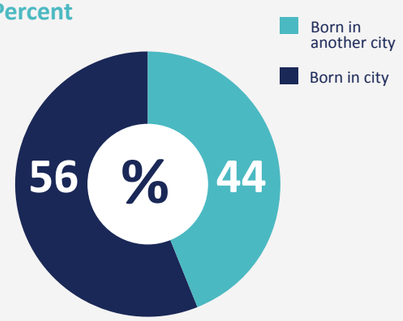
[39] *Locked out: Transport poverty in England*, Sustrans, 2012.
[40] Based on survey of 971 uberX and uberMOTOR users.
[41] *Shared Mobility: Innovation for Liveable Cities*, International Transport Forum, May 2016.
[42] Based on survey of 971 uberX and uberMOTOR users.
[43] *Gender Sensitive Transport Planning for Cities in India*, UNEP, December 2015
[44] Based on a survey of 3,031 Uber driver-partners in Indonesia.

EXHIBIT 16

Ridesharing services create employment opportunities for Indonesians who may otherwise have difficulty finding work

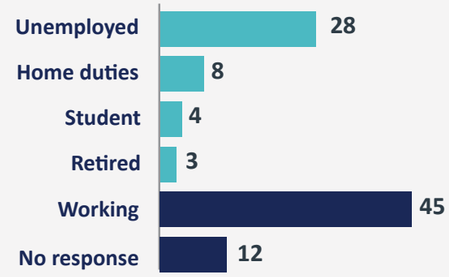
Almost half of Uber drivers have migrated from another city

Share of Uber drivers born in city where they are driving[1]
Percent



About 43% of Uber drivers were previously not in the labor force

Share of Uber drivers by previous activity[1]
Percent



[1] Based on a survey of 3,031 Uber driver-partners in Indonesia.
Source: Uber driver partner surveys; AlphaBeta Analysis

Ridesharing services can be a great source of economic empowerment for Indonesians. Based on the estimated potential for ridesharing services in Indonesia in 2020 (under our shared mobility scenario), we estimate that up to 7 million Indonesians could be engaged through ridesharing services at that time (Exhibit 17). This estimate is based on (a) a forecast of the number of potential ridesharing trips (in the "shared mobility scenario"); (b) an estimate of the average speed of trips to understand the implied driving time; and (c) an assumption of average working hours per day of drivers. The latter was assumed to be 4 hours per day, which allows for many drivers doing ridesharing services as part of a flexible, part-time income generating opportunity. It appears that ridesharing is already having a positive impact on creating income-generating opportunities in Indonesia. In August 2016, the Head of the Central Statistics Agency (BPS) stated that employment absorption is improving in Indonesia, and the sector with the most absorption was from trading and service sector, which includes online 'ojek' (motorcycle taxi).[45]

Ridesharing can also help to formalize the "grey economy". Historically, part-time work has been hard to measure, underestimated and under-regulated. This puts workers in vulnerable positions that are hard to adequately address, whether that means unfair compensation, excessively long working hours, or personal safety. Even today it is estimated that 65% of employment in Indonesia can be called informal.[46]

[45] http://jakartaglobe.id/business/ride-sharing-platforms-help-indonesia-reduce-unemployment-bps/
[46] http://www.indonesia-investments.com/finance/macroeconomic-indicators/unemployment/item255

EXHIBIT 17

Ridesharing services could potentially create economic opportunities for around 7 million Indonesians by 2020

Potential number of ridesharing drivers; 2020

Thousands

Rank	City	Number of drivers[1]	Rank	City	Number of drivers[1]
1	DKI Jakarta	2,585	18	Bogor	80
2	Surabaya	622	19	Padang	52
3	Bekasi	376	20	Cilegon	48
4	Depok	368	21	Jambi	47
5	Tangerang	359	22	Surakarta	47
6	Medan	327	23	Pontianak	45
7	Bandung	257	24	Balikpapan	43
8	South Tangerang	234	25	Yogyakarta	33
9	Semarang	224	26	Banjarmasin	30
10	Batam	210	27	Palu	24
11	Palembang	152	28	Sukabumi	24
12	Denpasar	143	29	Mataram	23
13	Bandar Lampung	112	30	Cirebon	20
14	Pekanbaru	99	31	Banda Aceh	18
15	Malang	99	32	Manado	16
16	Makassar	92	33	Kendari	14
17	Serang	84			

In total, ridesharing could provide up to 7 million part-time economic opportunities in Indonesia by 2020

[1] Analysis covers 33 cities in Indonesia, representing over 20% of Indonesia's current population and 39% of current GDP. Part-Time Employment (PTE) is based on assumption of 4 hours working per day.
Source: AlphaBeta Analysis

One of the other advantages of ridesharing is that it creates more efficient matching services between passengers and drivers. This reduces the amount of "dead time" for drivers where they do not have passengers and raises their productivity (and incomes). For example, one of Uber's recent product updates allows drivers to receive and accept nearby ride requests while they're still finishing their previous ride.[47] In addition, "Driver destinations" allows drivers to input their final destinations twice a day so that they're only sent trip requests that are on their way home.[48] Charging for wait times also allows drivers start the trip two minutes after their arrival at the pickup point.[49] Other Uber analysis has shown how this efficiency typically grows over time as the market matures and the time between pick-ups narrows.[50] Replicating this analysis in the four markets where Uber currently operates in Indonesia (Jakarta, Surabaya, Bandung and Bali), we also see a significant increase in driver productivity, with idle time being reduced significantly in the space of just 12 months.

One of the major benefits for Uber drivers beyond having employment and income, is that it offers flexibility. In the US, flexibility is a big motivating factor: 88% of drivers started with Uber because it fit their life well, not because it was their only option.[51] In a survey of Uber driver-partners in the US, it was found that most had other employment as they were driving with Uber, which makes the flexibility to set their own hours even more valuable.[52] This same insight holds true for Indonesian driver-partners (Exhibit 18).[53]

EXHIBIT 18

46 percent of driver-partners indicated flexibility in hours as the major reason to work for Uber

Why did you become an Uber driver-partner? [1]

Percent of Uber drivers who agree or strongly agree with statement

[1]Based on a survey of 3,031 Uber driver-partners in Indonesia.
Source: Uber driver partner surveys; AlphaBeta analysis

[47] https://techcrunch.com/2015/11/25/ubernomics/
[48] https://newsroom.uber.com/driver-destinations
[49] https://newsroom.uber.com/making-the-most-of-your-time/
[50] https://newsroom.uber.com/us-new-york/4-septembers-of-uberx-in-nyc/
[51] https://medium.com/uber-under-the-hood/new-survey-drivers-choose-uber-for-its-flexibility-and-convenience-b40e05c4c949#.6mdlog94t
[52] Jonathan V. Hall and Alan B. Krueger, "An Analysis of the Labor Market for Uber's Driver-Partners in the United States", Working Paper, January 22, 2015.
[53] Based on a survey of 3,031 Uber driver-partners in Indonesia.

BOX 2

What about the loss of jobs with taxis?

On-demand shared mobility companies such as Uber, Grab, and Go-Jek have come under intense scrutiny in 2016,[54] with local taxi drivers protesting the arrival of these companies due to increased competition and reduced earnings.

The available evidence does not support the fears of job losses however. For example, in the United States, the number of people employed in the taxi industry has remained largely unchanged even as shared mobility services have grown rapidly.[55] The total jobs outlook in the sector, when including ride hailing services, is extremely strong. For example, the Bureau of Labor Statistics in the United States estimates that employment of taxi drivers and chauffeurs is projected to grow 13% from 2014 to 2024, faster than the average for all occupations.[56] The increase in ride-hailing services is expected to contribute significantly to this economic opportunity growth. An analysis by Bruegel also casts doubt on the belief of shared-mobility companies squeezing out traditional taxi companies in Indonesia.[57] In Bruegel's analysis they find that taxis are price competitive with shared mobility services, especially during peak hours. Additionally, there is a significant amount of room for growth in the industry as the ratio of taxis to people in Jakarta is only 1.4 per 1000, which is significantly lower than other Asian cities (5.3 for Singapore, 10.2 for Bangkok).

[54] http://www.abc.net.au/news/2016-03-22/indonesian-uber-go-jek-grab-protest-in-jakarta-stops-traffic/7267784
[55] https://www.bloomberg.com/view/articles/2016-06-03/uber-and-lyft-are-adding-jobs-not-just-stealing-them
[56] https://www.bls.gov/ooh/transportation-and-material-moving/taxi-drivers-and-chauffeurs.htm
[57] http://bruegel.org/2015/12/the-rise-of-the-sharing-economy-in-indonesia/

Digital financial inclusion benefits

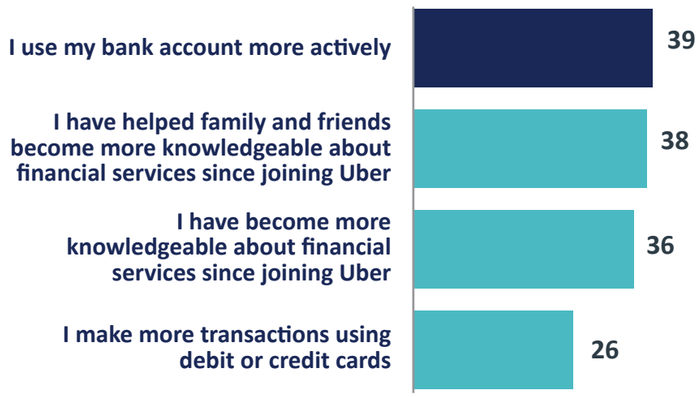
The expansion of mobile money throughout Indonesia in recent years has been impressive. Between 2011 and 2014 alone, the share of adults in Indonesia with a bank account grew from 20% to 36% of the population.[58] However, there is still a long way to go to achieve universal and deep financial inclusion in Indonesia, and this is one of the top priorities in the new ASEAN Economic Community (AEC) plan. As of 2014, more than 260 million people in ASEAN Member States were excluded from the financial system.[59] Usage is still an issue. Only 8% of Indonesians used a debit card in the last 12 months. Ridesharing services could create benefits to financial inclusion by providing a means for drivers to establish bank accounts and become accustomed to doing transactions online. This is borne out in the survey results of Uber driver-partners (Exhibit 19).[60] About 6% of Uber driver-partners in Jakarta, Bandung, Surabaya, and Bali did not have a bank account before joining Uber. Assuming this ratio is similar for other Indonesian cities (which is a conservative assumption given that financial inclusion data suggests these cities generally have much lower rates of bank account penetration), then based on the estimated number of ridesharing drivers needed in 2020 (in the shared mobility scenario), there is the potential for over 400,000 Indonesians to become financially included through ridesharing services (Exhibit 20). This greater financial inclusion could have significant income benefits for these Indonesians. International evidence suggests a potential boost to incomes of anywhere from 5% to 30%.[61]

EXHIBIT 19

Ridesharing services can be an important "ladder" for Indonesians to be financially included

Has your banking activity changed since driving on the Uber platform?[1]

Percent of Uber drivers who agree or strongly agree with statement



[1]Based on a survey of 3,031 Uber driver-partners in Indonesia.
Source: Uber driver partner surveys; AlphaBeta analysis

[58] Global Findex Database, World Bank. There is no available data for Brunei. The data for Lao PDR is from 2011.
[59] World Bank, http://blogs.worldbank.org/eastasiapacific/how-to-scale-up-financial-inclusion-in-asean-countries).
[60] Based on a survey of 3,031 Uber driver-partners in Indonesia.
[61] *Three paths to sustained economic growth in Southeast Asia,* McKinsey Global Institute, November 2014.

EXHIBIT 20

Ridesharing services could potentially support over 400,000 Indonesians to become "financially included" by 2020

Share of ridesharing drivers who did not have a bank account before joining Uber[1]		Potential number of ridesharing drivers in Indonesia in 2020 in a "shared mobility" scenario		Potential number of Indonesians gaining bank accounts through ridesharing in 2020
6%	+	6.9 million	=	414,000

Welfare benefits for financial inclusion

International evidence suggests digital financial inclusion could lead to a potential boost to incomes of anywhere from 5 to 30 percent

[1] Based on a survey of 3,031 Uber driver-partners in Indonesia.
Source: Uber driver-partner survey; AlphaBeta analysis

4

HEALTH AND THE ENVIRONMENT

CLEANER AIR AND BETTER HEALTH

Health and Environment benefits of shared mobility

Current and potential impacts (in 2020) of shared mobility in Indonesia:

CO_2 emissions from vehicles could be reduced by

159,000 Mt

in 2020 from shared mobility, equivalent to saving 415,000 hectares of land from deforestation

Traffic air pollution could be reduced by

8 percent

in cities by 2020

A cleaner environment

Cities are responsible for around 70 percent of global energy use and energy-related GHG emissions.[62] Many cities are also highly exposed to natural disasters and environmental concerns, particularly rising sea levels. A UN assessment found that more than 70 percent of the world's major cities are already highly vulnerable to flood-related mortality and economic losses.[63] Cities in Indonesia are particularly exposed given rising sea levels and intensifying storms where there are concentrations of people in low-lying urban areas. In addition, air pollution currently takes the lives of at least 6,500 Indonesians prematurely each year.[64] Why is all this relevant to shared mobility? The reason is that by reducing congestion, shared mobility can help lower GHG emissions, as well as urban pollution in Indonesian cities.

The potential is large. In the 2020 shared mobility scenario described in Chapter 2 and in the appendix, CO2 emissions from vehicles could be reduced by 159,000 Mt in 2020 from carpooling, equivalent to saving 415,000 hectares of land from deforestation (which is more than 5.5 times the land mass of Singapore, or more than 6 times the land mass of DKI Jakarta). In addition, traffic air pollution could be reduced by 8% in Indonesian cities by 2020 through carpooling.

[62] *Better Growth Better Climate: Synthesis report,* The Global Commission on the Economy and Environment, September 2014.
[63] *Risk of Exposure and Vulnerability to Natural Disasters at the City Level: A Global Overview*, UN Population Division, 2015.
[64] https://www.nytimes.com/2015/09/27/world/asia/as-indonesia-prospers-air-pollution-takes-toll.html?_r=0

5

CAPTURING THE PRIZE

LESSONS LEARNT FROM OTHER CITIES

As we have shown in the previous chapters, the potential benefits of shared mobility to economic efficiency, inclusiveness & well-being, and health & the environment, are potentially extremely large. So how should Indonesian leaders think about maximizing the upside, and dealing with the potential downsides, most notably the impact on the taxi industry?

An analysis of international approaches on shared mobility and transport solutions suggests seven lessons are worth keeping in mind (Exhibit 21):

EXHIBIT 21

Seven lessons on capturing the shared mobility prize

1. **Reduce barriers to entry to ridesharing**
2. **Improve the productivity of for-hire drivers, don't penalize ridesharing**
3. **Ensure certainty and create a strong fact base**
4. **Rethink parking**
5. **Support behaviour change**
6. **Maximize the interaction with public transport**
7. **Think about shared mobility as a catalyst for city transformation**

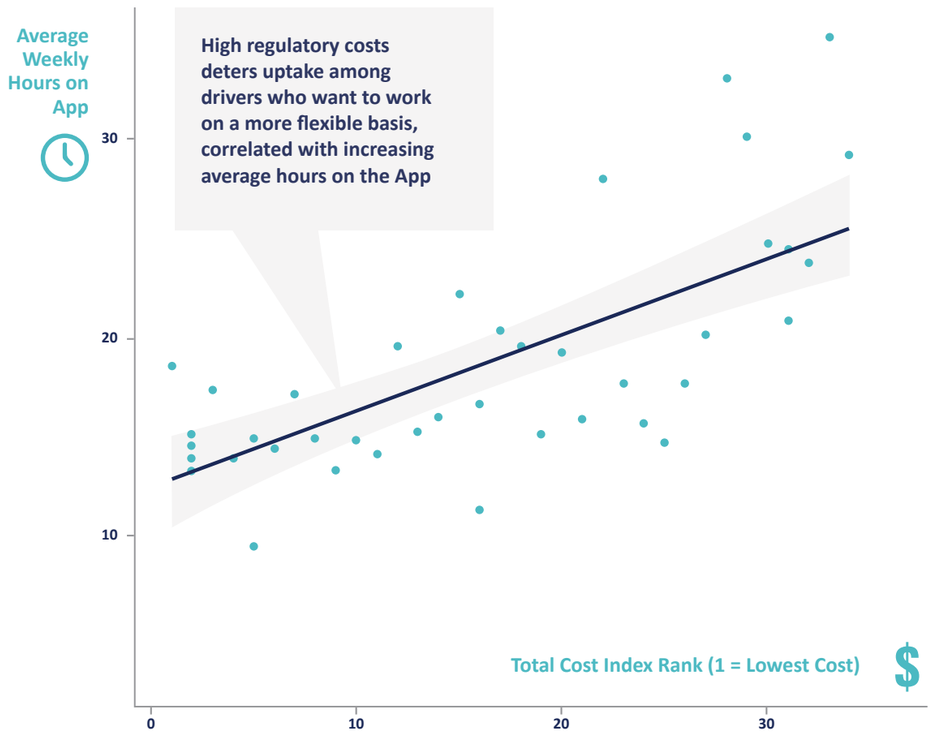
Lesson 1: Reduce barriers to entry to ridesharing

Regulation plays an important role — because when cities make it expensive or time-consuming (or both) to begin driving, drivers have less flexibility and uptake is lowered significantly. As costs increase, drivers tend to work longer hours to offset those costs (Exhibit 22). For example, in the U.S. — where it tends to be relatively simple to get started — more than 60% of drivers use the app for 10 hours a week or less. But in Asia (outside of China and India), that number is 51% and in Europe it's 31%. Both are regions that typically have higher barriers to entry for drivers than the United States.[65] Lowering the cost of entry can expand flexible work opportunities to more citizens, and are crucial for realizing the scale of the potential benefits quantified in this report.

EXHIBIT 22

High regulatory entry costs for drivers can deter usage by drivers who only want to work on a more flexible basis

Relationship between driver costs and hours on app for different cities across the globe
January – March 2016



Source: Uber

[65] https://medium.com/uber-under-the-hood/when-it-comes-to-driving-with-uber-all-cities-are-not-created-equal-f862121021df#.4k8cgn89c

Whilst there is a clear need for strong regulatory guidelines to ensure consumer safety, our research finds that there is often a false choice between ensuring strong regulatory safeguards and minimizing driver inconvenience. In many cases, the challenge relates to how regulations are enforced. For example, some cities only have limited locations for drivers to go to in order to comply with vehicle testing requirements, which can be both inconvenient and create delays, resulting in higher entry costs for drivers. In contrast, other cities allow ridesharing operators to conduct their own inspections, helping to streamline the process. Similarly, when it comes to regions that require vocational licenses for ridesharing drivers, these often vary in terms of ease of accessibility and time requirements.

It is also important to understand how drivers using ridesharing platforms value flexibility, choosing when and how often they drive. Higher barriers to entry can result in less flexibility for drivers, placing limits on flexible work opportunities that are the core of ridesharing's benefits. An efficient transport system requires flexible, part-time drivers that can increase supply during peak hours. As such, it is important that the regulatory framework is sufficiently flexible that it doesn't prevent these drivers from participating. Retro-fitting older laws onto new technologies may result in some of the benefits of the shared mobility being lost.

Many regions in Asia have recently released regulation that demonstrates different approaches in regulating shared mobility. It is important to stress that there is no "one size fits all" approach to shared mobility regulation and the appropriate regulatory response will depend to a significant degree on each region's unique situation.

The key differences in the regulations and approaches concern the following areas:

- **Driver requirements.** Most regions require forms of background checks and vocational licenses. Where they differ is mainly in the application of these requirements. At one end, there is New South Wales which places the burden of meeting requirements on shared mobility companies (with auditing by the industry regulator to ensure compliance). This enables efficient enforcement of the guidelines. On the other end is Indonesia, which requires drivers to have a commercial driver's license which is expensive and time consuming to obtain.
- **Vehicle requirements.** Similar to the driver requirements, the differences between regions is not so much in what they require, but how they enforce it. In the case of Indonesia, the challenge is that there is currently only one testing center for vehicle inspections, which makes compliance extremely burdensome for drivers. There is a pending requirement in Indonesia for all drivers to transfer ownership to cooperatives, which would require vehicles to belong to cooperatives, which could also act to raise barriers and limit supply.
- **Pricing and other regulation.** Indonesia has relatively restrictive requirements on pricing. It is important to explicitly allow for consumer choice by allowing a variety of pricing methods. Ride-hailing apps aim to adjust fares according to demand and supply in order to ensure that there is an optimal number of vehicles on the road at a given time. In addition, by preventing ride-hailing apps from recruiting drivers directly, the onboarding process is made much more cumbersome and the potential scale-up far slower.[66]

[66] http://www.cnnindonesia.com/teknologi/20160421182700-185-125708/grab-uber-tak-boleh-lagi-atur-tarif-dan-rekrut-sopir/

Lesson 2: Improve the productivity of for-hire drivers, don't penalize ridesharing

Taxi drivers are often the most vocal critics of shared mobility platforms like Uber. There is the opportunity to improve the productivity and competitiveness of the taxi industry, but not through raising barriers to entry for ridesharing.

The rise of ridesharing technologies provides an opportunity for policymakers to rethink regulatory requirements for the taxi industry. For example, the Australian Capital Territory (ACT) government studied existing regulations with a view to ensuring incumbent players remained competitive. To this end, they introduced measures to ease the burden on incumbents, such as cutting license fees, removing uniform requirements, etc. In Singapore, the government has simplified the Taxi Driver Vocational License (TDVL) requirements – reducing the time requirements from 60 hours to 25 hours, and allowing some of the course to be done via e-learning.[67] In New South Wales, costs for taxi and hire car operators are being reduced with lower license fees and other cost heavy regulations removed, equivalent to $30 million a year in red tape savings for the industry.[68] In Estonia, ride sharing legislation has lowered barriers for taxi drivers by streamlining some duplicative requirements around training and certification and reinforcing the exclusive right of taxis to pick up passengers on the street.[69]

There could also be opportunities to enhance the productivity of the taxi industry through technology. In Malaysia, the government has mandated taxi companies to use on-demand mobile applications in their operations as part of their new KPI which will be enforced by the Land Public Transport Commission.[70] In Singapore, the content of the TDVL course has been modified to reflect the new realities of driving - the course will no longer focus as much on memorizing the street directory for route planning - drivers will instead be taught to use GPS and online navigational tools.

Lesson 3: Ensure certainty and create a strong fact base

Political leadership to establish certainty around shared mobility regulation is essential. Early public statement from senior political figures offer certainty for companies and consumers, and provides political capital and momentum for the bureaucracy. The Australian Capital Territory (ACT) is a good example of this. The ACT Government never muddied the waters with contradictory messages. In June, the chief minister argued that "the government is going to have to evolve its regulatory environment in order to respond. I just think it would be crazy to think that you can put up barriers and regulatory rules that will stop this sort of activity from happening. You can't, so you are better off working with these new businesses."[71] Importantly, statements like these confirm the government's commitment in plain language. Other governments have actively sought broad engagement (beyond lobbying groups) to ensure there is a full understanding of the relative costs and benefits of different approaches, before making decisions. For example, the New South Wales government in Australia received more than 5,000 submissions from industry and the public before it introduced its reforms.[72]

Lesson 4: Rethink parking

The average car spends roughly 96% of its life parked. In many cities, a third of all land is now dedicated to parking.[73] Not only does this land have a high opportunity cost in dense cities, but government-subsidized parking is a regressive use of taxpayers' resources. As shown earlier in the report, over 46,000 hectares of commercial and residential land are set aside for parking in Indonesia, and the implied annual rental value of just the commercial land is over IDR 95 trillion (US$7.2 billion). Academic evidence has shown that 95% less space was required for public parking in a model city served by shared mobility services, freeing up this land for more productive uses such as those described above.[74]

To raise awareness of the opportunity costs of this land dedicated to parking, an annual global event called "PARK(ing) Day" has been organized since 2005, where citizens, artists and activists collaborate to temporarily transform metered parking spaces into temporary public places, such as parks, theatres, and recreational areas.[75] Similar efforts in Indonesia focusing on reclaiming public places from traffic have proven popular. For example, in Jakarta, very Sunday from 6 to 11 a.m., Jalan Sudirman and Jalan Thamrin are closed to all personal cars. Thousands of Indonesians come to the area to walk, run, cycle and skate whilst enjoying the street food and other activities.

Indonesia has begun to take measures to alleviate the parking issues that have been plaguing its cities, such as implementing electronic parking meters to improve revenue collection[76], and a heavy crackdown on illegal parking.[77] However, there are still many gaps within the current parking regulatory environment of Indonesia, particularly related to the on-street parking problems prevalent in urban areas.

Some practices from other nations that Indonesia could consider adopting include rethinking minimum parking requirements for buildings, which enable less parking to be built. For example, minimum parking requirements in Jakarta are 5 times higher than in Singapore for CBD office buildings.[78] Related to this, ensuring that parking space is not exempt from counting toward the allowable floor area of building developments can help ensure developer incentives are aligned with providing the most efficient level of parking.[79]

Another opportunity could be to implement a "proof-of-parking" rule, which essentially requires motorists to prove they have access to a local parking space, when they wish to register a vehicle. When coupled with a ban on overnight street-parking, this measure has helped to dampen vehicle ownership numbers in Japan.[80] However, the socioeconomic impacts of this would need to be carefully analyzed to ensure that it does not lead to inequitable outcomes.

Abolishing price controls on parking is another measure which Indonesia could adopt. Currently, on-street parking in Jakarta costs around 5,000 IDR an hour[81] or $0.37 an hour for parking, compared to $0.85 an hour in Singapore[82] or $1 an hour in the US[83]. Off-street parking in Indonesia is also capped at the same rate, while rates in Singapore or the US are often more as private owners can set parking rates based on market demand. Removing price controls could allow city governments to collect more revenue, but more importantly, it would allow market forces to dictate the parking rates which in turn would help to control demand and supply.

Our survey of Uber users in Indonesia revealed that 6% no longer use their personal cars; and a further 62% of users say they drive their personal cars less. To accommodate this shift in mobility patterns, it will be important for Indonesian policymakers to rethink urban planning processes so that as car ownership declines, less space is allocated for parking.

[67] http://www.straitstimes.com/singapore/transport/parliament-uber-grabcar-drivers-to-have-vocational-licences-undergo-background
[68] http://www.rms.nsw.gov.au/about/news-events/news/ministerial/2015/151217-ride-sharing.html
[69] https://medium.com/uber-under-the-hood/estonia-leads-the-way-on-regulated-ridesharing-28686a2fcf50#.t82bgoptm
[70] http://www.spad.gov.my/media-centre/media-releases/2016/spad-unveils-plan-uplift-taxi-industry
[71] *Regulating the new economy: Eight lessons from a case study of ride sharing, Uber and the ACT Government,* AlphaBeta, November 2015.
[72] http://www.rms.nsw.gov.au/about/news-events/news/ministerial/2015/151217-ride-sharing.html
[73] https://medium.com/uber-under-the-hood/less-parking-more-city-588b5e0d11fe#.56pq4l7sv
[74] *Shared Mobility: Innovation for Liveable Cities*, International Transport Forum, May 2016.
[75] For further details, see www.parkingday.org.
[76] "Electronic parking meters increase Jakarta's revenue", The Jakarta Post, 10 Aug. 2015.
[77] "Parking problems revealed on first day of heavy fines" The Jakarta Post, 9 Sep. 2014.
[78] *Parking policy in Asian countries,* The Asian Development Bank, 2011.
[79] *Parking policy in Asian countries,* The Asian Development Bank, 2011.
[80] "Japan's proof-of-parking rule has an essential twin policy" *Reinventing Parking,* 4 Jun. 2014.
[81] http://jakarta.coconuts.co/2016/08/26/jakarta-government-may-double-car-parking-fee-rp-10000-hour
[82] http://www.straitstimes.com/singapore/parking-fee-hike-after-big-jump-in-running-costs
[83] http://pwm.sagepub.com/content/20/1/49.full.pdf

Lesson 5: Support behavior change of commuters

A recent survey found that 10% of millennials who use Uber have already changed their car ownership behavior, choosing to get rid of a personal vehicle or to not buy a car because of Uber.[84] The Pew Research Center also found that of the people who use ride-hailing apps frequently — at least daily or weekly — only 64% own a personal vehicle (compared to 78% of people who don't use ride-haling apps).[85]

The challenge is often how to support consumers to give ridesharing solutions (and public transport options) a try in the first place. There are a range of measures that can be explored to help influence consumer behavior and encourage greater adoption of public transit and ridesharing options. For example, dynamic road pricing can provide a strong incentive to support behavior change. Despite Indonesia building 950 kilometers of toll roads, with plans to build much more, it is evident by the ongoing traffic problems that the rate of building new toll roads has not kept pace with the growth in personal vehicles. A complementary policy to supplement toll roads would be to introduce variable congestion pricing onto the toll roads or to zones of congestion pricing like the Electronic Road Pricing Zones in Singapore or the Congestion Charging zones in London. While Jakarta is currently exploring using congestion pricing in the city, it is leaning towards a fixed rate throughout the applicable hours. The full benefit of congestion pricing would be lost if drivers simply regarded it as an additional fixed cost (or tax). To maximize the benefits from congestion pricing, it should remain dynamic throughout the applicable hours to incentivize drivers to travel at different times. The benefits include increased vehicle speed of up to 37%; up to a 30 % decrease in peak period delays; a 50% decrease in public bus delays; and increases in public transit ridership of up to 30%.[86]

Lesson 6: Maximize the interaction with public transport

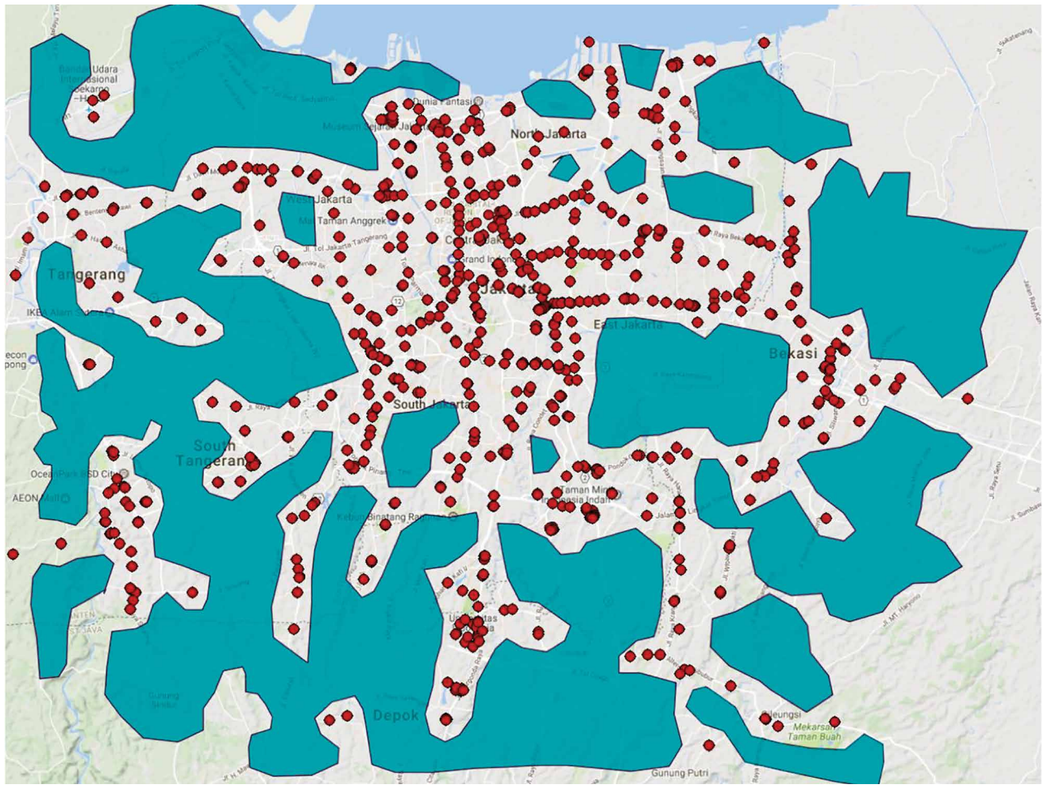
Public transit agencies should seize opportunities emerging from shared modes of transport to improve urban mobility through collaboration and public-private partnerships, including greater integration of service, information, and payment methods. Ridesharing and public transportation are both working toward the same goals of efficient, equitable, and safe commuting, and the benefits for riders expand when they work together.

Public transit is an important tool in combating traffic congestion and alleviating shortages in parking infrastructure. The challenge is that some public transport systems, such as Jakarta's Mass Rapid Transit (MRT) can take significant time and investment to build. Furthermore, in some cases, there will not be a strong economic case to justify full connection of neighborhoods with fixed public transport infrastructure links. As such, it is important to think of ridesharing as a complement (not a substitute) to public transport. As shown in this report and through various international case studies,[87] ridesharing can help supplement public transport during hours when public transport is unavailable, or in regions which are underserved by public transport. For example, within Greater Jakarta (where congestion and parking woes are particularly acute), almost 40% of regions are underserved from public transport (Exhibit 23).[88] In terms of population, only 16% of people in metro Jakarta are within 1km of a public transport option.[89]

[84] David Plouffe, "With Uber, Flexible Work Helps Families Turn Car Payments Into Paychecks", LinkedIn, November 13, 2015.
[85] *Shared, Collaborative and On Demand: The New Digital Economy*, Pew Research Center, May 19 2016.
[86] "Best Practices: Transportation Demand Management" *Seattle City Government*, Jan. 2008.
[87] *Shared mobility and the transformation of public transit*, American Public Transport Association (APTA), March 2016.
[88] "Underserved" refers to areas where a 1.5km or greater walk is required to get to the nearest public transit station.
[89] *People Near Transit: Improving Accessibility and Rapid Transit Coverage in Large Cities,* ITDP, October 2016.

EXHIBIT 23

Almost 40% of Greater Jakarta is currently underserved through public transport



[1] These stops include all forms of public transport, and are retrieved both from Google Places and OpenStreetMap.
[2] These areas consist of a set of points that are made up of residential roads, buildings and land usages as identified on OpenStreetMap. Underserved is defined as a distance of 1.5km or more to the nearest transit stop. Distance is calculated "as the crow flies".

One option to boost public transit ridership, is to introduce financial incentives in the form of transit subsidies to high-capacity transit operators, pre-tax benefits to employees who purchase transit passes (which could possibly also be extended to shared mobility), or unbundle parking from employee benefits. Research has shown that this can reduce the level of vehicle trips by 8-30%.

In addition, encouraging multi-modal trips through using ridesharing and public transport, can prove the most cost efficient approach to managing transport options. For example, a survey of 4,500 people across the US confirms that people who routinely use "shared modes" of transportation (e.g. bikesharing, carsharing, and ridesharing) were more likely to use public transit.[90] The report

[90] *Shared Mobility and the Transformation of Public Transit,* American Public Transport Association (APTA), March 2016.

also found that people who use ridesharing in conjunction with mass transit are more likely to forgo car ownership.

To maximize the benefits of shared mobility with public transit, it is crucial to synchronize transport networks, enabling customers to save time by easily switching between different modes and systems of mobility. A good example of such an approach is Uber's partnership with transit agencies in Florida. Uber and the Pinellas Suncoast Transit Authority (PSTA) in Florida announced a "first mile, last mile" partnership to support public transport.[91] The program allows riders to use Uber in Pinellas Park to travel within a specific geographic zone to or from a series of designated stops. From there, riders can connect with the regular PSTA public transit bus system. On the return trip, they can use Uber to travel from the designated stop back home or to work (within the zone).

Another opportunity to boost the linkages between ridesharing and public transport is through integrating technology solutions. For example, Uber is working with transit apps like Moovit and Citymapper, allowing riders to incorporate multiple modes of transportation, including public transit, into their commutes.[92] [93] Uber has also been working with public transport authorities to help support carpooling options from major public transport hubs, particularly around key events such as sporting matches, when demand is particularly high.[94]

Lesson 7: Think about shared mobility as a catalyst for city transformation

Once shared mobility systems are established, there are a range of additional benefits that a city can potentially leverage. This can include redesigning traffic systems, launching driverless vehicles, transforming logistics systems, and other innovations. Not only will this stimulate productivity and growth, it could have broader benefits. Consider the benefits to reducing the number of traffic accidents, which today kill 1.3 million people a year globally; and more than 30,000 in Indonesia.[95]

The data from shared mobility can be used to improve driver safety and enhance traffic flows. For example, Uber has launched four pilot initiatives to enhance road safety in the United States such as daily reports to drivers about how their driving patterns compare to other drivers in their city and a speed display in the app that alerts drivers to the speed of their vehicle.[96] These new technologies are also opening up opportunities for planning decisions to be informed by data. For example, the World Bank has partnered with major rideshare and navigation services companies to combine and make public their traffic data, providing governments with the latest, high-quality information to help with infrastructure and traffic management decisions.[97] A similar initiative has been launched by Uber, called Movement, which aims to support city decision-making on infrastructure and traffic flow issues.

There are also opportunities to exploit on-demand services. For example, Uber ran a pilot program called UberHEALTH in four U.S. cities, making flu care packages and the option to receive a flu shot available on-demand through the Uber platform.[98] This program aims to address the concern that more than 50% of patients complain about trouble getting appointments within at least one week or wait times of more than an hour in the waiting room. Over 90% of users rated the delivery aspect of the vaccine program as important in their decision to request a flu prevention package or flu shot.

[91] https://newsroom.uber.com/us-florida/uber-announces-partnership-to-increase-transportation-access-in-tampa-bay/
[92] https://techcrunch.com/2016/05/03/moovit-transit-app-integrates-with-uber/
[93] https://medium.com/uber-developers/uber-public-transit-by-citymapper-7ed84ad5a2b9#.cjqssel7d
[94] https://newsroom.uber.com/us-california/pooltrain/
[95] Based on 2013 World Health Organization data.
[96] https://medium.com/uber-under-the-hood/new-app-features-and-data-show-how-uber-can-improve-safety-on-the-road-4934da828eb9#.eea219x5p
[97] http://www.worldbank.org/en/news/feature/2016/12/19/open-traffic-data-to-revolutionize-transport
[98] https://medium.com/uber-under-the-hood/on-demand-health-uberhealth-and-the-future-of-healthcare-delivery-7b69f7a61318#.w3g4abs24

APPENDIX A – Detailed Methodology

This report describes the total potential economic impact of shared mobility in 2020 as comprised of three components: economic efficiency; inclusiveness & well-being; and health & the environment. The amounts (where applicable) were initially qualified in Indonesian Rupiah and then converted to US dollars based on the average exchange rate in 2015.[99]

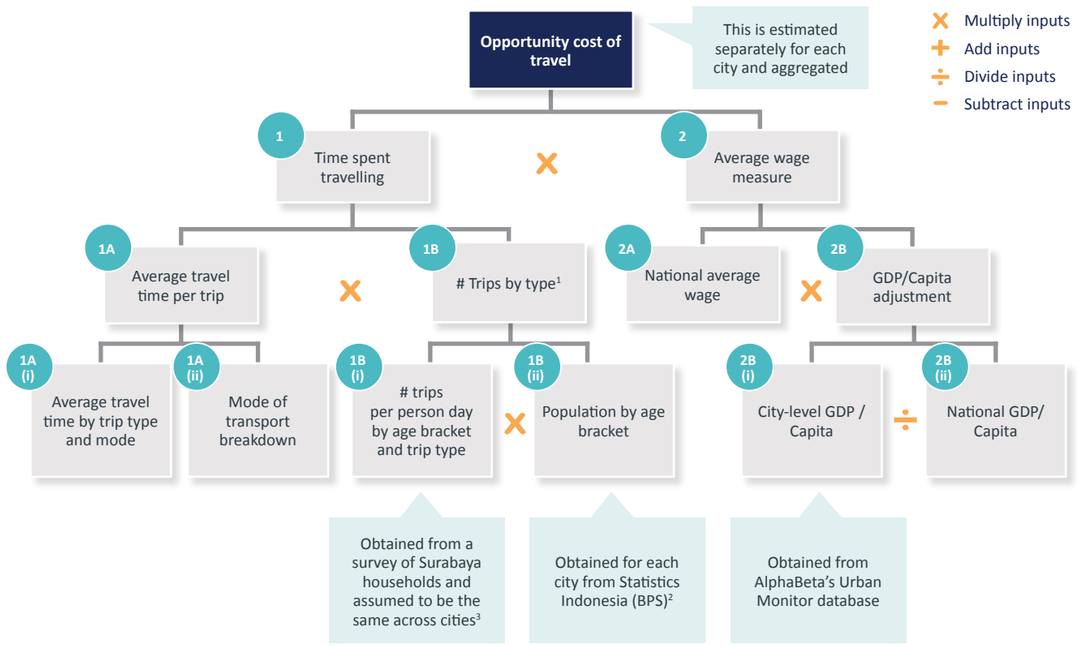
Methodology and Data: Economic Efficiency

The potential economic efficiency benefits of shared mobility in 2020 were sized separately for the following components: time-related commuting benefits; land productivity; more productive use of commuting time; and co-benefits to other sectors.

Commuting time benefits

The first step in sizing the potential impact of shared mobility on time-related commuting costs was to understand the current and future "business-as-usual" costs of congestion. This approach was based on the opportunity cost of travel (Exhibit A1). The opportunity cost of travel for each city was obtained by estimating the total time spent travelling each day and multiplying this by an estimate of the average wage as a proxy for the opportunity cost of time. The total time travelling was obtained by estimating the number of trips, as well as the average travel time per trip (by type of trip and mode of transportation). Below we explain in further detail how each of these components was calculated.

EXHIBIT A1: Estimating the opportunity cost of travel



[1] Trip types include commuting, school, business and private; adjustments were made for Bali to account for the impact of tourism.
[2] Adjustments were made to capture people who travel in from outside the city limits.
[3] Survey conducted by JICA in 2009, involving interviews with 39,000 households.

[99] Average exchange rate for 2015 was 1 USD = 13,395 IDR. Information sourced from X-Rates.com.

Estimating the number of trips by city

The number of trips was obtained using data from a 2009 Surabaya commuter survey[100] on the number of trips per person by age group (which can be considered more broadly representative of trip patterns linked to age groups in Indonesia), and multiplying these figures by the population of each age group in each city[101]. The survey data also allowed us to break these figures down by trip purpose (e.g. commuting, going to school, business trips and private activities).

Furthermore, as the JICA survey only contained "one-way" trips away from home, the trip numbers were doubled to account for the "homeward" journey. An additional 14% of total trips were added on top of this, in order to simulate people who travel into the city from the outlying regions.[102]

In the case of Bali, we adjusted the number of trips to include the impact of tourists. We obtained the number of tourists by month from data published by Bali's Tourism Office and based on the average length of stay of 8.2 days[103], we estimated the average number of tourists in Bali at any one time. We assumed several trips per person per day to calculate the adjustment.

Estimating the average travel time per trip

Average Travel Time by Trip Type and Mode

The average time travel time required for these trips was simulated for thousands of trips in each city (for cars and public transport) using an AlphaBeta algorithm, which pinpoints key destinations in a city representative of different trip types. For example, for commuting trips, a series of potential trips were identified based on key residential and commercial areas in each city. For personal trips, key points such as markets and shopping centers were used. The trips were simulated at different times of the day to capture different traffic conditions (i.e. peak versus off-speak traffic).

Mode of Transport Breakdown

Where commuter surveys were available (in the case of Jakarta[104] and Surabaya[105]), these were used to understand the mode of transport. For other cities where commuter surveys were unavailable, the mode of transportation was estimated based on the share of registered vehicles.[106] We obtained data on the number of motorcycles, cars, and buses by province, and then applied assumptions on average occupancy and hours of operation to estimate the percentage of total trips that each mode could likely facilitate.[107]

Estimating the opportunity cost of travel

The opportunity cost of travel was proxied using an estimate of the average hourly wage by city. This was estimated by taking the national average wage and scaling it based on city-level GDP per capita data from AlphaBeta's Urban Monitor database.

Projecting future evolution of travel costs in the "Business-as-Usual" scenario

The results were projected to 2020 by projecting the city-level population figures and age profiles, as well as the GDP per capita data. Projections of these variables were obtained from AlphaBeta's Urban Monitor database. The mode of transport breakdown (e.g. car, motorcycle, bus) was "frozen" at the current levels for specific journey types.[108] The number of trips was forecast to grow based on the population growth and changing demographics of the city. The average commuting time was forecast based on the correlation between city size and average commuting times. Our analysis found that for every 100,000 increase in population, average commuting time increases on average by 1.9 minutes.

[100] The survey involved interviewing 39,000 households in Surabaya about their commuting behavior. For more information, see JICA (2011), The Study on Formulation of Spatial Planning for GERBANGKERTOSUSILA (GKS) Zone in East Java Province: Final Report Volume 4: Development Action Plan for Transportation Sector.
[101] 2010 Population Census Data - Statistics Indonesia
[102] http://www.thejakartapost.com/news/2015/02/17/138-million-commute-jakarta-daily.html
[103] http://indosurflife.com/2015/09/average-spend-and-length-of-tourist-stay-in-bali/
[104] JICA (2012), Study on JABODETABEK Public Transportation Policy Implementation Strategy.
[105] JICA (2011), The Study on Formulation of Spatial Planning for GERBANGKERTOSUSILA (GKS) Zone in East Java Province: Final Report Volume 4: Development Action Plan for Transportation Sector.
[106] Korps Lalu Lintas Kepolisian Republik Indonesia (Korlantas POLRI) dan Kepolisian Daerah(POLDA)
[107] Note that if actual data were available (e.g. from surveys), these were used instead of the estimates
[108] For example, the share of commuters using private car for work commutes or the share of commuters using public transport for school trips. This still creates variation in the total share of trips as the demographics in a city change over time, which changes the number of different trip types.

Table 1: Inputs and sources for calculating and projecting congestion costs in the BAU scenario

Area	Metric	Source and Approach
1. Time spent traveling	1A. Average travel time by trip type and mode of transport	▪ Google Maps API (simulated using the AlphaBeta algorithm and validated with commuter surveys)
	1B(i). # trips per person per day by age bracket and trip type	▪ Commuter survey conducted in Surabaya by JICA (2009 data)
	1B(ii). Population by age bracket	▪ City-level population data and forecasts from the AlphaBeta Urban Monitor database (based on 2015 World Bank data) ▪ City-level age breakdowns from Statistics Indonesia (2010 Census) ▪ Projected age breakdowns based on national age profile (obtained from UN Population Division)
	1B(iii). Mode of transport breakdown	▪ Breakdown of registered vehicles (motorcycles, cars, and buses) by province in 2013-14, obtained from the Ministry of Transportation (2015)
2. Average wage measure	2A. National average wage	▪ ADB (2015)
	2B(i). City-level GDP/capita estimates & forecasts	▪ AlphaBeta's Urban Monitor database (based on 2015 World Bank data)
	2B(ii). National GDP/capita	▪ World Bank WDI (2015)

Defining the mode of transport breakdown in the "Shared Mobility Scenario"

The benefits of shared mobility were estimated based on how the type of trip could potentially vary with shared mobility (e.g. substituting personal car journeys for shared mobility options). These estimates were based on academic literature[109] and relevant benchmarks from more mature Uber markets. Specifically, the 2020 "shared mobility" scenario involves the following assumptions:

- All personal car and motorcycle trips become shared mobility trips.
- The penetration of carpooling is 20% of all shared mobility trips done by car (i.e. 20% of the combined total of shared mobility car and carpooling trips). This is based on the current penetration in Singapore, which is an example of a more mature shared mobility landscape.
- Users could substitute towards slower forms of transport (e.g. we assume personal motorcycle users could substitute towards shared mobility car trips).[110]
- Multi-modal trips are defined as a journey which involves multiple modes of transport, of which one is a public transit option

These assumptions, combined with data obtained from the Uber user surveys, allow us to construct a breakdown of the modes of transportation in 2020. Note – taxis are included as part of shared mobility options for this analysis. This approach is illustrated for Jakarta in Exhibit A2.

[109] Shared mobility: Innovation for liveable cities, International Transport Forum (ITF), 2016. See link: http://www.itf-oecd.org/sites/default/files/docs/shared-mobility-liveable-cities.pdf

[110] For example, a car trip could be more comfortable than a motorcycle trip.

EXHIBIT A2: Mode of transport breakdown: Jakarta example

Mode of transportation		BAU Scenario (% of trips in 2020)	Shared mobility Scenario (% of trips in 2020)
Personal mobility	Personal motorcycle	49%	0%
	Personal car	13%	0%
Shared mobility	Public transport	15%	9%
	Multi-modal[1]	21%	34%
	Shared mobility car[2]	1%[3]	8%
	Shared mobility motorcycle	0%	46%
	Carpool	0%	2%

[1] Refers to trips that combine any mode of transport with public transport
[2] Includes taxis
[3] Based on registered taxis in Jakarta, and assumption of 8 trips per day. Excludes taxis from outside city, as well as other shared mobility vehicles.
Note: Percentages may not sum to 100% due to rounding

It is worth noting that it is possible that shared mobility could generate "new" trips (i.e. where the trip-taker would have previously stayed home or walked instead of taking shared mobility). This effect, referred to as "induced demand", could have implications for time saved, as well as the number of cars on the road. Given the uncertainty of these impacts, we have not modeled them in this study, but doing so could change some of the impacts explored below. It is important to stress that policy levers explored in this report, such as dynamic road pricing, have proven extremely effective in mitigating these induced demand effects.[111]

[111] "Best Practices: Transportation Demand Management" Seattle City Government, January 2008.

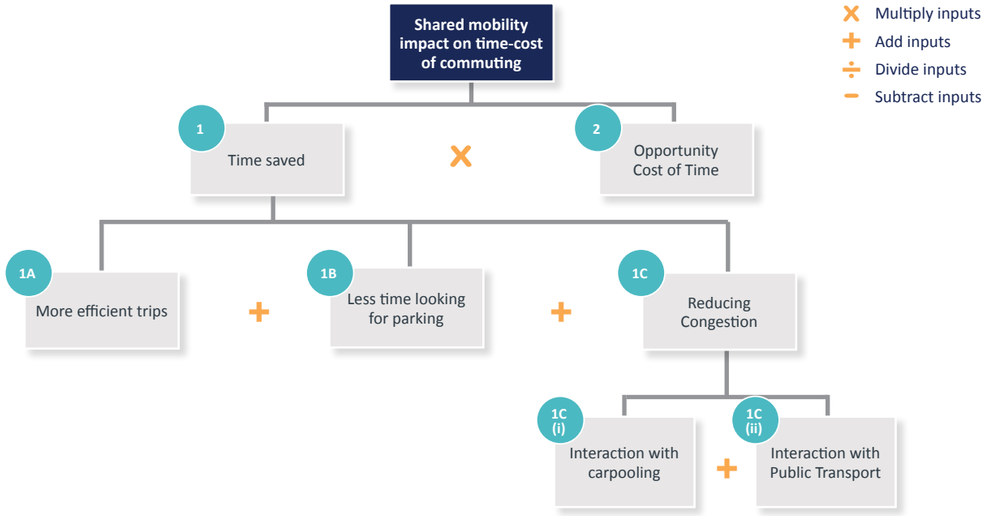
Estimating the time-related commuting benefits of shared mobility

The impact of shared mobility on time-related commuting costs can be calculated as the total amount of time saved, multiplied by a measure of the opportunity cost of travel. Shared mobility can reduce congestion costs by saving people time in three ways (Exhibit A3). These three effects are:

1. More efficient trips
2. Less time looking for parking, and
3. Reducing congestion

The time saved is calculated separately for each effect (detailed below) and aggregated. To quantify the economic value of the time saving, we use an estimate of the average wage by city (calculated as in Exhibit A1 above) and apply this to the total time savings.

EXHIBIT A3: Shared mobility can reduce time associated with commuting in three ways



Effect 1: Estimating time saved due to more efficient trips

The time saved due to more efficient trips was estimated separately for four categories: more efficient trips due to substitution from personal cars to shared mobility motorcycles; more efficient trips for multi-modal users (e.g. by facilitating more convenient public transport connections); more efficient trips due to substitution from public transport towards ridesharing; and slower trips due to substation from personal motorcycles to shared mobility cars. A breakdown of the calculation is provided in Exhibit A4, with the data inputs given in Table 2.

EXHIBIT A4: Estimating the time saved from more efficient trips

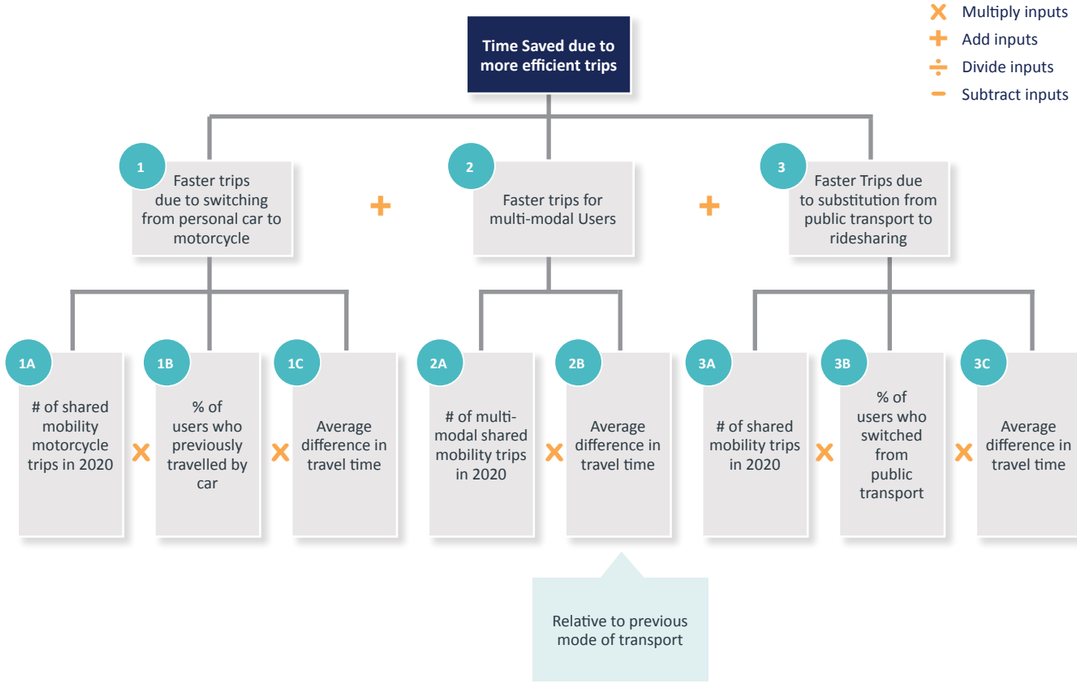


Table 2: Inputs and sources for time saved from more efficient trips

Area	Metric	Source and Approach
1. More efficient trips due to switching from personal car to motorcycle	1A. # of shared mobility motorcycle trips in 2020	▪ Estimated as part of the "shared mobility scenario" above
	1B. % of users who previously travelled by car	▪ Based on uberMOTOR user surveys
	1C. Average difference in travel time	▪ Commuter surveys with average speed of motorcycles versus cars ▪ Average BAU travel time by city (based on AlphaBeta trip simulator) ▪ Average time savings from uberMOTOR surveys as a sense check
2. More efficient trips for multi-modal users	2A. # of multi-modal shared mobility trips in 2020	▪ Number of shared mobility trips in 2020 (estimated as part of the shared mobility scenario above) ▪ % of users who use shared mobility as part of a multi-modal journey (based on Uber user surveys)
	2B. Average difference in travel time (relative to previous mode of transport)	▪ % difference in travel times from Uber user surveys ▪ Average BAU travel time by city (based on AlphaBeta trip simulator)
3. More efficient trips due to substitution from public transport to ridesharing	3A. Number of shared mobility trips	▪ Estimated as part of the "shared mobility scenario" above
	3B. % of users who previously used public transport but no longer do	▪ Based on Uber user surveys
	3C. Average difference in travel time	▪ % difference in travel times from Uber user surveys ▪ Average BAU travel time by city (based on AlphaBeta trip simulator)
4. Slower trips due to substitution from personal motorcycles to shared mobility cars	4A. # of shared mobility car trips in 2020	▪ Estimated as part of the "shared mobility scenario" above
	4B. % of users who previously travelled by motorcycle	▪ Based on uberX user surveys
	4C. Average difference in travel time	▪ Commuter surveys with average speed of motorcycles versus cars ▪ Average BAU travel time by city (based on AlphaBeta trip simulator) ▪ Average time savings from uberX surveys as a sense check

Effect 2: Estimating time saved looking for parking

The time saved looking for parking is calculated separately for car and motorcycle users, as motorcycles generally require less time for parking. A breakdown of the calculation is provided in Exhibit A5, with data inputs and sources shown in Table 3.

EXHIBIT A5: Estimating the time saved looking for parking

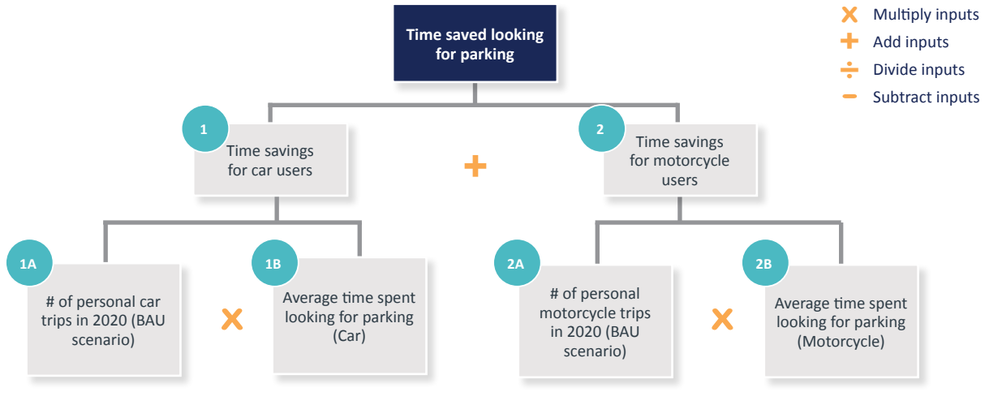


Table 3: Inputs and sources for time savings related to looking for parking

Area	Metric	Source and Approach
1. Time savings for car users	1A. # of personal car trips in 2020 (BAU scenario)	▪ Based on commuter surveys and growing based on population growth and change in demographics by city
	1B. Average time spent looking for parking (car)	▪ Uber user surveys
2. Time savings for motorcycle users	2A. # of personal motorcycle trips in 2020 (BAU scenario)	▪ Based on commuter surveys and growing based on population growth and change in demographics by city
	2B. Average time spent looking for parking (motorcycle)	▪ Uber user surveys

Effect 3: Estimating time saved from reducing congestion

Shared mobility can impact congestion through two main channels: by encouraging carpooling (e.g. through services such as uberPOOL), and through interactions with public transport such as facilitating more multi-modal trips and substitution from public transport to ridesharing. Note that the latter effect could be positive or negative on congestion depending on whether the change in people doing multi-modal transport offsets the number of people who may switch from public transport to ridesharing options. In this section, it is important to note that a "trip" refers to a single person's journey (e.g. three people carpooling together would count as 3 trips, even though these trips require only one car).

Exhibit A6 provides a breakdown of the calculation of time saved through the carpooling effect, with data inputs and sources provided in Table 4.

EXHIBIT A6: Estimating the time saved linked to reducing congestion: Carpooling

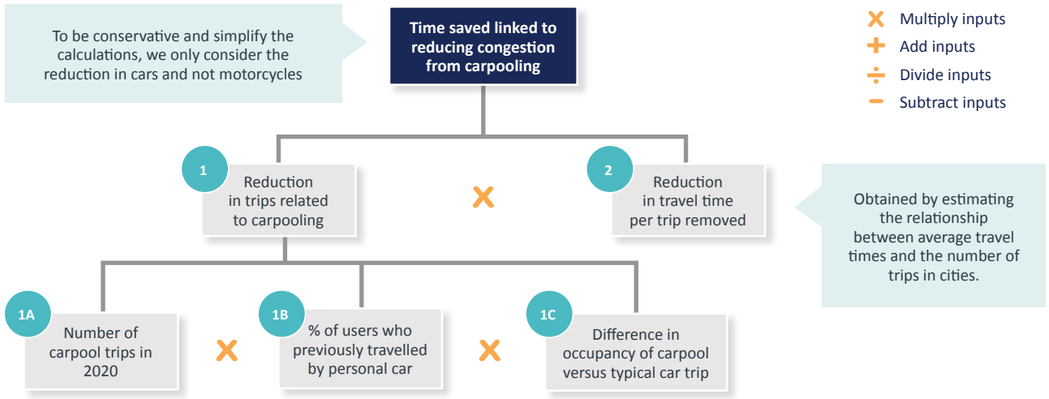


Table 4: Inputs and sources for reducing congestion related to carpooling

Area	Metric	Source and Approach
1. Reduction in trips related to carpooling	1A. Number of carpool trips in 2020	▪ Assumed to be 20% of total shared mobility car trips (equivalent to Singapore's current share)
	1B. % of users who previously traveled by personal car	▪ Based on uberX user survey
	1C. Savings in cars per car pool trip	▪ Based on Uber analysis for Los Angeles, suggesting that for every 10 car pool cars, 18 personal cars could be taken off the road
2. Reduction in travel times per trip removed	Change in average travel times per trip removed from the road	▪ Based on analysis of the number of cars by city and average journey times from the AlphaBeta trip simulator

The interactions with public transport include two effects. While ridesharing can increase the use of public transport by facilitating multi-modal journeys, it can also reduce the use of public transport by drawing people away towards ridesharing. The interactions with public transport are therefore presented as a net outcome of both effects. A breakdown of the calculation is provided in Exhibit A7, with data inputs and sources shown in Table 5.

EXHIBIT A7: Estimating the time saved linked to reducing congestion: Interactions with public transport

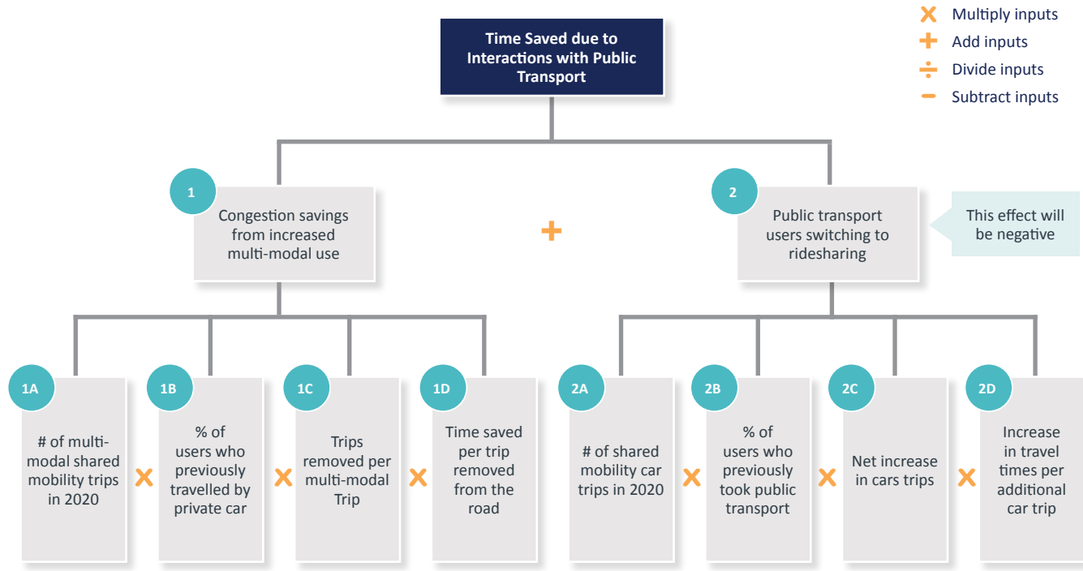


Table 5: Inputs and sources for congestion benefits related to interactions with public transport

Area	Metric	Source and Approach
1. Congestion savings from increased multi-modal use	1A. # of multi-modal shared mobility trips in 2020	▪ % of users partaking in multi-modal trips (from Uber user surveys) ▪ Number of trips for each type of shared mobility (this is estimated as part of the "shared mobility scenario" above)
	1B. % of users who previously travelled by personal car	▪ Uber user survey
	1C. Car trips removed per multi-modal trip	▪ Based on the average occupancy of cars versus buses, obtained from a 2009 Surabaya traffic survey conducted by JICA
	1D. Time saved per car trip removed from the road	▪ AlphaBeta trip simulator comparing average travel times and number of cars by city
2. Public transport users switching to ridesharing	2A. # of shared mobility car & carpool trips in 2020	▪ Estimated as part of the "shared mobility scenario" above
	2B. % of users who previously took public transport	▪ Uber user survey
	2C. Net increase in car trips	▪ Based on the average occupancy of cars versus buses, obtained from a 2009 Surabaya traffic survey conducted by JICA
	2D. Increase in travel times per additional car trip on the road	▪ AlphaBeta trip simulator comparing average travel times and number of cars by city

More productive use of commuting time

This was not quantified in monetary terms, but based on a survey of over 900 Uber users in Jakarta, Bandung, Surabaya, and Bali. The survey asked them the range of activities they typically do in their current Uber journeys, versus what they did previously.

Land productivity

Land productivity is a measure of land's contribution to an economy, estimated through the rental value of the utilized space as a proxy. Land productivity consists of two categories: commercial parking and on-street parking space productivity. A breakdown of the calculation is provided in Exhibit A8, with data inputs and sources shown in Table 6.

Commercial parking space productivity figures for Jakarta and Surabaya were based on research from the Asian Development Bank (ADB),[112] Colliers International,[113] and publicly available building blueprints. By applying the legal requirements for the provisioning of parking spaces against the commercial space available, and using a multiplier derived from developer tendencies in the building blueprints, we estimated the amount of space utilized for commercial parking. The respective rental rates were then applied, for cities where such information was not available, the findings from Surabaya were scaled to the respective city's GDP per capita and number of commercial jobs.

On-street parking space productivity was derived from the daily vehicle trips, the minimum parking lot size required for motorcycles and cars, and the cheapest land rental value for each city. For each of the trip types, a parking multiplier was applied to capture the number of vehicles that would be parked at a given time. For instance, a vehicle that is driven for a work commute would likely be parked for the entire day while a vehicle driven for a personal trip is likely to parked for an hour or two. The number of parked vehicles multiplied by vehicle parking lot sizes provided us with the total space utilized. Subtracting the commercial parking spaces from the total gives us the amount of on-street parking, where the lowest rental rate of the city is applied to it as a conservative measure.

[112] *Parking Policy in Asian Cities*, Asian Development Bank, 2011.
[113] *Jakarta Property Market Report*, Colliers International, 2016; and *Surabaya Half Year Report*, Colliers International, 2016

EXHIBIT A8: Potential savings related to land productivity

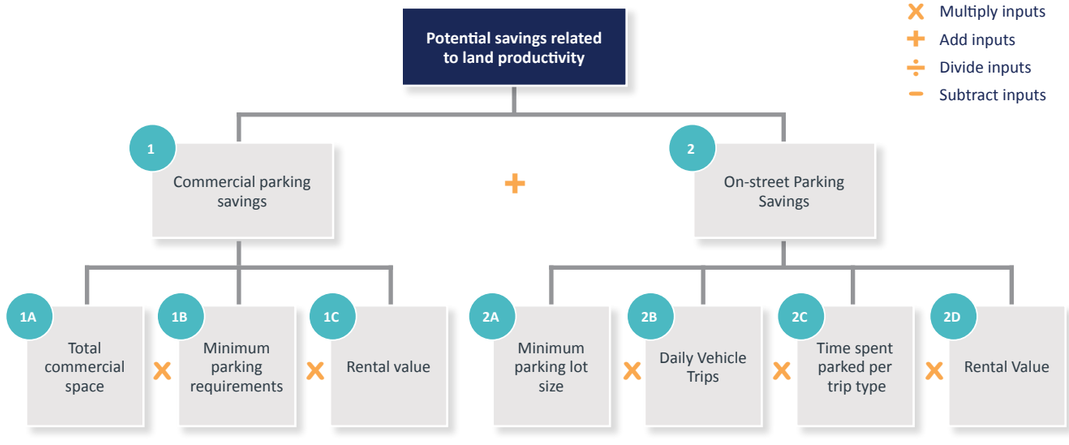


Table 6: Inputs and sources for congestion benefits related to interactions with public transport

Estimation	Metric	Source
1. Commercial parking space productivity	1A. Total commercial space (across Indonesian cities)	▪ Colliers International (2016)
	1B. Legal parking requirements (calculated as a share of total commercial space	▪ Asian Development Bank (2011)
	1C. Land rental value	▪ Colliers International (2016)
2. On-street parking space productivity	2A. Parking lot size	▪ Asian Development Bank (2011)
	2B. Daily vehicle trips	▪ AlphaBeta analysis
	2C. Time spent parked per trip type	▪ AphaBeta analysis based on "rule of thumb" (e.g., 8 hours for working; 1-2 hours for shopping, etc.)
	2D. Land rental value	▪ Colliers International (2016)

Co-benefits to other sectors

The co-benefits to other sectors were not quantified in monetary terms, however data from Uber was used to understand the nationality of visitors to Indonesia who most frequently use Uber in their commuting while traveling.

Methodology and Data: Inclusiveness & Well-being

The potential inclusiveness & well-being benefits of shared mobility in 2020 were sized separately for the following components: consumer surplus; drive productivity; direct economic opportunity effects; indirect employment effects; value of flexibility; lower mobility costs; and digital financial inclusion benefits.

Cost of mobility

We estimated the relative costs of mobility options by comparing the costs of owning a car versus using ridesharing options. A low-end and mid-range commuter profile were used to capture a range of commuting approaches. A breakdown in the components of each mobility option can be found in Exhibit A9 and Table 7. Specific assumptions were made for each commuting mode:

Personal car

- 14,000km is driven annually
- A 10-year loan is taken out to help pay for the car
- Applicable taxes are added onto the list price of the car. Two popular car types in Indonesia (Toyota Avanza and Toyota Corolla) were chosen to provide a range of vehicle costs
- There is no accident or mechanical failure during the car's lifespan
- The car has a residual value of 10-25 percent at the end of 10 years

Ridesharing

- Ridesharing cost is also based on 14,000km equivalent of trips
- Uber pricing is used as a proxy for shared mobility options
- User does not use free time during the ride for work

EXHIBIT A9: Cost of mobility

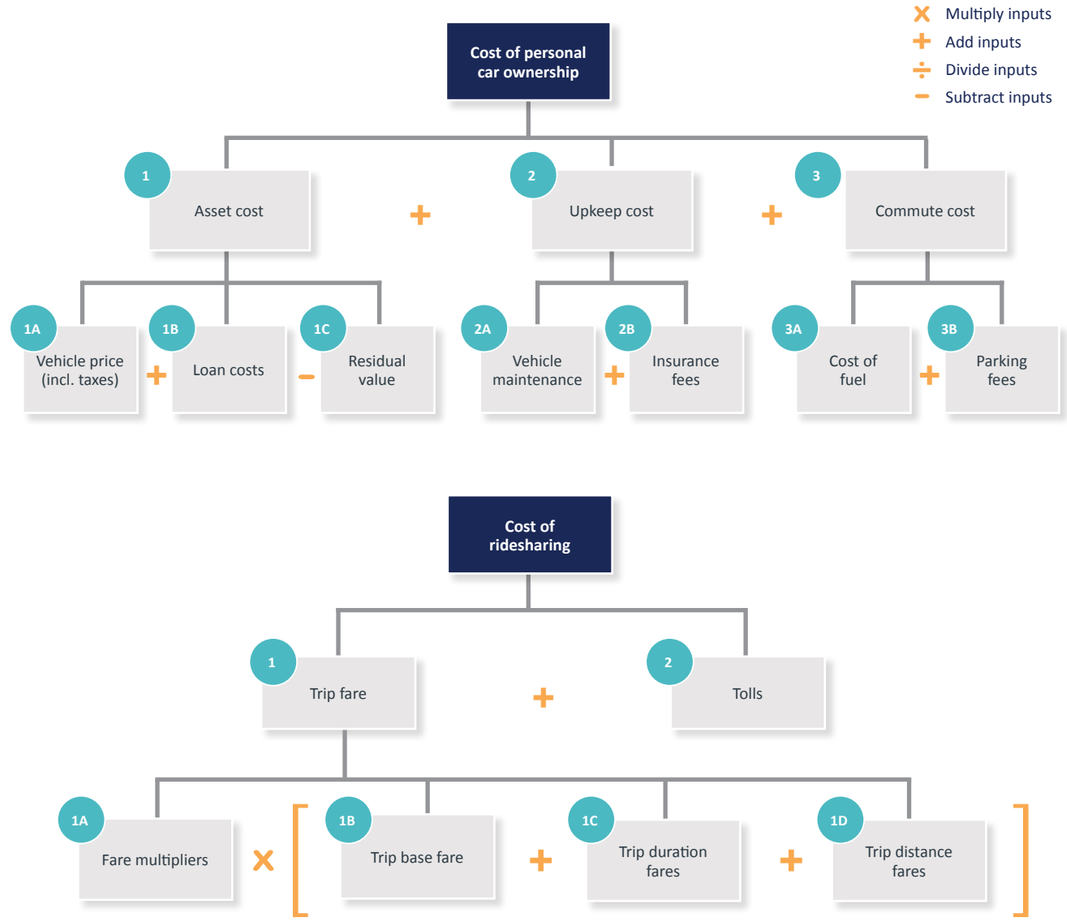


Table 7: Inputs and sources for calculating cost of mobility

Estimation	Metric	Source
Annual cost of car ownership	1A. Vehicle price (incl. including taxes)	▪ Toyota Astra Price List (2016)[114] ▪ Car Taxes in Indonesia (2016)[115]
	1B. Loan + depreciation costs	▪ Duitpintar.com (2016)[116]
	1C. Car trips removed per multi-modal trip	▪ Edmunds.com (2016) [117]
	2A. Vehicle maintenance	▪ Toyota Malaysia (2016) [118]
	2B. Insurance fees	▪ Duitpintar.com (2016)
	3A. Cost of fuel	▪ General rule of thumb for Indonesia is 8,000 IDR / liter
	3B. Parking fees	▪ Colliers International (2011)[119]
Annual cost of ridesharing	1A. Fare multipliers	▪ Uber internal data
	1B. Base fare	▪ Uber fare estimator[120]
	1C. Trip duration fare	▪ Uber fare estimator[121]
	1D. Trip distance fare	▪ Uber fare estimator[122]
	2. Tolls	▪ Uber fare estimator[123]

Personal safety

The personal safety benefits were not quantified, but instead were captured through a survey of Uber users in Indonesia which asked them the degree to which personal safety was an important consideration for them choosing Uber.

Economic opportunities for driving

The number of potential economic opportunities for Indonesians related to ridesharing (not just Uber) in 2020 was estimated based on (a) forecast of the number of potential shared mobility car trips (based on the "shared mobility scenario"); (b) an estimate of the average speed of trips to understand the implied driving time; and (c) an assumption of average working hours per day of drivers. The latter was assumed to be 4 hours per day, which allows for many drivers doing ridesharing services as part of a flexible, part-time income generating opportunity.

[114] *2016 Price list*, Toyota Astra, http://www.toyota.astra.co.id/shopping-tools/pricelist, Accessed 5 December 2016.
[115] *Car taxes in Indonesia,* Angloinfo, www.angloinfo.com/how-to/indonesia/money/indonesian-taxes/car-tax, Accessed 5 December 2016.
[116] Duitpintar.com, https://www.duitpintar.com/en_sg, Accessed 5 December 2016.
[117] Depreciation Infographic: *How Fast Does My New Car Lose Value?*, Edmunds.com, www.edmunds.com/car-buying/how-fast-does-my-new-car-lose-value-infographic.html, Accessed 5 December 2016.
[118] *Toyota Maintenance Schedule*, Toyota Malaysia, https://toyota.com.my/ToyotaOfficialWebsite/media/ToyotaCarPDF/MaxCheck%20PDF/201611/Avanza-Maintenance-Packages.pdf, Accessed 5 December 2016.
[119] *Colliers International Global Parking Rate Survey 2011,* Colliers International, http://www.thetruthaboutcars.com/wp-content/uploads/2011/07/globalcolliersparkingratesurvey2011.pdf, Accessed 5 December 2016.
[120] *Uber Fare Estimator,* Uber, https://www.uber.com/en-SG/fare-estimate/, Accessed 5 December 2016.
[121] *Uber Fare Estimator,* Uber, https://www.uber.com/en-SG/fare-estimate/, Accessed 5 December 2016.
[122] *Uber Fare Estimator,* Uber, https://www.uber.com/en-SG/fare-estimate/, Accessed 5 December 2016.
[123] *Uber Fare Estimator,* Uber, https://www.uber.com/en-SG/fare-estimate/, Accessed 5 December 2016.

Digital financial inclusion benefits

Financial activity data came from the survey of Uber driver-partners, who were asked how their banking habits have changed since joining Uber in relation to the usage frequency of bank accounts, credit, or debit cards, and how much more knowledgeable about financial services they have become.
The specific question asked for measuring the number who could be financially included through ridesharing was "Did you have a bank account prior to driving for Uber?". Roughly 6% of driver-partner respondents replied that they did not have a bank account prior to driving for Uber. This percentage was then applied to the total estimate of ridesharing drivers in 2020 in the "shared mobility scenario" (as estimated above). The economic benefits of financial inclusion were estimated based on global data.[124]

Methodology and Data: Health & the Environment

The potential health & environment benefits of shared mobility in 2020 were sized separately for the following components: GHG emissions; air pollution; and personal safety.

GHG Emissions

The GHG emission impact was based on the reduction in congestion (kilometers saved) from the earlier analysis, combined with data on fuel efficiency of Indonesian vehicles, and the average emissions per kilometer.

The conversion of CO2 emissions into other metrics such as hectares of forest saved from deforestation was derived from equations provided by the US Environmental Protection Agency.[125]

Air Pollution

This analysis was based on the share of air pollution in Indonesia linked to urban transport, obtained from the Indonesian Ministry of Transportation[126] and the Ministry of Environment,[127] and then combined with the savings on kilometers traveled (from the earlier analysis) to estimate traffic air pollution reduction.

[124] *Three paths to sustained economic growth in Southeast Asia,* McKinsey Global Institute, November 2014.
[125] https://www.epa.gov/energy/ghg-equivalencies-calculator-calculations-and-references
[126] *Indonesian Country Report on Environmentally Sustainable Transport Implementation,* Ministry of Transport, 2008.
[127] http://www.nytimes.com/2015/09/27/world/asia/as-indonesia-prospers-air-pollution-takes-toll.html?_r=0

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