

“The Last Hill”

A study on the role of informal transport in: the mototáxi system of Rocinha, Rio de Janeiro



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Supervisor: dr. Martin van der Velde
Word count: 21178

Front page picture: lifeinrocinha.blogspot.com

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“Favela is
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who do not have
another exit.”

Paulo Cesar Paschoalini

Preface

Ever since I visited Portugal in 2016, I have been fascinated by the Portuguese language. This eventually led me to become intrigued by Brazil, especially by the city of Rio de Janeiro. It sparked my interest because of its culture, geographical sites but also the inequality that can be seen within the agglomeration. Expensive neighbourhoods and slums can be found next to each other, which makes it unique and different from what I know in the Netherlands and Europe in general.

Because of my interest in Brazil, I decided that I wanted to write my thesis on a topic within this country's context. The way in which poorer classes lead their day to day lives seemed interesting to me. Recent material I found on YouTube, gave me an insight into how people construct their livelihoods in the favela, the Brazilian name for urban informal settlements. The slum that interested me is Rocinha, located in Rio de Janeiro. It is built up against the slope of a mountain which makes it difficult to access. Mototáxis enable people to travel through the narrow passages of the favela. The phenomenon sparked my interest, because it is a system of transportation that is fundamentally different from that of the Netherlands. After delving into the topic, I encountered numerous articles on moto taxis in Rocinha. BBC shed light on them in anticipation of the 2014 World Cup in Brazil. In a video, they gave their audience an idea of how travelling in the slum is (BBC, 2014). After seeing all this, my interest in the dynamics of mototáxis got even bigger.

Doing this research gave me some nice opportunities. Through a contact, I was invited to give lectures at UNICAMP, in the city of Campinas and Centro Universitário Moura Lacerda, in the city of Ribeirão Preto. I have met a lot of new people and made friends through doing this thesis. I want to thank everyone who has helped me during the past few months. Muito obrigado a todos de vocês!

I hope you enjoy my thesis!
Espero que aproveite minha tese!

Thijmen van Kleef
Nijmegen, June 2021

Summary

Many areas in the Global South have been struggling with providing good mobility to their inhabitants. Urban growth levels are often too rapid for planners to keep up with. Providing public transport services of good quality has proven to be especially difficult for urban dwellings since they are built without proper planning and are often located at sites difficult to access. Rocinha, a favela in Rio de Janeiro, has a huge mototáxi business which serves people living up the hill.

The goal of this research was to get an idea of how mototáxis function and how they help people to meet their mobility demands. This has been studied through the main question: *“How and why does informal transport (mototáxis) fill in the role of conventional public transport in Rocinha, Rio de Janeiro and to what extent is this applicable elsewhere?”*

To answer this question, there has been chosen for a holistic approach. By collecting data from both mototáxi drivers, the supply side, and from their users, the demand side, the goal was to get an overview of how the system worked and why. Drivers have been studied through interviews and the users of the system were studied by doing a questionnaire. By analysing policy from the municipality of Rio, the government has also been integrated in approaching mototáxis. Furthermore, interviews with experts have been done because they could see the system through a wider lens and offer new perspectives.

The results showed that public transport can only access parts of the community due to the topographic location of Rocinha, built upon a steep hillside. Furthermore, the lack of proper planning has led to small alleyways and roads that are not fit for large vehicles, let alone busses. People who live more distant from the main road, need other ways besides public transport to get to their final destination in the slum. Therefore there is a problem with covering ‘the last mile’. Mototáxis have anticipated this demand by providing a fast, relatively cheap and highly accessible service that goes where other vehicles cannot. Not only has the topography worked in favour of mototáxis, the data also showed that public transport is seen as inadequate, both in terms of quantity and quality. It is expensive for the quality that is on offer, is often completely packed and it only functions at certain times of the day. At the same time, mototáxis have proven to offer the service that is wanted. They are fast, relatively cheap and punctual. Therefore they have an advantage over public transport in Rocinha.

The government is mostly uninvolved in mototáxi. Their control over the system is almost non-existent in Rocinha. This is partly due to the traffickers that operate there, but also due to a lack of effort. The drug lords are in charge of what happens in the community and act as a governing power. This makes for a state with little influence. Therefore, the policy on mototáxi made by the state does not have much effect in favela areas. Furthermore, there is a distrust towards the government by many favela residents and the government’s intentions are questioned. Policy by the municipality is seen as insufficient and touching upon the wrong aspects of mototáxis.

Although mototáxis are not unique for Rocinha, their context and the importance they have in this favela is. They have a big part in the transportation of the community. They mostly act as feeders to conventional transport and therefore cover the ‘last mile’. What is also specific is the lack of control the government has over them due to them falling outside of their ‘control

zone'. With that said, a lot can be learned from mototaxis. They show policy makers where public transport lacks and give an idea of what people expect from it. Furthermore, mototaxi provides jobs to young guys in need of work and work in an adaptive manner. The system of mototaxis also shows what can better be avoided. The relationship between the drivers and the state is bad, to say the least. Other urban areas dealing with similar modes of informal transport can learn from it in their approach.

Sumário

Muitas áreas no Hemisfério Sul têm lutado para fornecer boa mobilidade aos seus habitantes. Os níveis de crescimento urbano costumam ser rápidos demais para os planejadores acompanharem. A prestação de serviços de transporte público de boa qualidade tem se mostrado especialmente difícil para as moradias urbanas, uma vez que são construídas sem planejamento adequado e muitas vezes estão localizadas em locais de difícil acesso. A Rocinha, uma favela do Rio de Janeiro, tem um grande negócio de mototáxis que atende as pessoas que moram no alto da montanha.

O objetivo desta pesquisa foi ter uma ideia de como os mototáxis funcionam e como ajudam a atender às demandas de mobilidade das pessoas. Isso será pesquisado por meio da pergunta principal: *" Como e por que o transporte informal (mototáxis) preenche o papel do transporte público convencional na Rocinha, no Rio de Janeiro e em que medida isso é aplicável em outros lugares? "*

Para responder a esta pergunta, optou-se por uma abordagem holística. Ao coletar dados de ambos os motoristas de mototáxi, do lado da oferta, e de seus usuários, do lado da demanda, o objetivo era obter uma visão geral de como o sistema funcionava e por quê. Os motoristas foram estudados por meio de entrevistas e os usuários do sistema foram avaliados por meio de um questionário. Ao analisar a política do município do Rio, o governo também se integrou na abordagem dos mototáxis na Rocinha. Além disso, as entrevistas com especialistas foram feitas porque eles podiam ver o sistema através de uma lente ampla.

Os resultados mostraram que o transporte público só tem acesso a uma pequena parte da comunidade devido à localização topográfica da Rocinha, construída em uma encosta íngreme. Além disso, a falta de planejamento adequado levou a pequenos becos e estradas que não são adequadas para grandes veículos como carros e muito menos para ônibus de transporte público. As pessoas que moram mais distantes da estrada principal precisam se deslocar de outras formas na favela. Portanto, há um problema em cobrir "a última milha" com transporte público. Os mototáxis anteciparam essa demanda ao fornecer um serviço rápido, relativamente barato e altamente acessível que vai aonde o transporte público não vai. Não só a topografia tem funcionado a favor do mototáxi, como a qualidade do transporte público também é vista como deficiente. É caro pela qualidade que é oferecida, muitas vezes está completamente embalado e só funciona em determinados momentos do dia. Ao mesmo tempo, o mototáxi pode ser utilizado a qualquer momento. Chamando um motorista ou indo a um dos pontos de mototáxi da Rocinha, o passageiro pode iniciar uma corrida.

O governo foi amplamente deixado de fora dos mototáxis. Seu controle sobre o sistema é quase inexistente na Rocinha. Isso se deve aos traficantes que atuam ali. Eles são responsáveis pelo que acontece na comunidade e atuam como um poder governante. O estado tem pouca influência. Portanto, a política que eles fazem sobre mototáxis não tem muito efeito nas áreas de favela. Além disso, há desconfiança em relação ao governo por parte de muitos moradores de favelas. A política do município é vista como insuficiente e não aborda os aspectos das reais necessidades dos mototáxis.

Embora os mototáxis não sejam exclusivos da Rocinha. A importância que eles têm na favela é fundamental. Na Rocinha, os mototáxis ocupam grande parte do sistema de transporte. Eles atuam principalmente como alimentadores do transporte convencional e, portanto, cobrem a última milha. O que também é específico é a falta de controle que o governo tem sobre eles devido ao fato de eles estarem fora de sua "zona de controle". Com dito isso, muito pode ser aprendido com os mototáxis. Eles mostram aos vereadores onde falta transporte público e dão uma ideia do que as pessoas necessitam. Além disso, fornece renda a jovens que precisam. O sistema de mototáxis também mostra o que não fazer. Já que a relação entre os motoristas e o estado é no mínimo ruim. Outras áreas urbanas que lidam com modais de transporte semelhantes podem aprender com isso.

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1. Introduction

1.1 Project orientation

“Urban areas, home to more than half of the world’s population, face unprecedented transport and mobility challenges. With rapid population and economic growth, demands for urban mobility are steadily rising” (Cervero, 2014, p. 175). Especially cities in developing regions grow rapidly. Not only in terms of population, but also when looking at the coverage of the physical surface. From 1995 to 2005, 85% of the 78 largest cities in the developed world experienced a faster growth in their suburban regions than their urban centres (UN Habitat, 2011). What took the US 90 years to accomplish in terms of urban growth, only took 30 years for Brazil (Henderson, 2002).

In major parts of the Global South, housing needs are met by informal settlements (Williams, Meth & Willis, 2009) and this number will only grow. It is expected that in 2050, 75% of the world population will live in the city. Of these people, 60% will be living in informal settlements (United Nations, 2015). Perez argues that the lack of adequate public transportation and physical exclusion of slum areas excludes people in poverty from job opportunities, cheap goods and public services (2016). To elevate them out of poverty, investing in physical mobility, someone’s ability to move in space, is essential to get people from one place to another. This enables them to access these goods and services (Wachs, 2010). Thereby, physical mobility is a core concept in the thinking on poverty alleviation and improving livelihoods (Perez, 2016).

Research has shown that urban areas in the Global South, parts of Latin America, the Caribbean, Africa and Asia (Williams, Meth & Willis, 2009), struggle with mobility issues (Venter, Mahendra & Hidalgo, 2019). In the urban areas of the Global South, one often encounters informal transportation systems, organised according to specific contexts. These systems often operate next to conventional government organised public transport such as metro lines, busses, trains, etcetera. TukTuks riding through the crowded streets of Delhi is a well-known example of an alternative form of transportation. Informal transport can also be found in parts of Africa, where mototaxis form the bridge between the rural areas and the urban centres, enabling people to go there. Therefore, they fulfil an important function in people’s livelihoods (Ehebrecht, Heinrichs & Lenz, 2018).

In Rio de Janeiro, informal public transport has also emerged. In many of the cities nearly 1000 favelas (NBC, 2016) mototaxis offer services. They are just one of the many forms of informal employment, with the informal economy offering a large portion of the jobs in the favelas. In this thesis, the slum of Rocinha will be the site under research. It will be studied how informal transport helps to cover ‘the last mile’, a term used to describe the last part of a trip by public transport. For Rocinha however, it is better to speak about ‘the last hill’, since people need to get up a hillside to reach their destination.

The rapid urbanization process in the Global South continues and this also brings about difficulties regarding physical mobility. For planners, this imposes the task of developing public transport that complies with the needs of a growing urban population. More people in the urban areas of the Global South are in need of physical mobility which leaves governments with the task of guaranteeing a certain level of physical mobility. The question arises if informal

transport is able to grant this to people in the developing regions of the world. To explore the idea, the case of mototáxi transport in Rocinha will be used. It will be studied how they have emerged, which are the enabling factors and what can be learned from informal transport in this favela.

1.2 Context of Rocinha

For this thesis, it is essential to provide context of Rocinha and demarcate the neighbourhood. Furthermore, a basic context of Rio de Janeiro and favelas in general will be given. The definition of the term 'mototáxi' will also be explained.

1.2.1 Rio de Janeiro

Before Rocinha can be discussed, it is important to have a context on Rio de Janeiro in general. Rio de Janeiro is the third largest city in South America, after São Paulo and Buenos Aires. The Greater Rio de Janeiro is considered one of the larger metropole regions on the globe. The city itself has around 6.3 million inhabitants (Atlas of Human Development in Brazil, 2010) while the metropole region is estimated at nearly 13 million people. It is located at the Atlantic Ocean and was founded by Portuguese colonizers in the 15th century. Rio de Janeiro is known for its characteristic topography, built in between mountains and the Atlantic Forest. Because of these natural physical barriers, the city is divided into different zones. The South Zone is the most famous of them all due to the cultural sites that can be found there, which attract large numbers of tourists. It is also the richest part of town, where housing is the most expensive.

In financial terms, Rio de Janeiro is one of the financial centres of Brazil. It has the second largest municipal GDP in the country, following São Paulo. The city's Human Development Index is set at 0,799, earning it a place in the top 50 municipalities of Brazil (Schreiner, 2016). Although the city is doing well economically, there exists a large income inequality. The Gini coefficient, based on the Lorenz curve, has been calculated at 0,61. That is relatively high considering that 0 means complete income equality and 1 meaning complete inequality (Szwarcwald, Bastos, Viacava, & De Andrade, 1999). Income inequality also had its effects on how the city looks. Many of the poorest people of the city live in favelas due to them not being able to afford formal housing (Barke & O'Hare, 2002) while at the same time, expensive neighbourhoods are just minutes away.

In recent years, the income of the people of Rio de Janeiro has steadily grown. This has resulted in a strong rise in the number of cars. Rio de Janeiro's car fleet grows at about 5% per year. Travel times by car have increased, with the average speed in the city falling under 20 kilometres per hour due to congestion. In reaction to this trend, the municipality has reacted by investments in public transport in anticipation of the World Cup of 2014 and the Olympic Games of 2016 (Hughes & Leshner, 2013).

1.2.2 Rocinha: its location and context

Most of the households living in low-income settlements are concentrated in 20 metropolitan regions in Brazil, especially in São Paulo and Rio de Janeiro. Maia, Lucas, Marinho, Santos, & de Lima (2016) characterize these settlements by the illegal and informal occupation of public or private land, its high-density and the lack of basic infrastructures. In Rio de Janeiro around 1.5 million inhabitants, accounting for 23% of the city's population, live in favelas (NBC, 2016). Most are located at places that are unsuitable for commercial development, which has allowed for the construction of informal dwellings (Barke & O'Hare, 2002).

Rocinha is Rio's main informal settlement and one of the largest slums in Latin America in terms of population (Arcidiacono, Causone, Grosso, Masera, Tadi, & Zadeh, 2017). It is located in the South Zone of Rio de Janeiro, Brazil (figure 1). Although the official population is set around 70.000, recent unofficial estimates come close to 200.000 inhabitants. These people live on about 450.000 square metres of land. In this area, most work in the informal sector. The average wage is set at €101 per month, which is less than the official minimum wage in Brazil (Santos, Silva, Fernandes & Marsden, 2020). The community, a word often preferred over favelas, has its origin at the end of the 1920's. It began as a large coffee farm, located on the slopes of a hill. The former farm, a rocha in colloquial Portuguese, forms the origin for the name 'Rocinha' (Centro Internacional de Estudos e Pesquisa sobre a Infância, n.d.). Land workers started constructing their own houses on the land and slowly, a neighbourhood started to form which kept on growing in the decades after.

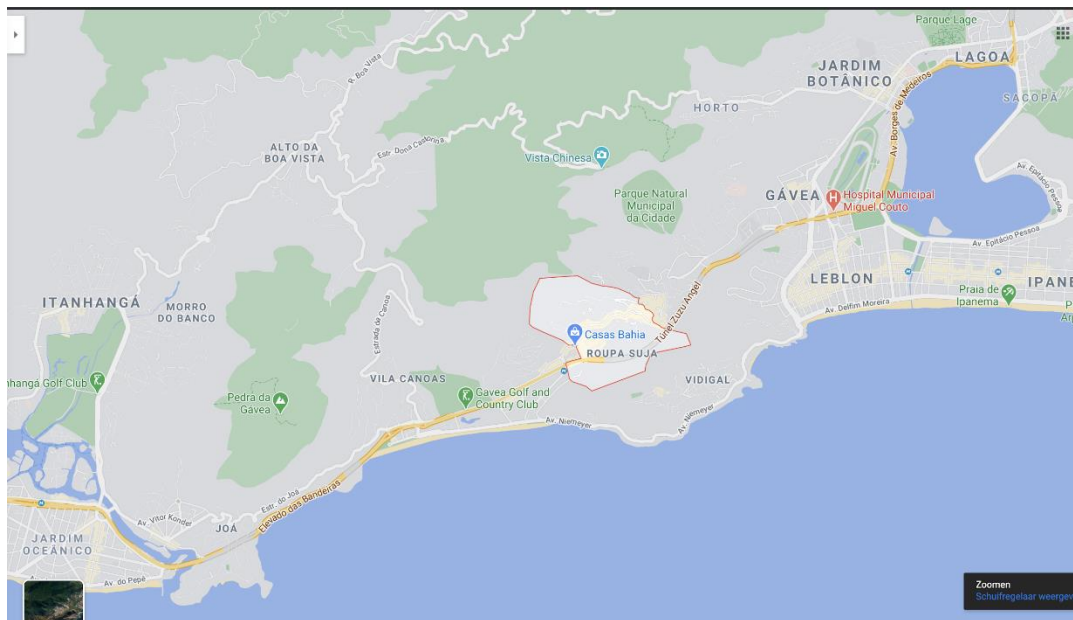


Figure 1: Rocinha's location (red box). Source: Google Maps

During the 1950's, migration started from the north eastern region of Brazil to Rocinha. A second migration peak occurred between 1960 and 1970 when jobs were on offer for the construction of two tunnels going through the mountainous landscape to better connect different parts of the city. These immigrants moved to Rio de Janeiro in the hope to find work. After this period of rapid growth, Rocinha received the status of an official neighbourhood by the city of Rio de Janeiro (Lucena, 2016). Progress came through public services. Investments were made in education, basic sewage was constructed and asphalted roads started being built. Still, the favela is characterised by poor water quality and poor sanitation standards (Arcidiacono et al., 2017). Most services are organised by the people from the favela itself.

Rocinha is often called 'a city within a city' because it has its own economy and is almost completely functioning by itself. The lack of government has led to 'creative survival' and people organising themselves.

Most 'carioca favelas', a nickname given to Rio de Janeiro's inhabitants, have been part of the urban landscape for more than a century. They are constructed in areas that would otherwise be deprived of housing (Pereira, 2014). This is also the case for Rocinha, which is built against the slope leading to 'Morro Dois Irmãos' and 'Litoriaux' (Vilani, Machado & da Silva Rocha, 2014). The steep hillsides act as natural barriers that limit the available construction space. Furthermore, the community is bordered by the neighbourhoods Gávea, São Conrado and Vidigal, the last being another favela. Rocinha is also relatively close to world famous sites such as Copacabana and Ipanema beach. Partly because of the difficulty the location brings, housing is cheap compared to other neighbourhoods in the southern region of Rio de Janeiro. Its location makes Rocinha challenging to access. There are only two main roads where larger transport vehicles can drive. For busses this is limited to one, Estrada da Gávea. Three bus lines operate on this street that connect Rocinha to other areas in the city. The 13 metre long vehicles struggle to drive down the small passages on Estrada da Gávea. In combination with other traffic, this leads to many traffic jams and unsafe situations. Due to the density of housing in internal parts of Rocinha, they are inaccessible by car or bus. Most of the houses are connected to small alleys that are only accessible by pedestrians, bikes or motorcycles. A study done by the Institute for Geography and Statistics of Brazil (IBGE, 2010), showed that almost all homes in Rocinha are only accessible by (motor)bike or foot (figure 2). Although the slum was built without building permits, the government tolerates its existence nowadays. It even provides some services. However, the main authorities have long been the drug lords who control the favela. They act as a governing power and provide some rules.

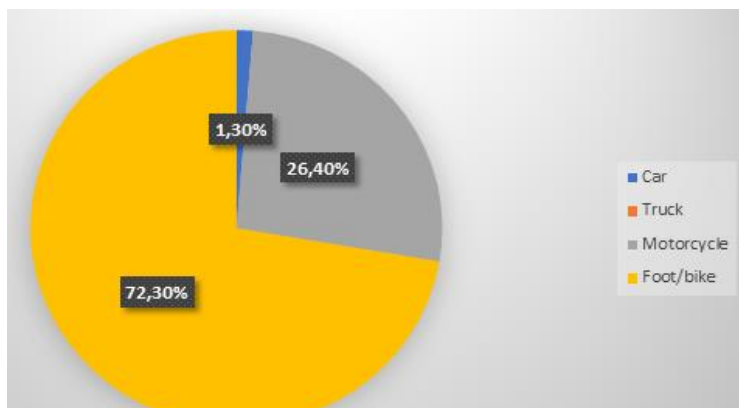


Figure 2: Accessibility of houses in Rocinha per transport type. Source: IBGE

The social problems of the favelas first received mass attention in 2003, when Brazil was trying to attract the World Cup to the country. "The high rates of violence and the international attention generated by the upcoming World Cup and Olympic Games pushed Rio de Janeiro's government into developing a security program called the 'Unidades de Policia Pacificadora' (UPP), which was released in 2008" (Oosterbaan & van Wijk, p. 179). This police pacification program was aimed at regaining control of Rio's slum areas and evicting the drug lords. After securing parts of Rocinha, the municipal authority could start to provide more social services such as schools and healthcare centres. Programs aimed at providing services like basic sanitation, electricity as well as better developed infrastructure, including bus links have cost

the government in excess of 200 million euros (BBC, n.d.). Still, Rocinha remains under the influence of drug traffickers who operate from the area.

Alongside progress, the modernization program installed before the World Cup and the Olympic Games also raised questions and anger. A plan to install a teleférico, a cable cart lift, was presented close to Rocinha. People were surprised by such a costly project while at the same time, Rocinha still lacked basic sanitary services. The teleférico became a symbol for the lack of dialogue between the state and its favela inhabitants (Pereira, 2014). Inequality has been at the bases of the favela ever since their origin. Many inhabitants feel marginalized. The debate around inequality is still relevant and especially noticeable in urban areas. People of different social classes share a city, but are segregated by favelas and condomínios (gated communities for the rich). Favela inhabitants often feel excluded from politics, the economy and are more vulnerable to police violence (Fahlberg & Vincino, 2016). To many, Brazil's society is marked by inequality. The political realm is often accused of doing too little to counter socio-economic inequality.

1.2.3 Mototáxis: alternative public transport worldwide, in Brazil and Rocinha

Mototáxis can be defined as a private form of transportation offered by motorcyclists for a set fare price. They normally carry one passenger and lack regular routes, fixed timings and fixed stations (Tuan & Mateo- Babiano, 2013). They are a worldwide phenomenon, especially to be found in cities of the Global South (Turner, 2020). For example, this mode of transport has seen an increased popularity in West and Central Africa (Diaz Olvera, Plat, Pochet & Maïdadi, 2012). In Brazil, the phenomenon first occurred in the beginning of the 1990's (Azevedo Filho & Oliveira, 2002). Mototáxis are also known for their function in rural areas where the availability of public and private transport is often very limited (Ngabmen & Godard, 2002; Porter, 2007).

Mototáxis offer an alternative and often faster form of transportation than conventional public transport services can. They have the advantage of being small, more agile and able to pass traffic jams (Brasileiro, 2005). This is also the case in Rocinha, where traffic jams occur on the main roads. Mototáxis are a fast and relatively cheap alternative, with a price set at around 3 reais or 45 euro cents, although this can differ per area. This is one of the main differences with traditional taxis. The price is calculated during the ride, while mototáxis already determine the price beforehand (Matos, 2016).

Mototáxis also possess some of the advantages of traditional taxis: no set hours, door to door services and faster travel times compared to conventional public transport (Matos, 2016). The drivers can be found near public transport terminals or in concentration zones where they often use phones to schedule rides (Azevedo Filho & Oliveira, 2002). Rides also can be scheduled on the spot by just approaching a driver. In Rocinha, there are multiple of these concentration zones. One of the main of the 6 official mototáxi points of Rocinha (Fala Roca, 2015), is the metro station of San Conrado located just outside of the favela, at the entrance. The station is located at the bottom of the slope and is the hub for people traveling to other parts of the city. It connects to large parts of the city and therefore is used by many commuters who work elsewhere. To many people, mototáxi services grant people the possibility to enter the job market since it makes it easier to travel in the city (Matos, 2016). Cervero emphasizes the complementarity of informal transport to

conventional public transport (2000): the mototáxis of Rocinha connects people to the larger public transport network of Rio de Janeiro.

"In many cases the informal transport sector is tolerated by public authorities, allowed to exist as long as it remains more or less 'invisible' and confined to low-income neighbourhoods" (Cervero, 2000, p.3). The difference in regulation of moto taxis differs per region and country. In some places, mototáxi drivers are obliged to pay taxes and their fares cannot extend a minimum or maximum. In the rural areas of West Africa (Tuan & Mateo- Babiano, 2013), they have a more informal role wherein government authorities do not interfere whatsoever. The municipality of Rio has accepted mototáxis to exist as long as they behave according to the rules of a decree, established in 2019 (Prefeitura Rio de Janeiro, 2019a). Furthermore, some drivers operate under a cooperative, which offers a (limited) safety net. It also helps against motor theft, which is huge in Brazil. Other members of your cooperative keep an eye out on your motor (Cervero, 2000).

Mototáxis are a relatively new phenomenon. A survey by da Fonseca (2006), showed that 100% of her sample group of drivers were males. Next to that, 82.9% of the group were younger than 29 years of age. Young guys often choose the occupation out of necessity and for status. Furthermore, it is a way to stay out of the criminal circuit. Most of them however, said they would not want to work as a driver when they were older due to the high risks involved in riding motorcycles. During their younger years 'mototáxistas', the Portuguese name for the drivers, have indicated that they like the job because of the freedom. They also like driving motorcycles and it attracts women (da Fonseca, 2006).

Mototáxis offer services at places where the normal public transport is unable to fulfil the transportation needs of the population (Matos, 2016). According to Matos, they are the result of a lacking transport plan, which is obligatory for Brazilian cities (2006). In most urban centres, the poor become the victim of it. Historically favelas have always been marginalized in Brazilian politics. When looking at public transport services in and around the favelas, that does seem to be the case (Matos, 2006).

1.3.1 Research objective

The goal of this research is to gain an understanding in the factors enabling mototáxis as an alternative to conventional public transport in the favela of Rocinha, Rio de Janeiro. Furthermore, the aim is uncover how the mototáxis operate and why they do. The research also tries to be study which elements can be transferred over to other urban areas and which cannot.

The external objective is to deliver a contribution to research around informal transport in urban regions of the Global South. This is becoming a more important area of research since urban areas are expected to grow significantly in the upcoming decades (United Nations, 2015). The aim is to make parts of the research generalizable to other cases and forms of informal transportation, besides just mototáxis. The aim is to find general lessons that can be retracted from the case of Rocinha and evaluate whether they are applicable to other contexts. It addresses both what can be learned from mototáxis, but also how the mistakes that have been made can be avoided. Secondly, the internal objective is to understand why inhabitants of Rocinha use mototáxis and what underlying patterns enable drivers to operate in the favela.

1.3.2 Research questions

From this objective the following main research question has come: *“How and why does informal transport (mototáxis) fill in the role of conventional public transport in Rocinha, Rio de Janeiro and to what extent is this applicable elsewhere?”*

The question is brought back to five sub questions, which aim to answer the main question. Each sub question will be elaborated and answered in a separate paragraph. At the end of this thesis, the sub questions will be brought together in order to come to concluding answers.

The sub questions are the following;

- *“How is conventional public transport organised in Rio de Janeiro and what are the downfalls for Rocinha?”*
- *“Which factors have led to the emergence of informal transport in Rocinha?”*
- *“How and why do mototáxis fulfil residents’ needs?”*
- *“How does the municipality of Rio de Janeiro recognize informal mobility and to what degree is this?”*
- *“To what extent is Rocinha’s mototáxi system specific and what can other slum areas learn from it?”*

1.3.3 Societal Relevance

Mototáxis remain a topic of debate within Rocinha itself, but also outside of the favela. Supporters refer to the decrease in travel times and improvement in physical mobility. In the largest cities of the country, 70% of the population has a travel time of more than two hours. In Rio de Janeiro, the average travel time is around 50 minutes (Amicci, Malburg, de Oliveira Souza, de Mesentier, da Silva, de Azevedo & dos Santos, 2015). There clearly is a demand for better mobility and mototáxis can help to improve this.

Criticism points at the drivers’ lack of responsible behaviour on the road which may result in accidents. Furthermore, mototáxis are often associated with being involved in trafficking. What is for sure, is that they play a major role in the transport of Rocinha. In large numbers, they drive through the favelas. The mototáxi business offers jobs to many and allows both inhabitants as tourists to travel in the favela.

Overall, mobility and accessibility are declining in most areas of the developing world. Travel times are high and mobility is decreasing even more for public transport users (Gakenheimer, 1999). This is critical since it has been proven that physical mobility is crucial to elevate people out of poverty. This thesis aims to analyse if and how mototáxis can be a solution to mobility problems in other urban areas of the Global South, especially in slums. The goal is to come up with general lessons on informal public transportation that can be applied to other urban areas. These lessons can help in the understanding of informal transport. Furthermore, by studying the mototáxi system of Rocinha, the objective is to uncover who the people behind it are, both the drivers and the users. This can also help government officials better understand the system so they are able to improve fit their policy to the needs of the people.

1.3.4 Scientific relevance

There is already an extensive collection of literature on the topic of informal transport in areas of the Global South. Cervero and Golub argue that small vehicles of informal public transport provide important benefits, particularly to poor areas devoid of formal transit. “On the other hand, they contribute to traffic congestion, air and noise pollution, and traffic accidents” (Cervero & Golub, p.445). Wachs also emphasizes how physical mobility can help to fight poverty (2010). It enables people to travel between their work and their residencies, among other destinations. Azevedo Filho & Oliveira (2002) have written about the Brazilian mototáxi phenomenon. They described that the phenomenon first emerged in 1996 in the city of Crateús, in the state of Ceará. The authors also describe how it has since spread throughout the country, to other regions and cities. What still remains a research gap however, are the conditions that enabled the emergence of a mototáxi system. This also remains unanswered for Rocinha. This thesis will research if it has emerged because of a certain path-dependency or if it came to be coincidentally. What remains to be answered is if structures and other factors together have resulted in mototáxi and if other urban areas of the Global South can follow a similar path.

Other research on informal transport and moto taxis in specific, mainly focuses on African and Asian contexts. Turner (2020) writes about the development of the motor taxi phenomenon in Hanoi, Vietnam. Motorcycle bans threaten the system, and undermine the livelihoods of thousands of informal mototáxi drivers. Rollason (2012) wrote about the job opportunities offered by motorcycle taxis in Rwanda and the role this has played in poverty reduction.

To add to the existing research on informal transport, this thesis will further develop research on mototaxis within the South American context because this is lacking in comparison to other continents in the Global South. There is a geographic bias towards these continents, while South America remains relatively untouched by research on informal transport. Furthermore, the research in English is rather limited. This piece will contribute to the English literature on the topic.

This research falls into the realm of (urban) informality. Jenkins (2006) identified informality as a key factor in urbanization and urban expansion. According to Kita & Okyere (2015), research on informality during the 1970's and 1980's had an emphasis on formal and informal settlements. This thesis touches upon informality by talking about informal public transport and informal urban settlements. It therefore expands on existing literature that is more focussed on settlements per se. It sees informality as both informal settlements and informal work. This research also approaches mototaxis via the drivers and their customers. It therefore includes both the sides of the suppliers and the people who demand of the system.

2 Theoretical framework

2.1 Concepts

The mototáxi system improves the mobility of the people in Rocinha. The system is organised informally, outside of the public sphere although there are some guidelines to follow. Regulation exists, but drivers do not pay taxes over their income. Creative and entrepreneurial minds started transporting people up and down through the narrow streets of the favela and this eventually led to mototáxis as they are in their current form. Mototáxis is one of the results of 'creative survival' in the favelas. This chapter is dedicated to elaborating the key concepts of this thesis, since they do come back regularly.

2.1.1 Mobility

Mobility refers to the ability to move or be moved freely and easily (Oxford Dictionary, 2021). In this thesis, the focus will be on both physical and social mobility. The first one is the ability to move freely in space. The latter refers to one's ability to move up and down the 'social ladder' within a lifetime (Institute for Injustice and Reconciliation, 2015). The two forms are linked: research has shown that a low-economic status, relating to one's social mobility, is linked to a significant reduction of physical mobility (BMJ, 2018). The relationship works in both ways: limited physical mobility also constrains one's social mobility. Both individually, or a combination of the two forms of mobility can result in transport poverty. Guzman, Lucas, Mattioli & Verlinghieri (2016) split transport poverty into three sub-concepts: mobility poverty, accessibility poverty and transport affordability. The concept of transport affordability refers to the lack of individual resources to afford transportation options, mobility poverty refers more to a systemic lack of transportation and mobility options" (Guzman, Lucas, Mattioli et. al, 2016, p. 356). Accessibility poverty adds costs, time and effort as extra layers to be considered (Guzman, Lucas, Mattioli et. al, 2016). All three of these concepts are of importance in studying the mototáxi system of Rocinha.

The relationship between physical mobility and social mobility is explained in a study done by Perez (2016). As already stated in the introduction, physical mobility can help people to rise out of poverty. When people have a high physical mobility, through access to transport, they have more employment opportunities because they are able to travel to a larger number of jobs. They are also able to travel to areas where there are better paying jobs, often in downtown areas of cities. With good physical mobility, people can get there without too much effort. Their physical mobility plays a role in their access to jobs, goods and services which may help them in climbing the social ladder. In a slum area like Rocinha, most of the inhabitants live in poverty. To be able to travel beyond the favela is crucial, because most of the jobs are located outside of the community, in the South Zone or the centre. Therefore, physical mobility constitutes a major role in their livelihoods. Mototáxis are one of the services granting people this physical mobility. Therefore they indirectly improve social mobility and may indirectly even have a part in poverty alleviation.

The concept of physical mobility refers to the ability to move around space with relative ease. To do this, transport and infrastructure are key factors. Physical mobility has multiple layers in

terms of supply and demand. One can look at quantitative physical mobility, if there are enough options to get from point A to B relatively easily. Relatively easily means within an acceptable time period and without too much (physical) effort. Inadequate quantitative mobility can eventually result in mobility poverty (Guzman, Lucas, Mattioli et. al, 2016). It is also possible to look see mobility in terms of quality. Through this scope, the question is if the existing mobility is sufficient to meet the demands of the people. One can think of the punctuality of a transport service, cleanliness but also safety and pricing. Considering both, physical mobility needs to be approached through these two lenses to really see it holistically. The mobility of the people in Rocinha will be studied in a similar way.

2.2.2 The first mile/the last mile/

“Although bus and rail services might cover the main part of a trip, people need to first walk, drive or use another method to get to and from the nearest station or stop. The first and last leg of the trip are referred to as the 'first mile/last mile'” (Mayeres & Van Zeebroeck, 2019, p.10).

For policymakers, it is often a struggle to connect transport hubs to final destinations. People cover it by foot, car or bike. Thinking about first mile/ the last mile, also has been influenced by the sustainability discourse. People are stimulated to cover the first or last part of their trip in an environmentally friendly way, so by (rental) bike or foot. Informal transport is another way to get from the public transport hub to the doorstep. It is one of the main ways in which informal transport is used, to connect to citywide public transport networks (Cervero, 2000).

2.2.3 Public and private services

In this research, the dichotomy of public versus private services has a central role. Public services are offered by the state and paid for by taxes. They include services such as public transportation, healthcare, education, sewage, among others. Private services on the other hand are set up by third parties. They include a profit model, while this is not the (primary) aim for public services.

Transportation can generally be divided into two forms: public and private. “Public transport may be defined as any form of passenger or freight transport that is available for hire and reward. In practice, it usually refers to land-based passenger transport and in particular bus and train services and variants thereof” (Preston, 2009, p. 452). It is paid or run for by the government. Private transport on the other hand, is transport for personal use. Taxis are somewhere in between, but are generally considered private commercial transport. In this research, mototaxis can be seen as the middle ground between public and private transport. They are run by third parties and not by the government. They however function in a similar way to public transport and are open for everybody to use. Therefore, they can be seen in a similar way as normal taxis, falling in between public and private transport.

2.2.4 Informality

“Informality is a term used to describe the collection of firms, workers, and activities that operate outside the legal and regulatory frameworks or outside the modern economy” (Worldbank, 2016). The International Labour Organisation estimates that around 60% of the world’s employed population works in the informal economy (2018). In Brazil, 41.4% of the working population is employed in the informal economy (IBGE, 2020). Mototaxis are also part

of this informal economy because they fall outside of the government's control to a large extent and do not pay taxes. However, the government has been coming with more regulation in recent years. Since 2009 mototáxi drivers have been placed under formal transportation laws in Brazil and are therefore bound to official rules (Machine, 2018).

Informality has always played a central role in urban slum areas. Residencies are built illegally, on land that was not designated for it. Sometimes, these areas exist for decades and receive more formal treatment such as public services. In most cases however, the fear of being evicted from their houses predominates (UN Habitat, 2019). A continuing battle between formal versus informal and everything in between dominates the scene of these areas.

2.2.5 Informal urban settlements: favelas

Informal urban settlements also belong to the realm of informality since they are built outside of official legislation. They can be found in crowded urban areas where housing opportunities are limited for the urban poor. These people have constructed their own housing within and just outside of large urban agglomerations. Informal urban settlements can mostly be found in the Global South, but also exist in Europe and the United States on a smaller scale.

It was estimated that around a quarter of the world's urban population lives in informal settlements in 2013, with the number growing by 213 million since 1990 (UN Habitat, 2013). Urbanization has grown due to globalisation and the hope for jobs in the city. According to the UN, urban settlements fit the following description (UN Habitat, 2013):

- lacking basic services and urban infrastructure
- places where inhabitants often have no security for the land they inhabit
- areas where housing may not comply to official regulations

Brazil has a large number of informal urban settlements, known under the name 'favelas'. Quoting Freire-Mederos: "Favela is the generic name given to the agglomerations of substandard housing that have emerged initially in Rio de Janeiro in the early 20th Century. The term was then widespread, with some regional variations, to define illegal squatter settlements, highly populated, with degraded properties, lacking essential public services. Throughout history, conventional wisdom placed favelas as a symbol of social and economic segregation, the main locus of poverty, a place where moral degradation mixes with poor sanitary conditions, a dark dystopia" (2008, p. 2). McCann (2006) says one cannot really speak about favelas in general terms since they are all so different. Some are better known due to their location, size and media reports on favela violence, to name a few reasons.

The term favela is used around Brazil, but has a slight negative context. Therefore some refrain from the word and refer to them as 'comunidades', communities. People from the favela also use the term 'morro', the hill, to refer to their favela since many are constructed on hillsides. Major favelas can be found in Brazil's biggest cities such as Rio de Janeiro, São Paulo, Brasília, Belo Horizonte, among others. The houses are often built from stone, but also use construction materials such as wood, corrugated roofs and other parts that can be bought cheap. The first favelas emerged when migrants moved to the major cities in need of work (Pino, 1997). Nowadays they play a big role in urban housing. Favelas are renowned for their crime rates. They often serve as hideouts and operating zones for traffickers. A large number of favelas however, have gradually become more peaceful in recent years due to pacification

programs. This sparked interest from tourists, who come to see the distinct cultures. Since the World Cup and Olympics in Rio, favela tourism has been on a rise in the city. There are a number of agencies who take foreigners for tours. Residents also take advantage of tourism by selling souvenirs or opening up their houses as Airbnb's (Almeida & Surico, 2016). Rocinha is one of the favelas that has seen an increase in tourism over the years. "Rocinha displays both 'a breath-taking view' and 'the contrast of the have and have-nots which is so striking for the gringo' in a reference to its proximity with São Conrado and Gávea, two of the most prestigious neighbourhoods in Rio" (Freire-Medeiros, 2008, p.12). Some mototáxi cooperatives have their focus specifically on attracting (foreign) tourists.

2.2.5 Informal (public) transport

The International Association of Public Transport (UITP) uses the term informal public transport to refer to "collective personal rapid transit with little or no control of its operations by an overall regulatory authority, it is usually characterized by an unplanned and ad-hoc service offer, insufficient or no respect for routes and no published or fixed fare structure" (2010). According to Detlaf: "informal public transport is made up of self-employed entrepreneurs, who work long hours in very competitive places, often for low salary" (2015, p.1).

What separates informal transport from private services, such as taxis, is that it lacks credentials (Cervero, 2000). Informal transport comes in various forms, to serve different demands. In the Global North one can think of New York City's vans that offer an alternative service in areas deprived of proper bus lines (Surico, 2020). Other famous examples of informal transport are TukTuks in large parts of Asia. In the document 'Informal transport in the developing world', Cervero (2000) made a class-based overview of the most common forms of informal transport in the Global South (Figure 3).

	Service Features		Passenger		
CLASS:	Routes	Schedules	Capacity	Service Niche	Service Coverage
I: Conventional Bus	Fixed	Fixed	25–60	Line–Haul	Region/Subregion
II: Minibus/Jitney	Fixed	Semi–Fixed	12–24	Mixed	Subregion
III: Microbus/Pick–Up	Fixed	Semi–Fixed	4–11	Distribution	Subregion
IV: 3–Wheeler/Motorcycle	Variable	Variable	1–4	Feeder	Neighborhood
V: Pedicab/Horse–cart	Variable	Variable	1–6	Feeder	Neighborhood

Figure 1: Summary of the different classes of informal transport

Mototáxis, belonging to class 4, have no fixed routes and operate based on demand. They do not ride based on a schedule, but can ride whenever they want. The passengers determine the destination. "mototáxis are the most rapidly growing form of informal transport services. Their growing popularity lies in their inherent advantages: door to door service capabilities; ability to enter narrow alleyways and footpaths that are inaccessible by any other motorized modes" (Cervero, 2000, p. 21).

2.3 Theories

2.3.1 Core - periphery theory

The usage of the terms core and periphery refers to a site's geometrical position in space. The idea was introduced by Wallerstein in his World System Theory: an economic division of the world in three different classes (Christofis, 2019). Brazil can be seen as a semi peripheral country. Although the country is developing economically, there are still many people who live in poverty. Later, the concept also became applicable on smaller geographic scales. Within countries one can divide between regions and cities. Within a city one can divide between core and (semi)peripheral neighbourhoods based on different criteria, which will be done in this research.

“Defined in geographical terms, the centre represents the locus of power and dominance and importantly, the source of prestige, while the periphery is subordinate. Simply put, a centre–periphery relationship is about hierarchy” (Azaryahu, 2008, p. 305). Core-periphery divisions in spatial terms are especially strong in areas with large inequality. This division can be based on relative location, but also on the opportunities that are on offer and the services that exist there. One can speak of core and peripheral neighbourhoods within an urban space. In such cases, different socioeconomic groups live segregated from each other. This is the case for Rio de Janeiro, where the poor and rich live clustered in different areas in the city. The rich live in centrally located places, while the urban poor reside in more distant and therefore more peripheral areas of the urban landscape.

It is also possible to distinguish between core and periphery when thinking about (public) transport. An area of the city that is well connected can be seen as the core while an area that is deprived of public transport, with a lack of connections, can be typified as peripheral. Differences in access to public transport exist in Rio de Janeiro which allows for using in core-periphery terms. All in all, there are multiple ways to distinguish between core and periphery, according to which criteria is chosen. These divisions will be touched up on later in the thesis.

2.3.2 Habitus & Field

Bourdieu introduced the concepts of habitus, field and capital. The idea is that society is not determined by practices nor are practices completely determined by society. Bourdieu explained practices as “the result of an indefinite, unconscious, double relationship between habitus and the field” (2003, p.147). The theory states that there are certain fields, arenas wherein people battle over certain forms of capital: economic, cultural, social and symbolic capital (Bourdieu, 1993). With habitus, Bourdieu aims at sustainable ways of thinking, thinking and acting. It includes certain habits and structures that are inherent to people. It is the way people perceive the world around them and how they interact with it (Bourdieu, 1993).

It is possible to look at Rocinha through this scope of Bourdieu. This favela can be seen as a field wherein certain practices happen. People act in it according to the habitus they have, the way they see the world around them. Another way of applying Habitus & Field is by seeing transport in Rio de Janeiro as a ‘working field’. Within the field of transport in the city, certain practices happen such as busses, trains, metros and informal transport operating. To be able to perform practices within this field, one needs to possess certain capital in it. A favela resident with a motor and knowledge about the streets for example, already possesses

different forms of capital to operate within the field of transport in Rio de Janeiro.

Moreover, people have a habitus. This includes their habits, certain structure and how they interact with the world. Mototáxi drivers behave according to their habitus and therefore are used to certain practices and habits. The terms also include abilities one possesses. This scope Bourdieu has created is interesting to apply on mototáxi drivers: to see how they live, experience and interact with their surroundings.

2.4 Conceptual model

After introducing the topic, explaining the main concepts, the theories and stating the research questions, the following conceptual model was created (figure 4).

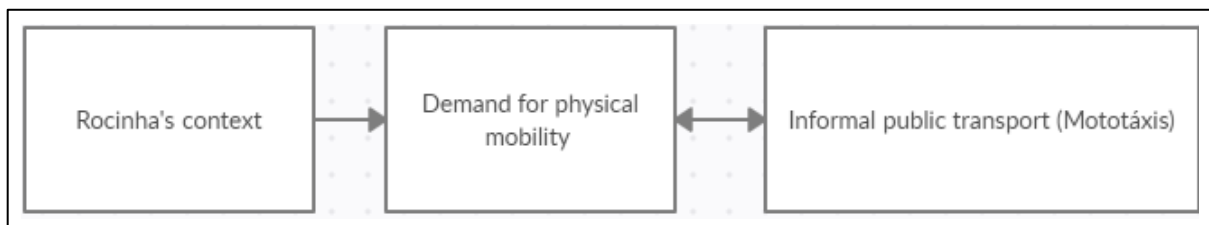


Figure 2: conceptual model

Rocinha is the largest favela in Rio de Janeiro, housing between 70.000 and 200.000 people according to which source one uses. Although the favela is not located far from the South Zone, the financial and cultural centre of the city, many people in the slum still struggle with mobility. This is due to Rocinha's context. Because of its location, on the steep slopes of a mountain, it is impossible to get there by car. Bus lines do exist, but only get to a small part of the favela. Next to the topography, the lack of planning has stood in the way of a good infrastructure. Rocinha has been built informally and this has led to a favela without an infrastructural plan. The result is high density of houses and small alleyways inaccessible to most vehicles. The topography together with the informal character of the favela, have turned it unsuited for larger transportation vehicles. Furthermore, the public transport that exists is seen as of inadequate quality which makes it unattractive to use for a part of the population.

The above has resulted in an unfulfilled demand for physical mobility. Demand is high since people often work outside of the favela itself and need transportation to get there. Since public transport in Rocinha itself is limited, alternatives are needed. This is where informal transport, in the form of mototaxis, comes into the picture. To get people from their homes to the public transport corridors, mototaxis offer services in and around Rocinha. They cover the last mile, from the public transport hubs to the favela itself. The drivers have largely been able to cover the existing demand. They are able to answer to it and therefore the arrow between 'demand for physical mobility' and 'informal transport (mototaxis)' goes in both directions. They exist because of the demand for physical mobility, but also serve those who are in demand.

3 Methodology

In this chapter, the methodologies of this research will be described and argued for. It will be discussed which data will be collected, from whom and how. Moreover, the choices of the research will be justified. The research definition, strategy and data collection will be explained in the methodology.

3.1 Research approach and strategy

This research used a mix of qualitative and quantitative research methods. Applying a 'mixed method' strategy produces a better understanding of a certain research area (University of Southern Denmark, n.d.). Qualitative research methods are used for the reason that they aim at analysing certain phenomena. In this case, that is to uncover factors that have enabled the mototáxi system and analyse why it works the way it does. When the understanding of a complex system is needed, qualitative research is the way forward. A qualitative approach is fitted to capturing subjective and dynamic opinions and perspectives on the concept (Lune & Berg, 2017) of mototáxis in Rocinha, Rio de Janeiro. Quantitative data has been collected through a questionnaire, although it has a number of open-ended questions which tends more to a qualitative approach. To answer the research questions, both primary and secondary research has been conducted. The primary research consisted of interviews, a survey and a policy analysis. By applying these different methods, one can speak of triangulation. By doing this, the researcher uses more than one method for the collecting of data. The aim of triangulation is to improve validity and capture different dimensions of a topic through various research methods (Nightingale, 2020). The secondary part was performed via desk study-research by doing a literature study. Already existing data has been used to analyse for the production of new insights (Verschuren & Doorewaard, 2000).

The research mostly focuses on the experience of people and therefore is of a phenomenological basis. "This research type aims to find differences and similarities between subjects on a certain topic" (van Manen, 1990, p. 177). In this research, those people are the inhabitants of Rocinha and the mototáxi drivers. The goal of the approach is to describe the nature of the particular phenomenon (Creswell, 2013), corresponding with this thesis' research goal.

In this study, the role of informal transport (mototáxis) within Rocinha is the subject under study. A case study allows the researcher to cover the circumstances of the specific case (Creswell, 2007). A case study uses just a small research sample. Instead of going a wide approach, a case study allows for in depth analysis of a phenomenon (Verschuren & Doorewaard, 2015). This research is an analysis of the mototáxi system within a specific area which is relatively small, the community of Rocinha. Furthermore a case study fits with exploratory research, which this thesis is. Therefore it best fitted the intended research goal. This research on focused on a specific case and context, with the aim of trying to capture the multi-dimensionality. To achieve this, it has been conducted from the perspective of mototáxi drivers, users and experts. Interviews addressed the mototáxi drivers and experts: to get a broad perspective on the mototáxis. The survey focussed on the users and the policy analysis aimed at getting an understanding of the policy and its effects. The policy analysis had the

objective of uncovering the stance of the government officials towards mototáxis and the regulation that has followed from it.

3.2 Types of data

The type of data needed for answering the research question are descriptions of the phenomenon and how it is experienced by certain groups. It was also important to get to know how the system has emerged. By doing this, it has been possible to argue for or against the adoption of a similar moto taxi system in other slum areas of the Global South. Furthermore, a survey offers insights into how mototáxi are used and how often they are by statistically analysing the information provided by respondents (Vennix, 2019).

The research has been conducted from the perspective of the drivers, users and experts. Furthermore, the policy of the municipality has been incorporated by doing a policy analysis. By addressing all these different groups, the aim was to approach the complete mototáxi system of Rocinha and analyse all the aspects of it. By understanding all the different aspects, it is possible to study how mototáxis emerged. Furthermore, it allows for general recommendations on what can be learned from the system.

The survey focussed on the users and the policy analysis aimed at getting an understanding of the policy and its effects on mototáxis. It has been executed by doing an online questionnaire. The third form of primary data was a policy analysis aimed at uncovering the regulation that exists and to see what approach the government takes.

3.3 Data collection

3.3.1 Policy analysis

Research consisted of a policy analysis on a document from the municipality of Rio de Janeiro, a decree on legislation of mototáxis signed in 2019. The policy analysis was used in the chapter 5.4 'Mototáxi recognition: the city versus the informal'. It touched upon physical mobility, planning of public transport and the role of informal transport within a larger transport system.

The analysis was performed in a consequent manner, to prevent it from becoming a subjective and rather random process. Elements of a grounded theory approach were used. This is a systemic approach used in qualitative research to make sure theory is grounded from collected data (Creswell & Ponth, 2018). Although this is not a grounded theory project, the coding method has been used to come closer to an objective approach. Providing codes helps the researcher to stay close to his concepts. It also makes it possible to create links between what has been said during the interviews, in the survey and the content written in texts. To work systematically, the document was coded through Atlas.ti. This program allows for a clear overview of data and helps to structurally process it afterwards. After the coding process was done, the policy document could be compared and related to the interview and survey data.

3.3.2 Interviews

For the purposes of research, in depth interviews were used. "An interview is a conversation wherein an individual - the interviewer, asks questions about behaviours, views, attitudes and experiences with respect to certain social appearances to one or more who respond to the

questions” (Maso, 1987, p.63). In depth interviews are often semi-structured. By doing a semi-structured interview the respondent can illustrate on their experience with the mototáxi system of Rocinha. Furthermore, the interviewer is able to add or skip questions when needed during the interviews. The interviews were conducted with mototáxi drivers and experts. In total there were interviews with 2 experts and 4 drivers. The two interviews differed in questions, but were built up in a similar way by addressing the same topics. The respondents were the observation units, the sources from where information has been retrieved. Through their perspectives, the research unit has been approached, the mototáxi system of Rocinha. The observation units facilitated in answering the research questions. By approaching different types of respondents, some of them being part of the system themselves and others who served more as experts, the aim was to come to a holistic description of the mototáxi system in the community.

Possible interviewees were contacted via email and social media. Most of them were taken in Portuguese since a small number of the Brazilian population is proficient in English. Furthermore, by speaking to them in their native language the aim was to make them feel at ease and therefore more expressive of their experiences. Less information and sentiment would get lost in translation by doing so. The interviews with the mototáxi drivers started with a round of introductory questions to get a feel for the person sitting in front of the interviewer. The questions focused on demographic and social-economic characteristics. The introductory part also served to encourage the interviewees to speak freely. The interviews with the experts started with a focus on their career and function within their respective organisations. Questions later on, addressed their take on the mototáxi system, legislation and further recommendations.

The interviews with the drivers were in depth. They were a bit more informal, in the hope that they would freely express how they experience the system. After all, it was their experience of working in mototáxi that stood central. The interviews with the experts were more formal. They delved into patterns of the system and were of a more analysing nature. By combining the drivers and experts, the aim was to gather information to gain an inclusive idea of the mototáxi system through the eyes of different groups.

The interviews all had a duration between 50 minutes and 90 minutes. After the interviews were conducted, they were analysed in Atlas.ti. The transcripts were first translated very precisely to English. After, they were marked following certain codes that can be found in the codebook. The results are presented in the form of quotes from the different groups of respondents in the research results and are based on the codes.

The following interviews were conducted (figure 5, next page). The mototáxi drivers have been given different names to maintain their anonymity. In the results, they will be referred to under their pseudonym so that quotes cannot be linked to the interviewees. This is done as a safety precaution.

Name	Function	Agency	Type Interview	Date
Creso Franco de Peixoto	Professor in civil engineering with a focus on mobility	Universidade de Campinas, Centro Universitário Moura Lacerda	Expert Interview	30-04-2021
John Surico	Journalist on urban mobility and researcher	Freelance journalist	Expert interview	30-04-2021
João	Mototáxi driver	x	In-depth interview	6-05-2021
Felipe	Mototáxi driver	x	In-depth interview	11-05-2021
Matheus	Mototáxi driver	x	In-depth interview	28-05-2021
Lucas	Mototáxi driver	x	In-depth interview	05-06-2021

Figure 3: interview respondents

3.3.3 Questionnaire

To research the sentiments towards informal transport of Rocinha's population, a survey has been used. This was executed through a questionnaire. The questionnaire focused on the user side of (informal) public transport in Rocinha. Participants were asked to give their opinion on the public transport and their experiences with mototáxis in Rocinha. The questions can be found in the attachments of the thesis.

In a survey research, one tries to make claims about a population through a selected part of them: the research sample. These people are the respondents. To have a high level of representativeness, it is best to draw a random survey sample of a population (Korzilius, 2008). In this thesis however, that was not possible since a database with contact information of all of Rocinha's inhabitants is non-existent. Furthermore, the exact total population of Rocinha is unknown. Considering the latter, the questionnaire of the survey was spread to a selected group: people from Rocinha on social media. Therefore, only people who are active online were able to participate. The questionnaire was spread online and people were asked to share it with their network. This type of survey is known as an availability survey (Korzilius, 2008). Using this form comes at the cost of representativeness, but requires a less time consuming way to find respondents. As a researcher, one needs to consider that by doing so, one cannot make claims about the entire population. Claims can only be made about survey samples. When concluding the study, the researcher needs to check for certain characteristics in the survey sample when it is concluded. On the basis of this, an estimation of the representativeness (or lack thereof) can be made.

Before people started the questionnaire, it has been made clear that the survey is for research purposes only and that respondents will remain anonymous. The questionnaire contained multiple choice and open questions on the participant's experience with mototaxis and conventional public transport in Rocinha. It was divided into three thematic blocks, which will be elaborated in the fourth chapter, 'Operationalization'. The questionnaire was built using the program Qualtrics. The multiple choice questions have a 5 point Likert scale, because it is the most universal method for survey research and therefore easy to understand for all respondents (Vennix, 2019). The language of instruction was Brazilian Portuguese, written without difficult jargon so the questions were understandable for a large public. After the data collection process, the data was analysed through SPSS. Before doing this, the data was translated from Portuguese to English. The goal was to stay as close to the original text as possible.

In total, 26 people participated in the questionnaire after data reduction. Part of the respondents were taken out due to not answering any questions. Qualtrics automatically sees them as a respondent when the link of the questionnaire is opened. All participants were between 21 and 61 years of age. From this group, 17 participants are men and 6 are women (figure 6). The exact ages of all the respondents can be found in the SPSS attachment.

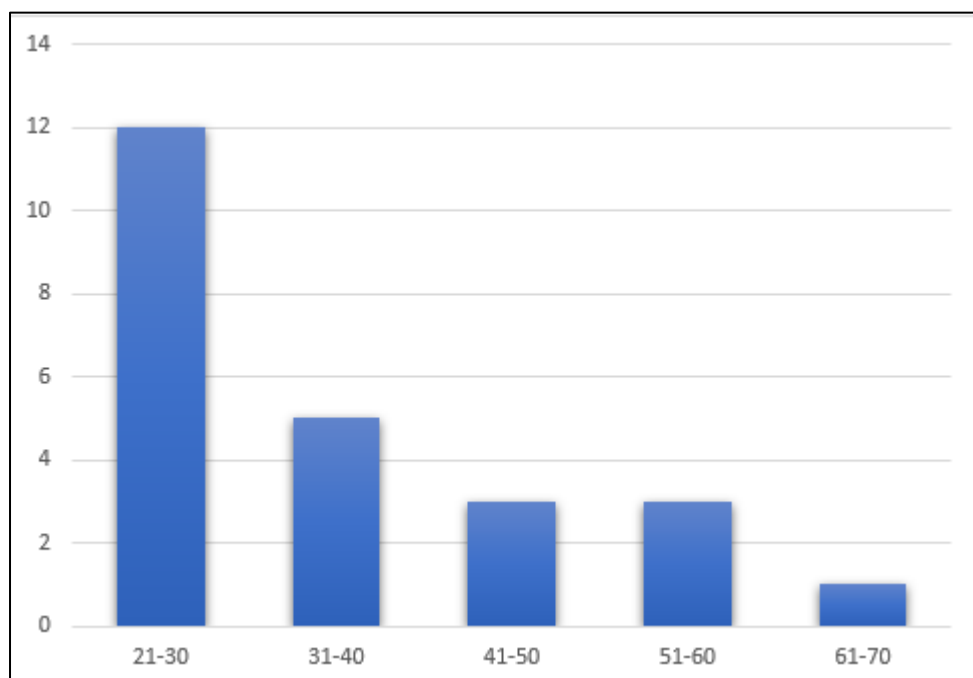


Figure 4: number of respondents per age category

3.4 Research process

Data has been collected during the period April, May and the beginning of June. In the weeks beforehand, the interview participants were contacted. Each interview was approximately an hour long. During the interview, respondents were free to express their views and attitudes towards phenomena. If they went too far off topic, it was up to me as the interviewer to bring the interviewee back to the relevant research topic. The survey has been performed during the same period. The data analysis was done alongside the interviews and survey

4. Operationalization

This research focuses on the role of informal transport in granting people physical mobility in Rocinha. Therefore, it was important to know how this population experiences public transport and informal transport. This has been studied with interviews and a survey focusing on 3 variables: experience of public transport, experience of mototáxis and how the relationship between mototáxis and the government is. The full questionnaire and interview guides can be found in the attachments.

4.1 Questionnaire

The questionnaire focused on three main topics:

- *Experience of public transport*

This part served to study how public transport in Rocinha and Rio de Janeiro is perceived in general by inhabitants of Rocinha. The questions ask them about their experiences, what they like, what they dislike and where they would want to see it improve.

- *Experience of mototáxis*

In this part of the questionnaire, the inhabitants of Rocinha were asked about their experiences with mototáxis. Questions focussed on whether they like them or not and why. Furthermore, the public transport was compared to the mototáxi service.

- *Mototáxis in relation to the government*

The final part of the interview focussed on what the respondents would want to see coming from the government to better the mototáxi system and how they see the current contact between different stakeholders.

4.2 Interview

The interview touched on the same themes:

- *Experience of public transport*

The interviewees were asked to describe the situation of public transport in Rio de Janeiro and in Rocinha specifically. They were asked what they liked and disliked about public transport and how they felt about it. The expert interviews offered an overview of public transport network in Rio de Janeiro by explaining its evolution. Questions were aimed at discussing the good and bad sides of it.

- *Experience of working in mototáxi*

The part focused on how mototáxi drivers see their job and what they like and dislike about it. The questions served to get a better idea of how the system works, how people use it and what the job is like. The expert interviews focussed more on the system in general and touched upon the solutions and issues it brings with it.

- *Mototáxis in relation to the government*

These block of questions focussed on what kind of regulation exists, how it is experienced and what the drivers would like to see different in the future. During this theme, there has also been spoken on what can be learnt from mototáxis in other places and suggestions for better recognition. The expert interviews were more focussed towards the latter.

5. Research results

After concluding the questionnaire, interviews and policy analysis, all the data had been collected. Using both quantitative and qualitative data provided a holistic scope to the mototáxi system. In the research results, the different forms of data will be presented and compared to each other and to secondary data. There will also be referred back to the core-periphery model and the theory of Habitus & Field.

During the period of data collection, 6 interviews were done. Furthermore, 23 people responded to the survey. More people opened the survey, but they did not answer the three initial questions. Therefore, they have been taken out of the questionnaire. Part of my respondents only answered the survey partially. This was possible since it was not made obligatory to answer all the questions. The number of respondents per question were used, instead of eliminating all participants that had not completed the full survey. The data shows that all participants were between 21 and 61 years of age (figure 6). From this group, 17 participants are men and 6 are women (table 1).

		Frequency	Valid Percent	Cumulative Percent
Valid	Man	17	73,9	73,9
	Woman	6	26,1	100,0
	Total	23	100,0	

Table 1: respondents by gender

Furthermore, 16 respondents lived in Rocinha during the time of research. Four respondents have lived there, but do not do so any longer. From the group of 23, 3 respondents have never lived in Rocinha (table 2).

		Frequency	Valid Percent	Cumulative percent
Valid	Live in Rocinha	16	69,6	69,6
	Have lived in Rocinha	4	17,4	87,0
	Have never lived in Rocinha	3	13,0	100,0
	Total	23	100,0	

Table 2: residency of respondents

5.1 Public transport for a limited public

As has already been said before, the Greater Rio de Janeiro is one of the larger metropole areas in the world. Its location, in a bay area between mountains and a rainforest, has made the city one of a kind. Research data from Herzog & Finotti shows the increase of urban sprawl based on data from 1984, 2001 and 2010. “Between 1984 and 2001, urbanized area increased from 33,749.94 to 42,023 ha; an expansion rate of 486.65 ha/year. From 2001 to 2010 urbanized areas grew to 53,114.60 ha; an increase rate of 1,232.40 ha/year” (2013, p, 640). This growth, in combination with the city’s topographical features, has left its mark on the current situation regarding public transport. It has shown to be a difficult task to connect different parts of the city which are separated by natural barriers. The current public transport in the region consists of different transport modes with the best known being Bus Rapid Transit (BRT), standard busses, the commuter rail, trams and the subway among others (figure 7). Next to it, informal transport exists in the forms of mototáxis and kombi vans.

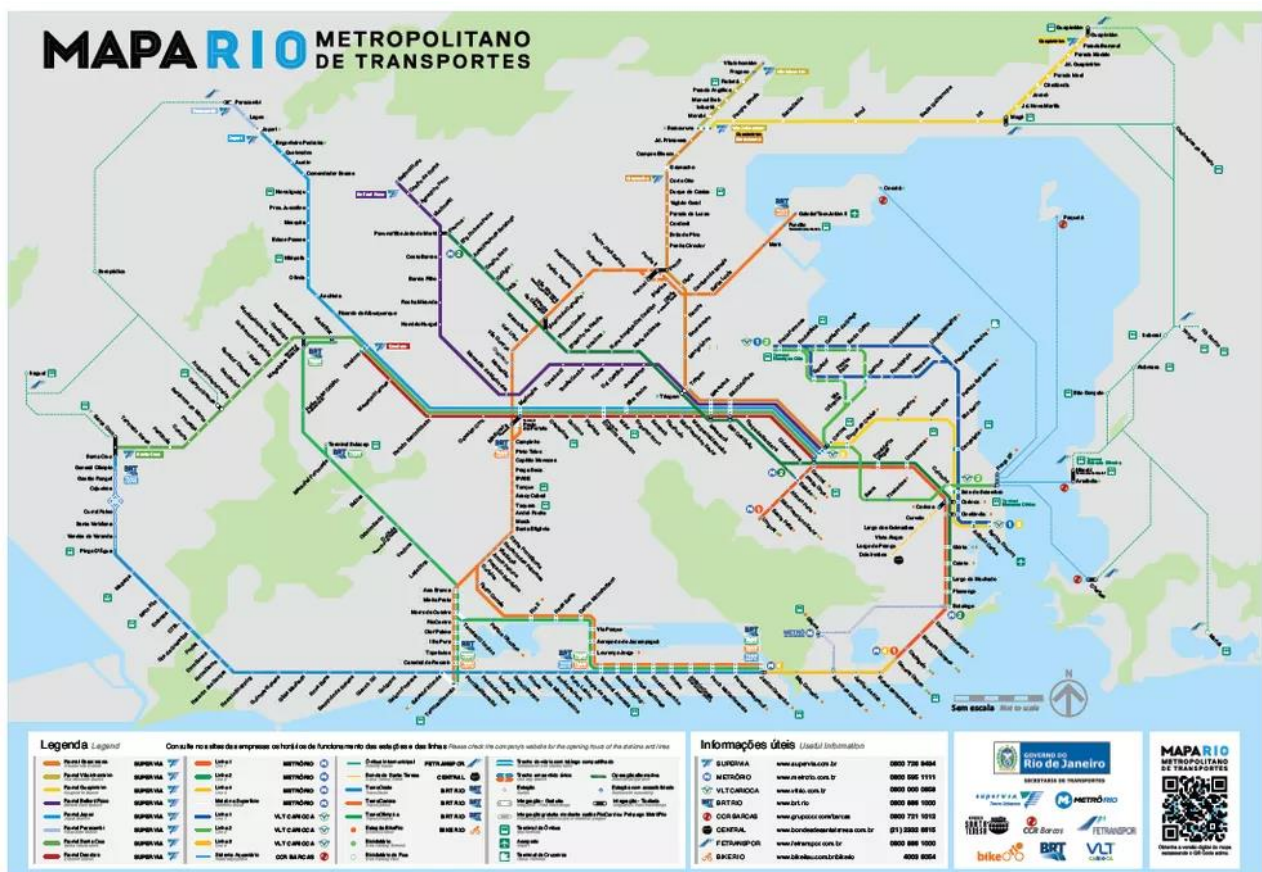


Figure 5: Overview of the mobility options in Rio de Janeiro. Source: Prefeitura Rio de Janeiro, 2018

5.1.1 The Metro system of Rio de Janeiro

The Rio metro has been operating since 1979 and is the second largest subway system of the country, after that of São Paulo. Rio's subway system does not need to account for the topography of the city since it has been built below the surface. This, in combination with the absence of other traffic, makes it the fastest and most time efficient form of public transport. The metro system has been expanded in anticipation of the 2014 World Cup and the 2016 Olympics, events which were hosted by the city. Interviewee de Peixoto on it: *"The alignment of the metro follows the economic power, the population and the political decisions. The west zone of Zona Sul, the South Zone, has long been left out, but now the line has expanded"* (C, de Peixoto, personal contact, 2021). From the interviews and the survey, it came forward that the subway is liked by many. Quoting Surico: *"For what it is worth, I think the Rio metro system is amazing and really beautiful. And then coming from New York, it is so clean and nice. But it only serves a specific subsection of the population"* (J, Surico, personal contact, 2021).

Immediately one of the problems of the metro is touched upon. It largely serves the higher and middle class neighbourhoods in the South Zone of the city and neglects many other parts. One of the survey respondents said the metro only connected a small part of the city. The central areas of Rio de Janeiro have metro lines but the more peripheral regions, further away from the historical centre and Zona Sul, are largely left out. This is also one of the main critiques on the investments in public transport leading up to Rio's mega sport events. The aim was to improve the transport situation for the urban poor. Banister, Pereira, Schwanen and Wessel argue that *"contrary to the official discourses of transport legacy, there has been little accessibility improvement in the most deprived areas, which are doubly disadvantaged with low income and low accessibility"* (2019, p. 32). The central focus means that a large part of the city remains disconnected by metro: *"The region in the north of Rio de Janeiro is huge. All of these regions, Duque de Caxias, etcetera, and the North Zone are marked by low incomes. This part is not connected by metro"* (C, de Peixoto, personal contact, 2021). For Rocinha however, the investments have actually made a difference since the community saw a metro station coming closely to the entrance of the favela, named São Conrado. One of the interviewees praised the metro for better connecting Rocinha: *"What they did with the metro was very good. It improved life here for a lot of the population. Because in a few minutes we can arrive in the centre of the city. Because sometimes you spend two hours of your day trying to arrive with traffic and such. So it improved a lot with the arrival of the metro. It improved living here in the community"* (Lucas, personal contact, 2021).

5.1.2 Bus transport in Rio de Janeiro

Furthermore, Rio de Janeiro has a bus system all around town. This is seen as the most important part of public transport, because they reach most neighbourhoods. It goes places where the metro cannot go: *"The metro only helps part of the population. They need the bus. The bus attends the majority of the low income population, in the more peripheral regions but it does not attend the communities in the mountains"* (C, de Peixoto, personal contact, 2021). Alongside the standard bus lines that exist, the city has made investments in Bus Rapid Transit as part of their World Cup and Olympics program. It has been acclaimed by many for being innovative and effort towards sustainability (Institute for Transportation and Development Policy, 2015). Rocinha is connected to bus lines as well, although the community does not have a BRT stop. Busses drive through the main street of the favela, but the survey data showed that the bus system is perceived as overpriced, dirty and unreliable by a number of

respondents. From the 18 responses to the question: “Public transport does not attend to my necessities”, 8 respondents agreed or strongly agreed on it (table 3).

Valid		Frequency	Valid Percent	Cumulative Percent
	Strongly agree	4	22,2	22,2
	Agree	3	16,7	38,9
	Neutral	3	16,7	55,6
	Disagree	6	33,3	88,9
	Strongly disagree	2	11,1	100,0
	Total	18	100,0	
Missing	System	5		
Total		23		

Table 3: public transport fails to meet my necessities

Paraphrasing one of the answers from the respondents: “The busses are almost unable to make the curves of Rocinha. This, combined with all the other traffic going up the mountain, makes them really slow”. Another respondent spoke about the lack of streets the busses serve. “It’s impossible for them to get into the internal parts of the neighbourhood. They can only serve the main street”. Critique also came forward in a number of interviews. One mototáxi drivers showed his dissatisfaction with public transport: “There is no air conditioning in the busses, the seats are destroyed. And the price just rises and rises and rises. Thank God I don’t use busses anymore. It has been a long time since I’ve used them. But it is a pain for people who use it. It’s 40 degrees! At night it’s 30! And inside the bus, there is no air conditioning! And then a ticket is 5 reais!” (João, personal contact, 2021). The state the busses are in was something that was criticized a number of times during other interviews and by various survey respondents. They are old and need to be renewed.

The interviews and survey data showed that the bus lacks to provide basic services that are expected by the population. Although there are busses in Rocinha, they are seen as inadequate. Especially for the price it comes at, which has only been increasing for years: “To be honest, I don’t think it’s fair. I don’t think anything is fair. The price for gas, the price of this and that. It all comes at the cost of Brazilians who work hard. I think public transport should be cheaper. Because the population depends a lot on it. They do not give support for how much they cover. They cover a certain price completely different from the service that they offer. Understand? So to be fair I don’t think it’s fair how much they ask” (Lucas, personal contact, 2021). According to Lucas, the municipality always makes promises to better bus transport but never follows them: “There have already been various goals here, to have air conditioning in all and such. I have never bought it. The price has only risen and the service hasn’t gotten any better” (Lucas, personal contact, 2021). Furthermore, they can only serve a small part of the community, are always overcrowded and on top of this have no form of comfort. The bus lines only connect to a few places: “The flux of the bus during the day is very big. There are busses the entire day. But the government has limited the number of lines here. We had lines from Rocinha to the centre of the city, to Leme, to various places in Rio de Janeiro. Now the busses only go close by” (João, personal contact, 2021). A similar conclusion followed from analysing the survey data. It shows that there is a moderate Pearson correlation of 0.573 between public transport failing the needs of the survey sample and their use of mototáxis. Their use of mototáxis increases as their level of dissatisfaction with public transport grows. Thereby both the interviews and the survey show similar results.

5.1.3 Unequal footing in public transport

The public transport is centrally focussed in the South Zone of Rio de Janeiro and disregards many other areas of the city such as Rocinha. There is a strong core-periphery division in terms of public transport in the city. Central areas have an abundance of options such as the metro, busses and BRT while many favelas do not have any public transport corridors at all. Although Rocinha has busses, the flux is little and seems unable to meet both the qualitative and quantitative demands of the public. There is a systemic lack of transport options which has resulted in mobility poverty (Guzman, Lucas, Mattioli et. al, 2016). Data from the IBGE revealed that 13% of Rocinha's inhabitants thought that improving the transport situation in Rocinha is the most important task at hand (2000). Up until now, it does not seem that the needed improvements have been made and the public transport still has its share of problems in the community.

Fernandes (2014) argues that many favela residents feel like second class citizens due to the stigmatization of the neighbourhoods, also showing through the lack of public transport and it being inadequate. Government interventions have been less successful in building a foundation for addressing inequalities beyond economic concerns. According to Ystanes & Strønen, many residents feel unaccepted by the upper and middle class due to their skin colour and their origin in the favela (2018). The data from the interviews supported these statements. Mototáxi drivers often feel like they are seen as less: *"As it is a profession that has more abnormalities. So it's seen with a prejudiced look. You are often associated with trafficking, that you transport bandits and drugs. That you do things wrong, that you drive like crazy, without being cautious. But it isn't true. Of course you have people like that, but that's everywhere. But the majority isn't"* (Lucas, personal contact, 2021). Furthermore, favela residents often feel left out and have distrust in politicians, especially since president Bolsonaro has allowed for harder enforcement by the police and army in favela neighbourhoods (Miranda, 2019). Surico elaborated on this unequal footing: *"I mean, the favelas are completely disconnected from the city. Not by incident, you know. It's definitely systems being played out"* (J, Surico, personal contact, 2021). A striking example of the inequality experienced by Rio's low income residents happened during the construction of the Bus Rapid Transit, which began shortly after the city received the right to organise the Olympic Games of 2016. To make place for bus routes, favela residents were evicted out of their houses without a fair trial. The permit was changed for the BRT and construction began. What followed were human rights abuses by the government to get rid of these 'unwanted occupants' (Gaffney, Kassens-Noor, Messina & Philips, 2018).

5.2 The emergence of mototáxis in Rocinha

Data from Koch, Lindau and Nassi (2013) showed that 23,4% of favela residents use informal transport. One can immediately see that it is of great importance. In the paragraph before, it has become clear that public transport has not been able to satisfy the needs of Rocinha's residents. In order to comply with these needs for transport, informal transport fulfils a role in their day to day mobility. Mototáxis partly solve the problem of mobility poverty by driving up and down the favela with passengers. In this paragraph, the question: *"Which factors have led to the emergence of informal transport in Rocinha?"* is central.

5.2.1 Problems in planning and public transport

There are a few factors that have led to the emergence of mototáxis in Rocinha. First, the topographic location plays a role. Due to the site where the favela is located, it is difficult to walk there by foot, let alone go there by large vehicles. Steep hillsides form a barrier between the entrances of the community and the houses located within the slum. Surico on it: *"It's hard to get a bus up there sometimes. It literally can't drive up there because it's so narrow, it's so steep. I mean, I've been in Ubers that went completely backwards {laughter} and they couldn't get up there"* (J, Surico, personal contact, 2021).

Moreover, Rocinha has been built without proper planning in mind. Due to the informal character of the favela, houses have been built illegally, without building permits. It also affected the infrastructure in the community. Besides a number of main roads, Rocinha consists of small alleys that cannot be passed by large vehicles. Government officials have had no control over the development of the community. The lack of central coordination has led to a planning paradigm of 'everyone for themselves'. Therefore roads are narrow, curvy and crowded. Residencies remain connected from large roads. Mototáxis have been able to adapt. They can go to places other forms of transport cannot reach. Driver João said: *"You need motos. Everyone is dependent on mototáxis. You can't just ascend and descend the favela by foot. There is a lot of dirt and small alleys. So the motor is much better"* (João, personal contact, 2021). All in all, it is hard for public transport to meet the qualitative demand of mobility due to the topography and infrastructure in the community. On top of that, the public transport that exists is seen as of bad quality.

5.2.3 The size of the mototáxi business

These factors have stood at the bases of the emergence of mototáxis. They came in response to wishes from the community and came as a sheer necessity: *"Transport by foot is used, but very tiring. Especially for weaker and older people. Because of it, the mototáxis became the main option because unfortunately there aren't other options"* (C, de Peixoto, personal contact, 2021). Due to the number of inhabitants in Rocinha, mototáxis come with many. It has been a local source for job opportunities. Official data on the number of drivers is not available due it being informal but one of the interviewees estimated the number has to be between 1000 and 1500 in Rocinha alone. The pandemic affected this. Due to people losing their jobs during the COVID-19, the number of drivers increased while the number of passengers fell: *"So what happened, the flux of passengers shrinked and the number of mototáxis grew. So we need to work double, to earn half of what we used to. ... In the past, you just arrived at the mototáxi point and there were 15 or 20 motorbikes parked. If you arrive now, there are 40 or 50 motorbikes parked"* (João, personal contact, 2021). In a favela close to Rocinha, named Vidigal, the number of jobs has also risen. *"There are 320 motos in Vidigal. The vests belong to a cooperative. The cooperative gives me a vest and I pay them to work. At the moment, 320 are occupied. Before, there were 200. It increased to 320"* (Matheus, personal contact, 2021). The demand for mototáxis has clearly increased over recent years in all of Rio de Janeiro. This had also led to the decision to create a new decree by the city of Rio de Janeiro in 2019 in order to provide more regulation.

5.3 Mototáxis to get home

It has become clear that mototáxis have emerged out of necessity. Due to the topographical location and the bad quality of public transport, mototáxis have become a popular option. According to the questionnaire, 65,7% of the respondents use them because they feel like there is a lack of alternatives (table 4). Furthermore, some people in Rocinha also prefer them as their mode of transport over public transport due to different reasons. They are highly responsive and cheap. The price of a ride is fixed at 4 reais, both for ascending and descending. This price is non-negotiable and fixed by the cooperative to prevent drivers from undercutting and thereby dropping the price too far. Locations outside of the community have fixed prices as well that can be found in a table at mototáxi points, where drivers wait to take passengers.

Valid		Frequency	Valid percent	Cumulative Percent
	Strongly disagree	1	5,9	5,9
	Disagree	5	29,4	35,3
	Neutral	2	11,8	47,1
	Agree	5	29,4	76,5
	Strongly agree	4	23,5	100,0
	Total	17	100,0	
Missing	System	6		
Total		23		

Table 4: I use mototáxis because there is a lack of other options

5.3.1 Affordability of mototáxis

The data shows that 35,2% (figure 8) of the respondents see the price of mototáxis as acceptable. In the follow-up question about their price compared to the price of public transport, the number of people agreeing grows to nearly 50% (figure 9). This shows that whether or not the price of mototáxis is seen as fair, is relative and dependent on what people think of the price of public transport. The data confirms the hypothesis that the price of mototáxis is seen as better than the price of public transport by many.

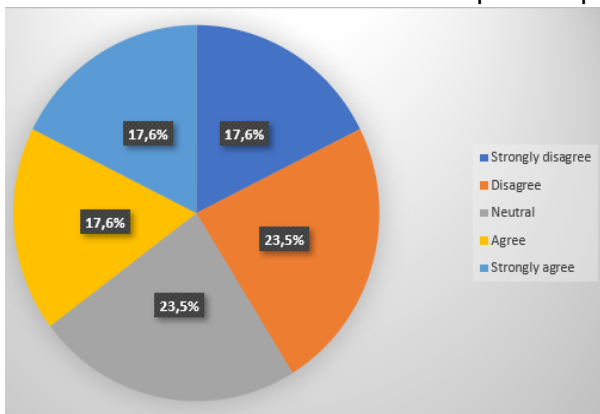


Figure 8: the price of mototáxis acceptable

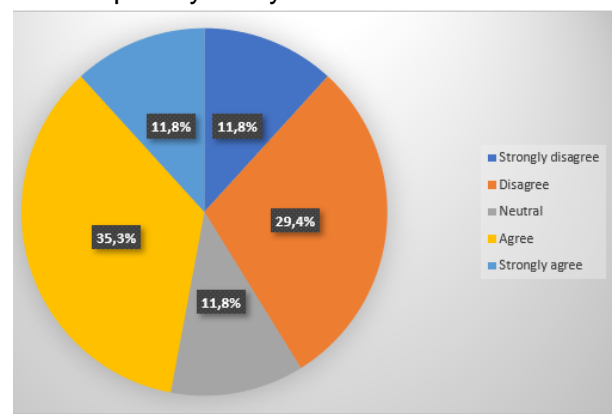


Figure 9: the price of mototáxis in Rocinha is acceptable compared to the price of public transport

People often prefer taking a moto instead of the public transport due to the first being faster and able to go through traffic jams when travelling longer distances. Da Fonseca argues that mototáxis came as a reaction to mobility problems in the favela. They aim to better connect these areas to the rest of the city (2006).

5.3.2 The use of mototáxis and its complementarity to public transport

It is estimated that around 40.000 passengers all throughout the city of Rio de Janeiro use mototáxis often (Globo, 2014). They have a significant position in the mobility of many. The survey showed that 41,2% of the sample group uses mototáxis every week (figure 10). Furthermore, 64,7% of the respondents stated that mototáxis are essential in their daily transportation (figure 11). This shows the importance of mototáxis to people from Rocinha, especially in combination with public transport when figure 12 is put next to it.

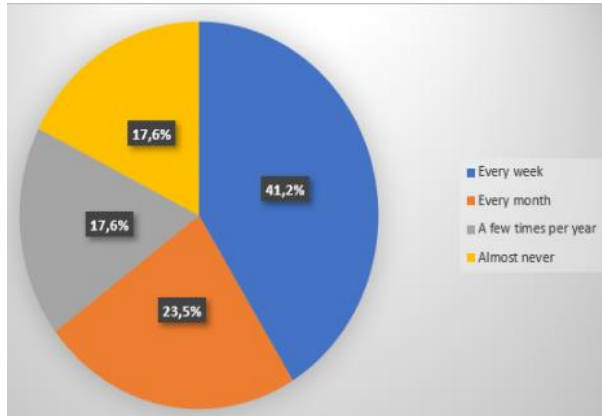


Figure 10: use of mototáxis

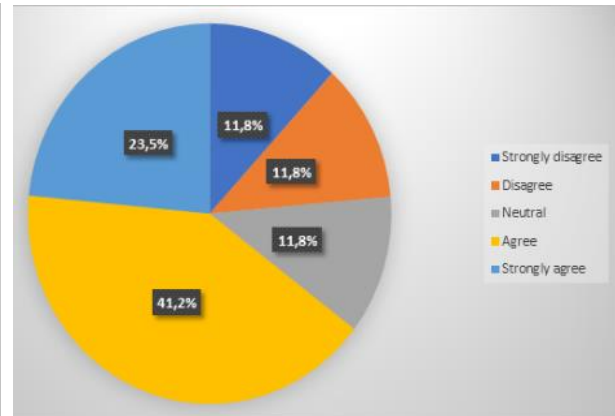


Figure 11: Mototáxis essential in daily transportation

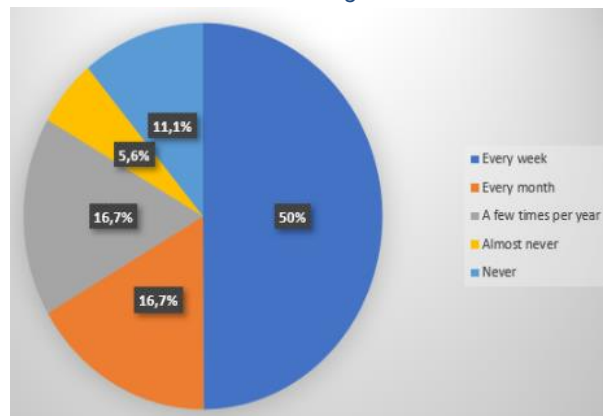


Figure 6: use of public transport

What stands out, is that it seem like the use of mototáxis does not come at the cost of the use of public transport. Looking at figure 10 and figure 12, the majority of respondents use both mototáxis and public transport at least once a month. There is a correlation of 0.649 which indicates that there is a positive relation between the use of mototáxis and that of public transport. The data supports the idea that they have a complementary role on public transport in Rio de Janeiro and that they do not necessarily serve as a substitution to it. This rhymes with the idea of Cervero on the complementarity of informal transport to conventional public transport (2000).

5.3.3 Catching a ride

In addition, mototáxis are characterized by their responsiveness. At the same time, busses are often perceived as unreliable due to them being late and off schedule. Mototáxi rides however, are made through the phone and arrive whenever needed. This gives more freedom to passengers who do not have to take a schedule into account. Some cooperatives operate under a shared number which one can call. One of their drivers comes to pick up the client. The mototáxistas that were interviewed however, use their personal cell phone. Part of their client base knows them personally: *“There isn’t a number you can call, it’s a personal number. Some choose a certain driver and then they’ll call me. “Can you bring me there and there?” Others will call you outside of your hours, like my friend did. He asked: “Are you driving right now? Save me dude” {laughter}. Generally they call me, understand? They trust me and they already know that I ride well so they call me. But when I can’t, I can’t”* (João, personal contact, 2021). Relating this to the theory of Habitus & Field, mototáxi drivers try to keep up their good name. They try this by attempting to drive safely, being fast and punctual. A trustworthy and pleasant driver is someone customers return to and therefore successful in the mototáxi business.

Valid		Frequency	Valid Percent	Cumulative Percent
	Strongly disagree	2	11,8	11,8
	Disagree	3	17,6	29,4
	Neutral	2	11,8	41,2
	Agree	7	41,2	82,4
	Strongly agree	3	17,6	100,0
	Total	17	100,0	
Missing	System	6		
Total		23		

Table 5: good experience with mototáxis

Mototáxis are opted for because they offer more freedom to the passenger than public transport does. Near 60% of the survey respondents have had mainly good experiences with them (table 5). Coming from a survey respondent the service is *“very useful, fast and on top it functions 24 hours a day, 7 days a week”*. They are also fast, which is the primary reason for the use of mototáxis for 82,4% percent of the survey (table 6).

Not only can they drive at high speeds, they are also able to pass traffic and are agile enough to go through alleyways. João said that this makes them popular for people who are late to work. When they need to get somewhere fast, they know he is the right man for the job.

Valid		Frequency	Valid Percent	Cumulative Percent
	Strongly disagree	1	5,9	5,9
	Disagree	0	0,0	5,9
	Neutral	2	11,8	17,6
	Agree	7	41,2	58,8
	Strongly agree	7	41,2	100,0
	Total	17	100,0	
Missing	System	6		

Table 6: use of mototáxis because of the speed

Mototáxi drivers know the streets like no other and are not afraid to take risks during their rides. This is an asset of their economic capital: the knowledge they have of the neighbourhood. They know the fastest roads from point A to B, which is important in the field of transportation in Rio de Janeiro. On the other hand, the speed and them passing everywhere also makes for dangerous situations. According to the survey, the more dangerous mototáxis are thought to be, the less likely people in the survey sample will continue using them in the future. There exists a negative correlation of -0.660. Although this cannot be generalised to the entire population of Rocinha, it seems likely that there is a coherence between the two items. More on the safety aspects will follow later in this chapter.

5.3.4 Mototáxis and favela tourism

Although the main focus of mototáxis is on serving the population of Rocinha, they also play their part in favela tourism. Rocinha became one of the more popular favelas for tourism due to its size, views it offers over the city and relative safety. Favela tourism peaked during mega events such as the World Cup and the Olympics. Tourism has been a factor that has made mototáxi as big as it currently is. A small portion of drivers and cooperatives even focus on tourism and offer guided tours on the back of a motorbike. Before the pandemic, the tourism sector was a lucrative business for them. One of the interviewees also showed intentions of focussing on tourism: *"I have another friend with some contacts and we are trying to focus on this side of tourism. To try tourism in Rocinha with the passengers. It's like this: tourism here is very important. Because I don't see a very big movement anymore in the local economy..."* (Lucas, personal contact, 2021). Mototáxi drivers try to benefit from the people visiting. In Rocinha, tourists are charged a higher price with the argument that they have more money than the average person in the favela: *"So it's better to ride tourists than inhabitants here. It's 7 reais, for inhabitants it's 4. So you take more tourists and earn more"* (João, personal contact, 2021). By having the skillset to inform tourists in English, a form of economic capital, mototáxi drivers can expand their work field. The new capital they have gained, can be used in the field of mototáxi to be more successful.

5.3.5 Job opportunities in mototáxi

Beside serving the population's transportation needs, the mototáxi business also offers jobs. Coming from João, it offers around 1000-2000 jobs just within Rocinha. In Rio de Janeiro itself, he estimates the number must be somewhere near 50.000. It is a way to make a living while doing what they like: *"I like the adrenaline. Since I was little.... Here in the favela, from a kid to an adolescent... Here as an adolescent in the community so high, where you climb a lot, you cannot not like motos. You need motos. ... And besides, the girls love the boys who have a moto in the community. So I wanted to drive a motor"* (João, personal contact, 2021). Another driver: *"I can earn an honest salary. So mototáxi opens this door"* (Felipe, personal contact, 2021).

Working in mototáxi is not just done by adults, although regulation does not allow minors to enter. Teenagers start doing it as a way to make some money at a young age: *"So I began riding mototáxis when I was just 15 years old. I did not have my license, but in this city you do what's necessary. I did know how to drive a motor. I heard that there was money in it and I heard some guys speaking about it. So I rented a motor. At that time it was 80 reais for a week. And I began driving. And because I knew the bosses of the mototáxi point, it was easier. I talked to someone I knew and said: "I want to drive", as a minor and paid and started driving*

until now {laughter}. I've never left" (João, personal contact, 2021). The ability to drive a motorcycle is essential in the field of mototáxis. It is what makes the difference between a good and a bad driver. Many start doing it at a young age. It is also one of the points that can make mototáxi dangerous: a number of young guys are driving without a license.

5.3.6 Safety issues

Driving behaviour is often one of the points under critique by people against mototáxis. The survey data however, does not reflect this negative sentiment (table 7). The majority, 64,7% of the respondents disagree or strongly disagree on mototáxis being unsafe. One of the drivers said he felt like the motorcycles are not the only ones to blame for the danger on the streets: *"People who have a car, or busses or trucks... They need to be a bit more cautious with the motos. Of course, there are also those who are crazy. But not all. So I think a bit more consciousness from all would help. (...) All the traffic is to blame"* (Felipe, personal contact, 2021). At the same time mototáxis are prone to crashing and accidents occur every day. They are also the most vulnerable since motorcycles do not offer much protection against the impact of a crash. *"Imagine an inhabitant of Rocinha that takes a mototáxi of someone he doesn't know. When you know someone, your cousin, and you know he is crazy. That he drives crazy. So you don't sit on the back of his motorcycle. But when you go by mototáxi, you don't know who is in front of you. So this increases the risk of the users"* (C, de Peixoto, personal contact, 2021). One of the survey respondents chooses his drivers wisely. *"I choose my drivers based on thrust. I only take rides with people I know"*. Another just tried to avoid having to use mototáxis as much as possible: *"The problem is their lack of education, if you don't get out of the way, they go over it. They are very anxious (...) I prefer public transport because it is much safer"*. There have been attempts to improve safety through legislation. More on this follows in the next part on government recognition and regulation.

Valid		Frequency	Valid Percent	Cumulative Percent
	Strongly agree	1	5,9	5,9
	Agree	1	5,9	11,8
	Neutral	4	23,5	35,3
	Disagree	8	47,1	82,4
	Strongly disagree	3	17,6	100,0
	Total	17	100,0	
Missing	System	6		

Table 7: mototáxis are unsafe

5.4 Mototáxi recognition: the city versus the informal

The following part is based on the data from the policy analysis, a decree released in 2019 and signed by one of Rio's former mayors. The document legalised the profession of being a mototáxi driver and took certain measures into effect. The interview and survey data will be put side to side with this policy document from the municipality to show how it is perceived by the drivers and users.

5.4.1 The mototáxi decree and how it is perceived

The decree touches upon different aspects regarding mototáxi. Legislation has its focus on creating a safer environment. This comes in different forms. The decree establishes rules on helmets and recognizable, highly visible vests. Next to direct safety measures, there is a focus on education. Drivers are obliged to take a course to learn about safety aspects in mototáxi, as can be seen in the list below. Furthermore, the legislation attempts to gain more insight into who works in mototáxi. The municipality opened a website where drivers need to be registered. On paper the decree seems like a big step forward for mototáxi transport and it was also presented as such through media outlets.

According to the decree, drivers need to comply with the following requisitions (Prefeitura Rio de Janeiro, 2019b):

- I. have at least 21 years of age at the date of registration
- II. possessing a driver's license of category "A" for at least two years with registration as "mototáxista"
- III. have a safety vest equipped with retro-reflective details, in yellow, in accordance with the Resolution of the National Traffic Council - CONTRAN - No. 410, of August 2, 2012, which regulates the mandatory specialized courses for professionals in passenger transport (motorcycle taxi driver) and in delivery of goods (motor-freight operator) who carry out paid activities in driving motorcycles and scooters;
- IV. have a safety helmet, with a visor or goggles, pursuant to CONTRAN Resolution No. 203, of September 29, 2006, which governs the use of helmets for the driver and passenger of motorcycles, scooters, mopeds, motorized tricycles and quadricycles motorized, and other measures, equipped with retro-reflective details, in red and white;
- V. be approved in a professional training course for motorcycle taxi drivers, according to CONTRAN Resolution - No. 410, of 2012, and specialization courses carried out with the support of CONTRAN Resolution No. 350, of June 14, 2010 are considered validated;
- VI. own the vehicle, with a Vehicle Registration and Licensing Certificate - CLRV -, issued in the State of Rio de Janeiro, or have a leasing or financing contract in its name;
- VII. declare, under the penalties of the law, not to have an employment relationship with the person providing the service referred to in this Decree.

Moreover, the decree states that: *"The driver is authorized by mototáxi.RIO to carry out the activity of remunerated individual passenger transport by motorcycle"* (Prefeitura Rio de Janeiro, 2019b). In reality however, this authorization does not seem to be the case. The drivers spoken to during interviews see the decree as policy for the sake of creating policy: *"They only recognized it to say they did. They also do this with other jobs. Just so they can*

talk to the media that they did it. But it does not work, nothing of it” (Felipe, personal contact, 2021). Furthermore, the mandatory courses are always full and on top of that, seen as unnecessary. Without registration and without following the course, one can still continue working in mototáxi since there is not control. That is due to its informality. Mototáxis are organized within favelas themselves. In the case of Rocinha, the drug world has a large stamp on it. *“There doesn’t exist a cooperative on its own. It’s fictional. In reality we work for the traffickers right. So the money we need to pay is for them, understood? We are submitted to their laws. (...) So the price is determined by them, the price we need to pay to them. We call it ‘Diario de Accordo’, they charge it. (...) They’re responsible for organizing it, but there isn’t a cooperative”* (Lucas, personal contact, 2021). This has made it difficult for the government to really change anything, because the drivers are subject to the traffickers and not completely to the government itself. The government is more of a marionette that wants to be seen as the one in control rather than really being it in Rocinha. Mototáxis fall under the control of drug gangs. Often, gangs of different favelas have rivalries. Therefore a driver from Vidigal, a nearby community of Rocinha, cannot pick up a passenger in Rocinha: *“I can take a passenger from here, Vidigal, to Rocinha. But, I cannot take passengers from there. The passenger from Vidigal? I can take him and bring him back”* (Matheus, personal contact, 2021).

According to the interviewees, the recognition has changed next to nothing for the drivers. One interviewee on the lack of insurance provided by the government: *“I work outside of the law, I have zero guarantees. If I fall, I’m screwed. (...) We pay, we just pay. We are just working and have no rights. We want basic insurance”* (João, personal contact, 2021). The drivers do not receive many benefits from the government. When they are involved in an accident, they can receive help but this is perceived as a costly and bureaucratic process. Although the drivers would want to see more help from the government, they do not necessarily want enforcement on mototáxis. This could mean change for mototáxis and could make it more difficult to earn a good salary. According to one of the interviews the will not to change also has to do with the traffickers in Rocinha. They determine the price points for rides, collect the fees that need to be paid every week and even use mototáxis for their own operations. Coming from Lucas: *“Since the majority of mototáxi points are located in favelas and are dominated by traffickers, submitted to traffickers, I think it is very difficult for the government to come together with mototáxi. Because I don’t think the traffickers will let the government earn the weekly fee that needs to be paid for example”* (Lucas, personal contact, 2021).

Again, it is possible to look at it from a core-periphery perspective, now from the eyes of governance. In terms of government presence, the favela is a periphery because the amount of influence the state has over them is little. Historically seen, Rio’s favelas have always been the frontline of the enduring clash between drug lords and the government. Favela residents fall in between the two parties: on the one hand they are subject to the power of the cartel bosses, while on the other hand a government is trying to control them. This has led to a unique position of favela residents that also becomes apparent when looking at the mototáxi system.

5.4.2 The organisation behind mototáxis

Although the government remains relatively uninvolved in the mototáxi business, it does not mean that organisation does not exist. As already said before, there are cooperatives behind it all. They demand a fee to be paid in exchange for a ‘colete’, a vest which indicates that one

officially works in mototáxi and is registered by them. If payment is failed, the person loses his right to work as a driver and a spot opens up for a new one. It is not easy to get yourself a job in mototáxi. From one of the interviews it came forward that your contacts matter, social capital in terms of Bourdieu's theory of Field & Habitus: *"So I studied how to do it. I went to the cooperative and asked to work. I got contacts, waited and succeeded. I took a moto and started working in mototáxi. (...) It's like that because a lot of people want to work in mototáxi. A lot of people want it here in Vidigal. It's a good salary, so people want to do it. But to start, it's very difficult"* (Felipe, personal contact, 2021).

5.4.3. The relationship between Rocinha and the state

In the interview with Surico, the special relationship between the favelas and the government was also highlighted. He advises the city to be cautious in their approach towards mototáxis. They are one of the most important forms of transportation in many favela areas. Favelas have always felt marginalized and there is large distrust between the government and these communities. *"You know, the favelas have such a unique historical relation with the city that I think that the city would have to do a lot.... Go above and beyond to get rid of all those undue burdens right"* (J, Surico, personal contact, 2021). At the moment of doing the research, 66,7% of the respondents feel like mototáxis are not being treated as an integrated part of the transport system of the city (table 8). This is partly a result, but also a cause for the rejection of the government in Rocinha and distrust in the state. The government is not seen as if they genuinely want to improve life in the favela. Suspicion on everything the government does seems like a habitus that is shared by people in Rocinha.

Valid		Frequency	Valid Percent	Cumulative Percent
	Strongly disagree	7	46,7	46,7
	Disagree	3	20,0	66,7
	Neutral	4	26,7	93,3
	Agree	0	0,0	93,3
	Strongly agree	1	6,7	100,0
	Total	15	100,0	
Missing	System	8		
Total		23		

Table 8: the municipality of Rio de Janeiro treats mototáxis as an integrated part of transport

5.4.4 Regulation outside of the communities

Within Rocinha, there is no government regulation on mototáxis. Outside of the communities, minimal regulation exists. One driver I spoke to told me about 'blitz', police controls. They are located in the South Zone and check motor drivers and cars on licenses and documents. It is not especially focussed on mototáxis, but sometimes they get picked out. Mototáxi drivers communicate to avoid being checked: *"Here, we have a group on WhatsApp that says where there is a blitz. To avoid being stopped, yes {laughter}. So we have this communication between us to not be caught. There is a lot of corruption as well dude. These barriers are to earn money. They stop you, ask for money and let you go. But this is good because if I'm stopped with invalid papers, they will let me go. I will pay them some money and they will help me. If I talk to an agent: "No officer, I'm wrong. I know I'm wrong, but this is for me to make some money and survive", they will let you go"* (Matheus, personal contact, 2021). The police

controls always come with a risk. Even if all your papers are fine, the risk is there that a driver has a wrong passenger on his seat: *“So if you have a passenger who isn’t that good, the police can make you stop. And they blame you for something you cannot be blamed for. We do not choose our passengers. The passengers choose us. We never know who we are taking. We can only see their backpack and if they’re dressed normally. But they can be armed and crazy. Like they’re going to assault someone, I don’t know. Transporting drugs. And then the police stop us and we are blamed for something we don’t know anything about”* (Felipe, personal contact, 2021). This can lead to problems for the drivers.

5.4.5 The wish for recognition and regulation

Although mototaxis are controlled by the drug world, the survey data shows that there is a wish for more regulation on them from the municipality. There is a large group of respondents who wants to see new legislation, 80% (table 9), but only a small group that sees mototaxis as unsafe, at just 11,8% (table 7). Therefore it is possible to make the tentative conclusion, considering it not being significant, that most respondents do not necessarily want to see regulation that is focused on making the system safer. However, this is where current regulation, the mototaxi decree, from the municipality is primarily aimed at. There is a need for new regulation, but policymakers only see certain aspects of it and are forgetting, or neglecting, the rest of it.

Valid		Frequency	Valid Percent	Cumulative Percent
	Strongly disagree	0	0,0	0,0
	Disagree	1	6,7	6,7
	Neutral	2	13,3	20,0
	Agree	8	53,3	73,3
	Strongly agree	4	26,7	100,0
	Total	15	100,0	
Missing	System	8		
Total		23		

Table 9: the municipality of Rio de Janeiro needs to come with more legislation

De Peixoto shared some of his ideas on possible legislation during the interview. His main worry about mototaxis is the safety aspect. Young drivers are incentivized by their bosses or by the money they can earn, to speed. To better the safety aspect of jobs using motorcycles such as mototaxi and motoboy, de Peixoto came with proposals: *“The most important thing is to organize a good fiscalization system. (...) The idea is not to take money out of their pockets. The idea is to make them understand that it is not that. It is explaining and educating them. In article 320 in our traffic code, we have this point we discussed earlier. There need to be educational campaigns and money needs to go there. I propose, one, more intense fiscalization. Two, educational campaigns. Three, support the use of mototaxis in a safer way. Four, a rule that makes sure helmets are renewed every four years. And also the bosses of the motorcyclists need to be held responsible for the act of incentivizing speeding”* (C, de Peixoto, personal contact, 2021).

5.5 Learning from mototáxis: the good, the bad and the ugly

Informal transport has its strengths and weaknesses. This is also the case for mototáxis, on which opinions differ according to who you ask. The poorer passengers, from Rio's lower class communities, see them as a conventional way of transport that improves their physical mobility and therefore indirectly their social mobility. At the same time, people in the upper classes may see them as dangerous and irresponsible. A lot can be said about mototáxis and whether or not they should exist in their current form or even at all. In this paragraph, it will be discussed what can be learned from mototáxis in Rocinha and what is better to be avoided for other contexts.

5.5.1 Rocinha's unique mototáxi system

Mototáxis are certainly not specific to Rocinha. They exist in all urban areas of Brazil and other areas of the Global South. Other favelas in Rio are also known for having them. What is different for Rocinha however, is the level of dependency of the population on it. As has been said before, mototáxis exist out of pure necessity in Rocinha. There is a lack of options due to public transport being unable to reach certain spots on the 'morro', the hill. They connect the houses of people to hubs of conventional public transport and thereby cover 'the last mile'. They often function as feeders for the metro or the Bus Rapid Transit. In those cases, they have a complementary role, but they can also replace a passenger's need for public transport completely by substituting it. This makes them a versatile mode of transport, fitted to different travel demands. Moreover, Rocinha is a favela with a huge population. This has led to a mototáxi system that is unique in size. Mototáxis themselves are not specific to Rocinha as they can be found in different areas of the Global South. The topography of Rocinha and its size together with the lack of public transport, has resulted in a great importance for mototáxis. It can be argued that this is what makes the favela's mototáxi system specific and different from others.

5.5.2 The advantages of mototáxis

With that said, there are certainly things to be learnt from them. Both in urban areas in the Global North as well as the Global South. Mototáxis, and informal transport in general, give policymakers insights in the parts of the population that are deprived of public transport. Mototáxis are there to serve those who are left unattended by government organised transport and fill up a gap in the market. Because they work outside of an official, bureaucratic and organised system they can also charge lower prices than public transport does, which makes them highly accessible to nearly everyone. Furthermore, the mototáxi system is excellent at anticipating the demand from the market. If it is busy at the moto taxi point, they do more rides. If the demand is low, they stay at home. Coming from the interview with João *"I just don't have a fixed schedule. I ride a bit in the morning. I drive down the mountain at 6 or 7 in the morning. That's the peak hour when people go to work or to school. Then I ride until 9 or 10 in the morning. Then I spent a bit of time with my daughter and then I go to the studio. In the studio I stay until 4 in the afternoon. Then I work as a mototáxi driver again. At 6 or 7 in the night, I begin with the delivery app"* (João, personal contact, 2021). Drivers do not have a typical 9 to 17h day. They anticipate how many possible passengers they have and work based on when and where they are needed. Another taxi driver said: *"We work when we want. We just put on the vest and work. When we want to stop, we stop. We do not have a certain standard"* (Matheus, personal contact, 2021). Furthermore, they work via cell phones based on demand.

Many mototáxi drivers also do other jobs on the side during the hours the demand is low. All of my interviewees spoke about their activities as 'motoboys'. This job focuses on delivery of goods and food from restaurants. Mototáxi allows them the freedom to plan their day as they like and do these kinds of jobs on the side when the flux of passengers is low. Therefore informal transport is dynamic, agile and adaptive (Advancing Public Transport, 2021), which mototáxi is as well considering all of the above. They have adapted themselves to how the market functions and can quickly change how they work if that is asked from them. Public transport in its current form does not have this advantage of being able to quickly adapt to changing situations. This is something wherein mototaxis outperform public transport and from which public transport can take lessons away.

Mototaxis operate where other transport vehicles cannot come. Other places with similar topographical barriers could learn from small-scale transport. By using vehicles that are small and agile, places that remain disconnected become part of the transport system. Mototaxis are something that needs to be considered for places with difficult topography, may it be with the help of the government. Additionally, mototaxis have proven to be able to serve a wide range of people, just like well-functioning public transport services do. Although motorcycles are known for not being the most comfortable and safe mode of transport, their audience varies from mothers with small kids on their lap to elderly. While public transport is often work oriented, the destinations for mototaxis are more varied. Surico on it: *"I think what informal transport does really well is that it reaches audiences that are not necessarily going to work. (...) Informal transport is reaching these destinations that public transport might not be reaching. Studying the informal... Rather than seeing them as a burden, study them and see who are they serving, where are they going, what are the most popular routes. Because you will get a better sense of where, how your city is kind of functioning. That you won't get looked at through the lens of jobs. And I think this last year really showed that obviously because the access to medical care, schooling, access to green space became so much more important during the pandemic and I think the informal transport really hits those points in a very specific way. That I think is a main point together with the job focus because I think mototaxis can play this huge role to help transport planners understand where people are actually going and how to kind of better connect them"* (J, Surico, personal contact, 2021).

They serve a wide range of people due to them having many advantages over public transport. One of them is also the price for the service you get. Mototaxis bring people to their doorsteps at an affordable price. Busses are around the same price but due to the service being bad, they are seen as overpriced. You do not get what you pay for. Mototaxis have found a way to offer a service at a price point so that many are willing to use the service. This is something important all around the world, especially since more people are in need of transport. Keeping it affordable is key, even when public transport is evolving. It is becoming more modern, more time efficient and in most western countries, more environmentally friendly. These innovations have effects on the construction and operation cost of public transport. One thing that cannot be lost out of sight is the price of fares, to enable the use of public transport to whoever wants to. Especially since urban areas will grow and mobility in the developing world is still declining (Gakenheimer, 1999).

5.5.3 The role of mototáxis during a pandemic

Informal transport is important to many people who live in urban dwellings. Especially during the COVID-19 crisis (Advancing Public Transport, 2021). Due to mototáxis only having one passenger, they have grown in importance to frontline workers during the COVID-19 pandemic. To avoid contact with others and remain socially distanced, they take mototáxis. *“I’m going to take a guess here that a lot of the vagues who were using the mototáxis are ‘quote on quote’ frontline workers. So they’re going into Leblon, they’re going into Copacabana, they’re going into centro to work as either... You know, work in the offices there. Maybe they’re maintenance workers, maybe they’re working in other positions there. They are vendors. Because that’s usually the kind of favela inhabitants, the main kind of occupation there. Or they work in tourism right. That’s another thing, they work in tourism. (...) So I would say that the mototáxis probably have been a lifeline. You know, just based on their general scope and mission. They’re a lifeline for people who work in public facing positions just kinda naturally”* (J, Surico, personal contact, 2021). They have proven to be essential in enabling people to transport during the pandemic, especially since formal public transport was (partly) shut down in many cities. “Informal services have stepped up to fill the gap left by formal transit and keep cities running, serving as a lifeline for low-income residents who cannot work from home, do not have access to cars, and for whom it is unfeasible to walk or cycle” (Calnek-Sugin & Heeckt, n.d.)

Other urban areas can learn from how mototáxis have operated. Many cities struggled with providing public transport to those who worked in the frontline while at the same time making sure everyone could travel, considering social distancing. Mototáxi, and informal transport in general, have shown to do an excellent job. During similar pandemic situations which may occur again in the future, resorting back to small-scale transport in the forms of taxis, micro-busses or even mototáxis is something that cannot be overlooked by policy makers. The pandemic has shown that mass transport is exactly what needs to be avoided to keep viruses from spreading. Small-scale transport, like most forms of informal transport, can offer a (temporary) solution.

5.5.4 The disadvantages of mototáxis

Of course, not all informal transport has to offer is rosy. There are some clear downsides to it and to mototáxis in specific. As has already been mentioned a number of times, they are prone to crashing which make it a risk to use them. De Peixoto criticized the municipality of Rio de Janeiro for acknowledging them: *“Mototáxi, when the state permits it, they say it’s safe. But that’s not true. Because the risk of mototáxi is high in comparison to conventional taxis or compared to apps like Uber”* (C, de Peixoto, personal contact 2021). Safety is still one of the main concerns of mototáxis and informal transport. Due to their informality and lack of organisation, there are not clear cut rules to which the drivers need to behave in accordance and they are incentivized to speed.

This relates to another weakness of informal transport and mototáxis: “Informal transport has a lack of awareness towards governance in the sector” (Advancing Urban Transport, 2021 p.4). The municipality of Rio de Janeiro has little control over mototáxis in Rocinha due to their limited presence in the community. Informal transport is organised outside of their influence and led by traffickers. This has proven to be a barrier for the government in getting a grip on mototáxi. According to Surico, the municipality needs to take a cautious approach: *“You know,*

the favelas have such a unique historical relation with the city that I think that the city would have to do a lot.... (...) There is a lot of like, walking on eggshells. That expression, like they have to walk cautiously with the motor drivers. I think it could get better. I think that literally, the legislation that will work best is the one that recognizes that historical distrust between the two and works to be beneficial to both parties. That's really important right" (J, Surico, personal contact, 2021). If governments want to rapprochement with informal transport, they need to take an approach where they acknowledge informal transport. They need to engage in a relationship to build trust and take a cautious approach because in informal transport, governments are often seen as the culprit of it all. By showing restraint and acknowledging what they could have done better in the past, there is room for dialogue.

Another aspect of informal transport that is hard to get a grip upon, is the pollution. Mototáxis are not fuel efficient because the motorcycles are often older models and only have one passenger per ride. *"Motorcycles are just proportionally bad for air pollution and the favelas have it the worst. I mean, low income communities of colour usually have the worst air pollution or they are exposed to the worst. (...) So I would say the motorcycles, the pollution thing, is something that needs to be talked about more"* (J, Surico, personal contact, 2021). If cities want to make informal transport more sustainable, campaigning is needed and people need to be incentivized to change (Advancing Public Transport, 2021). This is something that has not been done in Rio de Janeiro yet and something to consider. Surico's take on it: *"Go above and beyond to get rid of all those undue burdens right. We're going to pay you to get electric motorbikes, we're going to not make it so hard"* (J, Surico, personal contact, 2021).

5.5.5 The applicability of mototáxis elsewhere

Since the role of mototáxis in Rocinha is specific, it is impossible to completely copy paste certain aspects of the system to other contexts. But it is certain that similar systems are applicable elsewhere. What looking at the mototáxi system of Rocinha does, is that it allows for critical thinking. Planners need to consider what works and what does not. They need to consider their approach towards informal transport. With informal transport only growing in the future, the choices in how to deal with it will become more important and will need to be made more often. Governments can pave the road to incorporate them legally within their transport system or they can choose to let it be, without them being involved. Whatever they decide to do, they can take inspiration from how things work in the mototáxi from Rocinha. It can open many new doors or close doors that have been open for too long.

6. Conclusion

The aim of this research was to give a concluding answer to the main question: *“How and why does informal transport (mototáxis) fill in the role of conventional public transport in Rocinha, Rio de Janeiro and to what extent is this applicable elsewhere?”* To answer this question, the research has been split up into five sub questions. These have been answered through interviews, a questionnaire and a policy analysis. Concluding, the results showed that mototáxis in Rocinha exists because of the following reasons.

At first, the topography makes it near impossible for mass oriented public transport vehicles to get up there. Due to Rocinha only having one main road, cutting through the community, the majority of the area remains disconnected from easy access to public transport. Furthermore, the topography and informal character of the slum have resulted in narrow alleyways where only mototáxis can drive. The main conventional public transport lines in Rio de Janeiro consist of metro and busses. The problem is that they do only serve Rocinha partly. The metro line is at the base of the favela and therefore still pretty far to walk to for people living higher up in the community. Bus lines in the favela exist, but they can only reach certain areas and they ride at limited hours. Next, the public transport that exists in the favela is seen as expensive, unreliable and overall lacking. This combination of factors makes public transport lacking for many. The quality is not what is expected of it. The insufficient public transport in combination with the topography have eventually led to the existence of mototáxis in Rocinha. They have played into this by providing an on-demand form of transport as an alternative to government organised transport. Mototáxis offer a fast mode of transport, being able to go where most vehicles cannot. This makes them fitted for door to door transport and popular to many in Rocinha.

Mototáxis have been acknowledged as a legal form of transport and an official profession since 2019 by the city of Rio de Janeiro. The state has made an effort to better recognize mototáxis and have come up with rules that need to be followed. From the results however, it came forward that the degree from 2019 has had next to no effects. This is due to the lack of government presence in Rocinha. The cooperative in the organisation is led by traffickers. Furthermore, the policy does not match with what most people wish to see for mototáxis. The main thing that the drivers want is better insurance. The system of mototáxi has shown to be self-sufficient, without needing government interference. It has some basic organisation, but still allows for a lot of freedom for the drivers.

The mototáxis of Rocinha clearly have their negatives. The service is dangerous at times and there is always the risk of accidents. Still, there are a lot of positives to them. They are there for those who are forgotten by the state. They provide a service that is essential to the livelihood of many people in Rio de Janeiro who are deprived of public transport. They make living in the favela just that little bit easier. Furthermore, they offer job opportunities to the youth.

Although it is not advisable to blindly copy the mototáxi system of Rocinha on itself, there are certainly things other urban regions and policymakers can take away from it. Mototáxis offer insights into the needs around transport mobility. Their accessibility, easy use and trustworthiness have made them a popular transport option. Policy makers should start thinking about why informal transport exists. It clearly means that a part of the population is

dissatisfied with how public transport works. Instead of completely disregarding informal transport, it would be a big step to better recognize and even incorporate it within the transport system, something which has not been done in Rio de Janeiro. To conclude, the system of Rocinha is specific but parts of mototáxi are certainly applicable elsewhere. Informal transport can work complementary to public transport while at the same time being cost saving to the state and to the wallets of clients as well. With clear regulation and boundaries, there should be no reason why the two cannot exist next to each, even strengthening each other.

7. Discussion

7.1 Reflection

Looking back at the thesis, I am satisfied with the end result. During the research, I have experienced highs and lows. I already knew months before the thesis started, that I wanted to cover a topic within the Brazilian context due to my passion for the country. At times, I doubted if my choice was right since it seemed very hard to find respondents at the other side of the world without being able to visit them.

Normally, this research would have been done on location. Due to the COVID-19 pandemic and the travel restrictions, I was unable to visit Rio de Janeiro and Rocinha specifically. This made the process more difficult, while it was harder to find respondents for my interview and survey. In the end, I succeeded in finding the respondent, but it took more of my effort and time than anticipated. At times, I was unsure if I could find respondents. But always my doubt went away when I received an enthusiastic response from someone wanting to participate. I also doubted if my level of Portuguese was sufficient since I have not spoken with a lot of Brazilians yet, especially those who use more colloquial language. Fortunately, this was not a problem. Sometimes there were some misunderstandings during the interviews, but in general we were able to communicate really well.

As said in the methodology chapter, no fieldwork has been done on location. This partly resulted in a non-representative survey, with a relatively low number of respondents. Through online sources, it turned out to be impossible to come with a research population. It also proved difficult to distribute the survey. Some people were willing to spread the survey, but this still resulted in a low number of respondents. Therefore the findings from the survey could not be used to generalize. They are only valid for the survey sample itself.

Overall, writing this thesis was a pleasant experience. I have enjoyed the process and I am happy with my results. I have met a lot of great people and it also opened my eyes. I spoke with people who live such a different life from mine and this offered new perspectives. The people I contacted were always surprised why someone from the Netherlands would want to research mototáxis in Rocinha and this made them willing to give me a helping hand.

If I could do something different, I would be more careful in expressing my opinions during the interviews. At times, the interviews became a bit too informal and I also shared my opinions on certain topics because people were so easy going. Next time, I will try to be more aware of my role as the researcher during the interviews. Furthermore, I would have done more research if I had more time at hand. For example, I would also do in depth interviews with users of the system, I would talk to representatives of the municipality and would try to find out more about public transport and the relation between mototáxis and the government. All in all, I am proud of what I delivered and I hope it can give more insights into what mototáxi is and how informal transport works.

7.2 Recommendations

7.2.1 Recommendations for further research

This thesis showed that mototáxis have a significant role in the transportation of Rio's favela inhabitants and are able to compete with modern public transport. This thesis studied how mototáxis function and why they do. In future research, the focus could be more on who they serve exactly. After concluding the research, it remains a knowledge gap how big the system of mototáxi really is outside of the favelas: in the areas of the city better connected to public transport. It would be interesting for the drivers, but also for the municipality of Rio, to know how the demand is spread around different areas of the city. This could be combined with a research focussing on an analysis of where public transport is located and how it is perceived. Doing a city wide review of transport in Rio de Janeiro would give an overview of what exists, what is already good and what the city needs to improve. It would better emphasize the importance transport has in the livelihood of people in the developing world. Another suggestion is to focus on the effect mototáxis have in helping people to come out of poverty.

7.2.2. Societal recommendations

It is advisable for policymakers to seek rapprochement with the mototáxi drivers and their bosses. Instead of coming with a set of rules without any discussion, involve them in the decision making process. This would not only make for the policy to be more efficient, but would also address the thrust issues that historically exist between favela residents and the state. By taking a facilitating role in a stakeholder process and providing certain frames, the state would show that they are open to input. Furthermore, it would show the favela residents that their thoughts and ideas really matter and that they are heard. How exactly to deal with mototáxis and how to govern is a question that remains to be unanswered yet. A huge first step would be to start the conversation and work from there onwards.

Furthermore, the city of Rio de Janeiro needs to get aware of where their public transport lacks and need to improve it where most needed: in the favelas. Transportation has proven to be a key factor in poverty alleviation. Therefore, it is especially important to a low income area like Rocinha. To help the people in the favela, a reaching public transport network is needed. This does not automatically mean that mototáxis need to go. Topographically seen, it is impossible to let busses operate in many of Rocinha's narrow streets. Mototáxis could still function as feeders to public transport in areas where it cannot reach. They should not be seen as the enemy of public transport but as an extension of it. By cooperating with them, the formal and informal transport can be aligned with each other so that both the municipality and the mototáxi drivers benefit from it. It would also make it easier to incorporate them within Rio's road to becoming a more sustainable city.

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Attachments

Attachment 1: interview guide experts

First, I would like to thank you for participating in this research. My name is Thijmen van Kleef. I am a third year student of the bachelor course Geography, Planning & Environment at the Radboud Universiteit of Nijmegen, the Netherlands. I am doing my bachelor thesis on the mototáxis of Rocinha. The research focuses on the way the system functions, why it does like that and what can be learned from it. The interview will take about an hour.

Before starting the interview I want to emphasize that you can ask questions during the interview and have the right to stop at any moment. Furthermore, I would like to ask if it is ok if I record the interview. This makes it easier to analyze the results. You will stay anonymous.

Do you have any questions before we start? Then I begin the recording now.

1. First off, I want to start with some questions about you and your career

- What kind of career do you pursue?
- How did you get interested in urban mobility research?
 - For how long have you been working on the topic?
- Can you describe how you first were introduced to 'favelas' in regard to urban mobility?

2. Now I want to ask a few questions about public transport in Rio de Janeiro.

- How would you describe the current state of public transport in Rio de Janeiro?
 - How is this for favelas?
- What are the upsides of conventional public transport?
- What are the main downsides of it?
 - Can you specify this for Rocinha or other slums?
- How would you describe the prices of tickets for conventional public transport?
 - Are they making public transport inclusive for everyone?
- What kind of efforts do come from the municipality to better the public transport in the city's favelas/Rocinha?
 - Do you have some clear examples?

3. The next part of the interview will be about the mototáxis

- Why do you think moto taxis exist?
- Which types of people use mototáxis?
- Can you name some major upsides of mototáxis?
- What do you consider negatives of the system?
- In many areas of Rio de Janeiro, moto taxis also play a role in the transportation of tourists. When googling famous slums like Rocinha or Vidigal, moto taxis are one of the first things you encounter. How important is tourism to moto taxi drivers in the favela's?
- Mototáxis are often associated with irresponsible driving and seen as a danger on the road leading to accidents. What are some implementations that could be done to make them safer in your opinion?

- Has the use of mototáxis changed since the corona pandemic?

4. In recent years, the regulation on mototáxis has been increasing. The job is now recognized as official by the municipality of Rio de Janeiro.

- How would you describe the relationship between moto taxi drivers and policy makers?
 - Can we speak of an equal dialogue? To what extent are the drivers heard by policy makers?
- Are the rules for the drivers made clear by the municipality?
 - If so, how?
 - If not, what is causing this discrepancy?
- How do moto taxi drivers experience the increasing legislation? Is it a step forward for them or is it seen as a limitation?
- Is there strict enforcement of the rules? For example, do officers come to check on licences, motorcycles, etcetera?
- How are the cooperatives organised?
 - Do you know of some other parties that are involved?
- Have the rules affected the number of users of the mototáxis?
- Would you say moto taxis still fall into the realm of informality after the implementation of these rules?

5. Now I have some final concluding questions:

- What do you think other urban areas over the world can learn from it, both in good and bad terms?
 - Difference between Global North and Global South?

Last, I want to ask you if you know of any other persons in the field that would be willing to help me. If you have any names, you can also contact me later on.

Conclusion

We have arrived at the end of this interview. Again, thank you for your participation. If you would like a transcript of the interview and the final results, let me know. Do you have any other questions about the research or the way your interview will be used in it?

Attachment 2: interview guide mototáxi drivers

First, I would like to thank you for participating in this research. My name is Thijmen van Kleef. I am a third year student of the bachelor course Geography, Planning & Environment at the Radboud Universiteit of Nijmegen, the Netherlands. I am doing my bachelor thesis on the mototáxis of Rocinha. The research focuses on the way the system functions, why it does like that and what can be learned from it. The interview will take about an hour.

Before starting the interview I want to emphasize that you can ask questions during the interview and have the right to stop at any moment. Furthermore, I would like to ask if it is ok if I record the interview. This makes it easier to analyze the results. You will stay anonymous.

1. First I want to start off with a round of introductory questions to get a feel with whom I am dealing with.

- Do you live in Rocinha?
 - If so, for how long?
- For how long have you been a moto taxi driver?
- Is it your main job or something on the side?
- How many hours do you drive a week?
 - How many rides a day would that be?
- What made you decide to become a moto taxi driver?
- Can you describe your career path until becoming a motor taxi driver? What jobs did you do before?
 - Do you enjoy being a mototáxi driver?
- Are you planning to keep working as a mototáxi driver in the upcoming future?
- How is the job market for moto taxi drivers? Is there a lot of work?

2. Now I want to ask a few things about the public transport in Rocinha.

- How would you describe the current state of public transport in the community?
- Do you use the public transport in Rocinha yourself?
- What is your opinion on the prices of public transport? Are they fair and affordable in your opinion?
- What kind of efforts do come from the municipality to better the public transport in Rocinha?

3. Questions on mototáxis and their own experience

- Can you describe the way you work?
- Why do you think people use moto taxis in Rocinha?
- What types of commuters do you typically drive?
- What hours are the busiest?
- Have you ever come into dangerous situations during your job?
- How important is tourism for moto taxi drivers?
- mototáxis are often associated with dangerous driving and accidents. How do you see this?
- How has the corona crisis affected mototáxis?
 - Has the number of users changed?

4. The next part of the interview is about regulation

- Do you work for a cooperative?
 - Is it possible to give feedback to the cooperation?
 - How would you describe the relation between the cooperations? Is it friendly or highly competitive?
- If not: So is it possible to work beyond a cooperative?

Since a few years, the regulation has been increasing. mototáxis are now acknowledged as an official job by the municipality of Rio de Janeiro.

- What has this meant for you?
- Are the rules from the municipality clear?
 - How are they made clear?
- Is it possible to get involved or to contact the municipality regarding moto taxis?
- Is there strict enforcement of the rules?
- How do you experience the increased legislation by the municipality? Is it a step forward or a limitation?
- What are your ideas to improve the mototáxi system?

Conclusion

We have arrived at the end of this interview. Again, thank you for your participation. If you would like a transcript of the interview and the final results, let me know. Do you have any other questions about the research or the way your interview will be used in it?

Do you know other people with whom I can speak?

Attachment 3: questionnaire

Rocinha mototáxis

Hello, thank you very much for the participation in my research. It is about the role of informal transport in the community of Rocinha and how the city can better recognize this form of transport. With the questionnaire, I would like to research your perception of the mototáxi. The questionnaire takes only 5 minutes and your answers will be completely anonymous. The research is done in the name of the Radboud University, the Netherlands.

In this questionnaire, I would like to hear about your experience with public transport and mototáxis in Rocinha. Please, only respond if you live or have lived in Rocinha. Remember that there are no right or wrong answers.

If you have any doubts about the questionnaire, send me an email.

I thank you for your collaboration

Q1 What is your gender?

- ☐ Male (1)
- ☐ Female (2)
- ☐ I rather not say(3)

Q2 What is your age?

Q3 What is your level of education?

- ☐ Elementary school incomplete (1)
- ☐ Elementary school complete (2)
- ☐ High school incomplete (3)
- ☐ High school complete(4)
- ☐ Higher education incomplete (5)
- ☐ Higher education complete (6)
- ☐ I have not attended school (7)

Q4 In which sector do you work?

- ☐ Formal sector (1)
- ☐ Informal sector (2)
- ☐ I do not have a job by choice (3)
- ☐ I cannot find a job (4)
- ☐ I am retired (5)
- ☐ I am still in school (6)

Q5 Do you live in Rocinha?

- ☐ Yes, I live in Rocinha (1)
- ☐ Yes, I have lived in Rocinha (2)
- ☐ No, I have never lived in Rocinha (3)

Questions on the public transport in the community

Q6 How often do you use public transport in Rocinha?

- ☐ Every week (1)
- ☐ Every month (2)
- ☐ A few times a year (3)
- ☐ Almost never (4)
- ☐ Never (5)

Q7 "Public transport does not attend my necessities"

- ☐ Strongly disagree (1)
- ☐ Disagree (2)

☐ Neutral (3)

☐ Agree (4)

☐ Strongly agree (5)

Q8 What are the main problems with public transport?

Questions on mototáxis

Q9 How often do you use mototáxis in Rocinha?

☐ Every week (1)

☐ Every month (2)

☐ A few times a year (3)

☐ Almost never (4)

☐ Never (5)

Q10 "Mototáxis are essential in my day to day transport ."

☐ Strongly disagree (1)

☐ Disagree (2)

☐ Neutral (3)

☐ Agree (4)

☐ Strongly agree (5)

Q11 "I will continue using mototáxis in the future."

☐ Strongly disagree (1)

☐ Disagree (2)

- ☐ Neutral (3)
- ☐ Agree (4)
- ☐ Strongly agree (5)

Q12 "I use mototáxis because of the speed."

- ☐ Strongly disagree (1)
- ☐ Disagree (2)
- ☐ Neutral (3)
- ☐ Agree (4)
- ☐ Strongly agree (5)

Q13 "The price of mototáxis is acceptable in Rocinha."

- ☐ Strongly disagree (1)
- ☐ Disagree (2)
- ☐ Neutral (3)
- ☐ Agree (4)
- ☐ Strongly agree (5)

Q14 "I think the price of mototáxis is acceptable in Rocinha compared to the price of public transport."

- ☐ Strongly disagree (1)
- ☐ Disagree (2)
- ☐ Neutral (3)

- ☐ Agree (4)
- ☐ Strongly agree (5)

Q15 "I use mototáxis because there is a lack of alternatives."

- ☐ Strongly disagree (1)
- ☐ Disagree (2)
- ☐ Neutral (3)
- ☐ Agree (4)
- ☐ Strongly agree (5)

Q16 "I do not think mototáxis are safe."

- ☐ Strongly disagree (1)
- ☐ Disagree (2)
- ☐ Neutral (3)
- ☐ Agree (4)
- ☐ Strongly agree (5)

Q17 "The pandemic did not change my use of mototáxis."

- ☐ Strongly disagree (1)
- ☐ Disagree (2)
- ☐ Neutral (3)
- ☐ Agree (4)
- ☐ Strongly agree (5)

Display This Question:

If "The pandemic did not change my use of mototáxis." = Strongly disagree

Or "The pandemic did not change my use of mototáxis." = Disagree

Or "The pandemic did not change my use of mototáxis." = Neutral

Q18 How did your use of mototáxis change because of the pandemic?

Q19 "I prefer to use the public transport over mototáxis in Rocinha."

☐ Strongly disagree (1)

☐ Disagree (2)

☐ Neutral (3)

☐ Agree (4)

☐ Strongly agree (5)

Display This Question:

If "I prefer to use the public transport over mototáxis in Rocinha." = Agree

Or "I prefer to use the public transport over mototáxis in Rocinha" = Strongly agree

Q20 Why do you prefer public transport over mototáxis in Rocinha?

Display This Question:

If "I prefer to use the public transport over mototáxis in Rocinha." = Strongly disagree

Or "I prefer to use the public transport over mototáxis in Rocinha." = Disagree

Q21 Porque você prefere mototáxis na Rocinha?

Q22 "My experience with mototáxis in general is good."

☐ Strongly disagree (1)

☐ Disagree (2)

- ☐ Neutral (3)
- ☐ Agree (4)
- ☐ Strongly agree (5)

Display This Question:

If "My experience with mototaxis in general is good." = Agree

Or "My experience with mototaxis in general is good." = Strongly agree

Q22 Why is your experience bad?

Display This Question:

If "My experience with mototaxis in general is good." = Strongly disagree

Or "My experience with mototaxis in general is good." = Disagree

Q23 Why is your experience bad?

Display This Question:

If "My experience with mototaxis in general is good." = Neutral

Q24 Why did you choose: "neutral" in the last question about your experience?

Questions on the relationship between the municipality and mototaxis

Q25 "The municipality of Rio de Janeiro treats mototaxis as an integrated part of the public transport."

- ☐ Strongly disagree (1)
- ☐ Disagree (2)
- ☐ Neutral (3)

- ☐ Agree (4)
- ☐ Strongly agree (5)

Q26 "The municipality of Rio de Janeiro needs to create new laws for the mototáxi system in Rocinha."

- ☐ Strongly disagree (1)
- ☐ Disagree (2)
- ☐ Neutral (3)
- ☐ Agree (4)
- ☐ Strongly agree (5)

Q27 Please, leave here what kind of laws you would like

Q28 "It would not be a problem if more laws would affect the price of mototáxis."

- ☐ Strongly disagree (1)
- ☐ Disagree (2)
- ☐ Neutral (3)
- ☐ Agree (4)
- ☐ Strongly agree (5)

There are just three final questions left

Q30 Do you know anyone who works in mototáxis in Rocinha?

- ☐ Yes (1)
- ☐ No (2)

Display This Question:

If Do you know anyone who works in mototaxis in Rocinha? = Yes

Q32 If you work in mototáxi or know someone who does, please get in touch with me. I would like to do interviews with mototáxistas.

Q33 Please leave your observations about the research here

Q35 If you would like to receive the research results, leave you email here

Attachment 4: codebook

Codegroup	Description	Example
Context of Rio de Janeiro	Descriptions of certain situations, particularities and things that are specific to the city of Rio de Janeiro	"So gas is quite affordable there, which led cars to explode in the last twenty years. There are cars everywhere in Rio."
Downsides of mototáxis	The negatives of mototáxis such as safety issues and informality	"So I would say the motorcycles, the pollution, is something that needs to be talked about more."
Downsides of public transport	The negatives of public transport, seen through the eyes of the interviews	"Dude, for the quality of transport that they offer, it's expensive."
Effect of the pandemic on mototáxis	How the pandemic has affected mototáxi in terms of number of clients, number of drivers and operating	"Yes, it fell a lot because of the pandemic. We used to earn 200 reais per day. Now it's 100 to 120."
Experience of drivers	Experience of drivers during their time working in mototáxi, but also experiences of how they see the favela and the government	" Yes, we work when we want. We just put on the vest and work. When we want to stop, we stop. This is very nice as well."
How the system works	How mototáxis function	"We pay per week. If we stop paying because I'm unsatisfied, something like that... They will take my vest and give it to someone who pays."
Job market	Everything said about the number of people working in mototáxi	"Nowadays the job of mototáxi has a lot of competition. You can see it has changed."
Legislation by the government	Everything relating to rules and policy made by the the state and the city of Rio de Janeiro on mototáxi	"Nowadays, mototáxi is a recognized job in all of the city. But still, it's hugely informal."
Life in the favela	Descriptions of what it is like living in Rocinha and how this experienced	"I had a lot of plans, including studying. But unfortunately, my life took other turns."
Organisation of mototáxis	Descriptions of how mototáxi is organised and who are behind it	"In reality, we work for the traffickers right. So the money we pay is for them,

		understood?"
Public transport in Rocinha	Descriptions of the different public transport services that exist in Rocinha and near it	"They were opening the new line which connected Rocinha for the first time with the metro."
Relation between mototáxis and the government	The contact between the two that exists and how this seen by mototáxi drivers	"I personally do not know anyone who is registered at the cadaster of the municipality."
Risk of using mototáxis	The risks to which a passenger is exposed when using a mototáxi	"Dude, the number of accidents is high. Very high. I don't know what to say to improve it."
Risk of working in mototáxi	The risks to which a driver is exposed when working in mototáxi	"I work outside of the law, I have zero guarantees. If I fall, I'm screwed."
Side jobs	Everything relating to what has been said about jobs done next next to mototáxi by the drivers	"We do delivery as well."
Suggestion to improve mototáxis	What the interviewees would like to see change or come in the future for mototáxi	"I think it needs to be better recognized. There needs to be more insurance behind the job."
Suggestion to improve public transport	What the interviewees would like to see change or come in the future for public transport in Rio de Janeiro and Rocinha	"I understand that the transport system that is necessary in these areas is the teleferico, a cable cart."
Upsides of mototáxis	The positives points of mototáxis such speed and pricing	"It connects the favela to the city, you know."
Upsides of public transport	The positive of public transport	"What they did with the metro was very good. Because in a few minutes we can arrive in the centre of the city."
Why mototáxis exist	Everything said about why mototáxis operate in Rocinha	"But it's an essential job here in the community because there are places where busses, kombis and vans do not come. Only mototáxis go there. So in a certain way I can help the community."

Attachment 4: SPSS tables

Descriptive data

Descriptive Statistics								
	N Statistic	Range Statistic	Minimum Statistic	Maximum Statistic	Mean Statistic	Std. Error	Std. Deviation Statistic	Variance Statistic
What is your gender?	23	1	1	2	1,26	,094	,449	,202
What is your level of education?	23	3	3	6	5,00	,209	1,000	1,000
In which sector do you work (1)?	13	0	1	1	1,00	,000	,000	,000
In which sector do you work (2)?	8	0	1	1	1,00	,000	,000	,000
In which sector do you work (3)?	1	0	1	1	1,00	.	.	.
In which sector do you work (4)?	2	0	1	1	1,00	,000	,000	,000
In which sector do you work (5)?	0							
In which sector do you work (6)?	1	0	1	1	1,00	.	.	.
Do you live in Rocinha or have you lived there?	23	2	1	3	1,43	,152	,728	,530
How often do you use public transport in Rocinha?	18	4	1	5	2,11	,332	1,410	1,987
"The public transport does not attend my necessities"	18	4	1	5	2,94	,328	1,392	1,938
How often do you use mototáxis in Rocinha?	17	3	1	4	2,12	,283	1,166	1,360
"Mototáxis are essential in my daily transport"	17	4	1	5	3,53	,322	1,328	1,765
"I will continue using mototáxis in Rocinha in the future"	17	4	1	5	3,76	,291	1,200	1,441
"I use mototáxis because of the speed"	17	4	1	5	4,12	,256	1,054	1,110
"The price of mototáxis in Rocinha is acceptable"	17	4	1	5	2,94	,337	1,391	1,934
"I think the price of mototáxis in Rocinha is acceptable compared to the price of public transport"	17	4	1	5	3,06	,315	1,298	1,684
"I use mototáxis because there is a lack of other options"	17	4	1	5	3,35	,320	1,320	1,743

"I do not think mototáxis are safe"	17	4	1	5	3,65	,256	1,057	1,118
"The pandemic did not change my use of mototáxis"	17	4	1	5	3,35	,296	1,222	1,493
"I prefer using public transport over mototáxis in Rocinha"	17	4	1	5	2,65	,320	1,320	1,743
"My experience with mototáxis in Rocinha in general is good"	17	4	1	5	3,35	,320	1,320	1,743
"The municipality of Rio de Janeiro treats mototáxis as an integrated part of the transport system"	15	4	1	5	2,00	,309	1,195	1,429
"The municipality of Rio de Janeiro needs to create more laws for mototáxis"	15	3	2	5	4,00	,218	,845	,714
"It would not be a problem if more legislation were to affect the price of mototáxis"	14	4	1	5	2,21	,350	1,311	1,720
Do you know anyone who works as a mototáxi driver in Rocinha?	16	1	1	2	1,13	,085	,342	,117
Valid N (listwise)	0							

Frequencies

What is your gender?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Man	17	73,9	73,9	73,9
	Woman	6	26,1	26,1	100,0
	Total	23	100,0	100,0	

What is your age?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	21	2	8,7	8,7	8,7
	22	1	4,3	4,3	13,0
	23	2	8,7	8,7	21,7
	25	2	8,7	8,7	30,4
	27	3	13,0	13,0	43,5
	29	1	4,3	4,3	47,8
	33	1	4,3	4,3	52,2
	35	1	4,3	4,3	56,5
	36	1	4,3	4,3	60,9
	38	2	8,7	8,7	69,6
	41	1	4,3	4,3	73,9
	43	1	4,3	4,3	78,3
	44	1	4,3	4,3	82,6
	53	1	4,3	4,3	87,0
	58	1	4,3	4,3	91,3
	60	1	4,3	4,3	95,7
	61	1	4,3	4,3	100,0
	Total	23	100,0	100,0	

What is your level of education?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Highschool incomplete	2	8,7	8,7	8,7
	Highschool complete	5	21,7	21,7	30,4
	Higher education incomplete	7	30,4	30,4	60,9
	Higher education complete	9	39,1	39,1	100,0
	Total	23	100,0	100,0	

In which sector do you work (1)?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Formal sector	13	56,5	100,0	100,0
Missing	System	10	43,5		
Total		23	100,0		

In which sector do you work (2)?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Informal sector	8	34,8	100,0	100,0
Missing	System	15	65,2		
Total		23	100,0		

In which sector do you work (3)?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	I do not have a job by choice	1	4,3	100,0	100,0
Missing	System	22	95,7		
Total		23	100,0		

In which sector do you work (4)?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	I have not managed to get myself a job	2	8,7	100,0	100,0
Missing	System	21	91,3		
Total		23	100,0		

In which sector do you work (5)?

		Frequency	Percent
Missing	System	23	100,0

In which sector do you work (6)?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	I am still in school	1	4,3	100,0	100,0
Missing	System	22	95,7		
Total		23	100,0		

Do you live in Rocinha or have you lived there?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes, I live in Rocinha	16	69,6	69,6	69,6
	Yes, I have lived in Rocinha	4	17,4	17,4	87,0
	No, I have never lived in Rocinha	3	13,0	13,0	100,0
	Total	23	100,0	100,0	

How often do you use public transport in Rocinha?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Every week	9	39,1	50,0	50,0
	Every month	3	13,0	16,7	66,7
	A few times per year	3	13,0	16,7	83,3
	Almost never	1	4,3	5,6	88,9
	Never	2	8,7	11,1	100,0
	Total	18	78,3	100,0	
Missing	System	5	21,7		
Total		23	100,0		

"The public transport does not attend my necessities"					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	4	17,4	22,2	22,2
	Agree	3	13,0	16,7	38,9
	Neutral	3	13,0	16,7	55,6
	Disagree	6	26,1	33,3	88,9
	Strongly disagree	2	8,7	11,1	100,0
	Total	18	78,3	100,0	
Missing	System	5	21,7		
Total		23	100,0		

How often do you use mototáxis in Rocinha?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Every week	7	30,4	41,2	41,2
	Every month	4	17,4	23,5	64,7
	A few times per year	3	13,0	17,6	82,4
	Almost never	3	13,0	17,6	100,0
	Total	17	73,9	100,0	
Missing	System	6	26,1		
Total		23	100,0		

"Mototáxis are essential in my daily transport"					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	2	8,7	11,8	11,8
	Disagree	2	8,7	11,8	23,5
	Neutral	2	8,7	11,8	35,3
	Agree	7	30,4	41,2	76,5
	Strongly agree	4	17,4	23,5	100,0
	Total	17	73,9	100,0	
Missing	System	6	26,1		
Total		23	100,0		

"I will continue using mototáxis in Rocinha in the future"

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	1	4,3	5,9	5,9
	Disagree	2	8,7	11,8	17,6
	Neutral	2	8,7	11,8	29,4
	Agree	7	30,4	41,2	70,6
	Strongly agree	5	21,7	29,4	100,0
	Total	17	73,9	100,0	
Missing	System	6	26,1		
Total		23	100,0		

"I use mototáxis because of the speed"

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	1	4,3	5,9	5,9
	Neutral	2	8,7	11,8	17,6
	Agree	7	30,4	41,2	58,8
	Strongly agree	7	30,4	41,2	100,0
	Total	17	73,9	100,0	
Missing	System	6	26,1		
Total		23	100,0		

"The price of mototáxis in Rocinha is acceptable"

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	3	13,0	17,6	17,6
	Disagree	4	17,4	23,5	41,2
	Neutral	4	17,4	23,5	64,7
	Agree	3	13,0	17,6	82,4
	Strongly agree	3	13,0	17,6	100,0
	Total	17	73,9	100,0	
Missing	System	6	26,1		
Total		23	100,0		

"I think the price of mototáxis in Rocinha is acceptable compared to the price of public transport"

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	2	8,7	11,8	11,8
	Disagree	5	21,7	29,4	41,2
	Neutral	2	8,7	11,8	52,9
	Agree	6	26,1	35,3	88,2
	Strongly agree	2	8,7	11,8	100,0
	Total	17	73,9	100,0	
Missing	System	6	26,1		
Total		23	100,0		

"I use mototáxis because there is a lack of other options"

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	1	4,3	5,9	5,9
	Disagree	5	21,7	29,4	35,3
	Neutral	2	8,7	11,8	47,1
	Agree	5	21,7	29,4	76,5
	Strongly agree	4	17,4	23,5	100,0
	Total	17	73,9	100,0	
Missing	System	6	26,1		
Total		23	100,0		

"I do not think mototáxis are safe"

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	1	4,3	5,9	5,9
	Agree	1	4,3	5,9	11,8
	Neutral	4	17,4	23,5	35,3
	Disagree	8	34,8	47,1	82,4
	Strongly disagree	3	13,0	17,6	100,0
	Total	17	73,9	100,0	
Missing	System	6	26,1		
Total		23	100,0		

"The pandemic did not change my use of mototáxis"

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	2	8,7	11,8	11,8
	Agree	1	4,3	5,9	17,6
	Neutral	6	26,1	35,3	52,9
	Disagree	5	21,7	29,4	82,4
	Strongly disagree	3	13,0	17,6	100,0
	Total	17	73,9	100,0	
Missing	System	6	26,1		
Total		23	100,0		

"I prefer using public transport over mototáxis in Rocinha"

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	5	21,7	29,4	29,4
	Disagree	2	8,7	11,8	41,2
	Neutral	5	21,7	29,4	70,6
	Agree	4	17,4	23,5	94,1
	Strongly agree	1	4,3	5,9	100,0
	Total	17	73,9	100,0	
Missing	System	6	26,1		
Total		23	100,0		

"My experience with mototáxis in Rocinha in general is good"

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	2	8,7	11,8	11,8
	Disagree	3	13,0	17,6	29,4
	Neutral	2	8,7	11,8	41,2
	Agree	7	30,4	41,2	82,4
	Strongly agree	3	13,0	17,6	100,0
	Total	17	73,9	100,0	
Missing	System	6	26,1		
Total		23	100,0		

"The municipality of Rio de Janeiro treats mototáxis as an integrated part of the transport system"

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	7	30,4	46,7	46,7
	Disagree	3	13,0	20,0	66,7
	Neutral	4	17,4	26,7	93,3
	Strongly agree	1	4,3	6,7	100,0
	Total	15	65,2	100,0	
Missing	System	8	34,8		
Total		23	100,0		

"The municipality of Rio de Janeiro needs to create more laws for mototáxis"

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	1	4,3	6,7	6,7
	Neutral	2	8,7	13,3	20,0
	Agree	8	34,8	53,3	73,3
	Strongly agree	4	17,4	26,7	100,0
	Total	15	65,2	100,0	
Missing	System	8	34,8		
Total		23	100,0		

"It would not be a problem if more legislation were to affect the price of mototáxis"

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	5	21,7	35,7	35,7
	Disagree	5	21,7	35,7	71,4
	Neutral	1	4,3	7,1	78,6
	Agree	2	8,7	14,3	92,9
	Strongly agree	1	4,3	7,1	100,0
	Total	14	60,9	100,0	
Missing	System	9	39,1		
Total		23	100,0		

Correlations (0.01)

Question	Question	Pearson correlation	Cramer's V
How often do you use mototáxis in Rocinha?	How often do you use public transport in Rocinha?	0,649	0,645
I use mototáxis because of the speed	I will continue using mototáxis in the future	0,616	0,765
I do not think mototáxis are safe	I will continue using mototáxis in the future	-0,660	0,546
I prefer to use the public transport in Rocinha over mototáxis	mototáxis are essential in my day to day transport	0,671	0,586
I use mototáxis because of the speed	The municipality of Rio de Janeiro needs to create new laws for the mototáxi system	0,692	0,677
I think the price of mototáxis is acceptable in Rocinha compared to the price of public transport	The price of mototáxis is acceptable	0,903	0,732

Correlations (0.05)

Question	Question	Pearson correlation	Cramer's V
Have you lived in Rocinha or do you currently live there?	How often do you use the public transport in Rocinha?	0,499	0,596
Public transport does not attend my necessities	I use mototáxis because there is a lack of alternatives	0,573	0,611
I will continue using mototáxis in Rocinha	I prefer to use public transport over mototáxis in Rocinha	0,568	0,591
I will continue using mototáxis in the future	My experience with mototáxis in general is good	0,529	0,543
I will continue using mototáxis in the future	Do you know anyone who works as a mototáxi driver?	-0,548	0,844
"The pandemic did not change my use of mototáxis."	"I prefer to use the public transport over mototáxis in Rocinha."	0,532	0,464
"I prefer to use the public transport over mototáxis in Rocinha."	My experience in general with mototáxis is good	-0,498	0,628
"It would not be a problem if more laws would affect the price of mototáxis."	"I think the price of mototáxis is acceptable in Rocinha compared to the price of public transport."	0,564	0,624