Getting People into Buses:
The Case of Belo Horizonte

LSECities | Executive MSc in Cities

Candidate ID: 202162141

Getting People into Buses: The Case of Belo Horizonte

Candidate ID: 202162141

LSE Cities, London School of Economics and Political Science

PP4A7E: Executive MSc in Cities

Assignment Due Date: 28th February, 2024

Contents

Executive Summary

This consultancy project was based on research conducted in the city of Belo Horizonte, which included forms answered by 225 people, a focus group with 20 people divided by gender and classes A and B. In addition, four people representing a quadrant of this group participated in an in-person experience to test the use of buses in the city. To do this, we used two phases of the BIT TESTS model, in addition to the COM-B model for behavioral analysis of the participants. The three main difficulties presented were: convenience, efficiency and quality. The main recommendations are the connection of electronic payment methods with those that people already use and public data with these technologies, in addition to the resumption of an already established program with the presence of the Municipal Guard on board. The city of Belo Horizonte is now invited to test these recommendations to follow the methodology.

Introduction

The Population's Relationship with Public Transport in Belo Horizonte

In 2015, the 193 Member States of the United Nations (UN) met and established 17 objectives in the most comprehensive areas aimed at global sustainable development and protecting the planet from climate crises, poverty and combating inequalities. Among the 17 UN sustainable development goals[1] to be achieved by the year 2030, is the 11th called "Sustainable Cities and Communities", in which we highlight points 11.2 and 11.6 below[2], significant for this consultancy:

> By 2030, provide access to safe, affordable, accessible and sustainable transport systems for all, improving road safety, notably by expanding public transport, with special attention to the needs of those in vulnerable situations, women, children, persons with disabilities and older persons;
>
> By 2030, reduce the adverse per capita environmental impact of cities, including by paying special attention to air quality and municipal and other waste management. (Neshovski - Goal 11: Make cities inclusive, safe, resilient and sustainable, nd)

Belo Horizonte is the sixth largest capital in Brazil, with a population of 2.315.560 inhabitants, according to the last Census carried out in 2022. (*2022 Census Overview*, [n.d.]). Chart 1 shows the number of residents in Belo Horizonte since 2007. In 2007, the city had less than 1 million vehicles on the streets, and currently has more than 2.500.000 cars in circulation. (Chart 2) Currently there is more than one vehicle per inhabitant in the city.

[1] (Source: https://www.un.org/sustainabledevelopment/.

[2] https://www.un.org/sustainabledevelopment/cities/

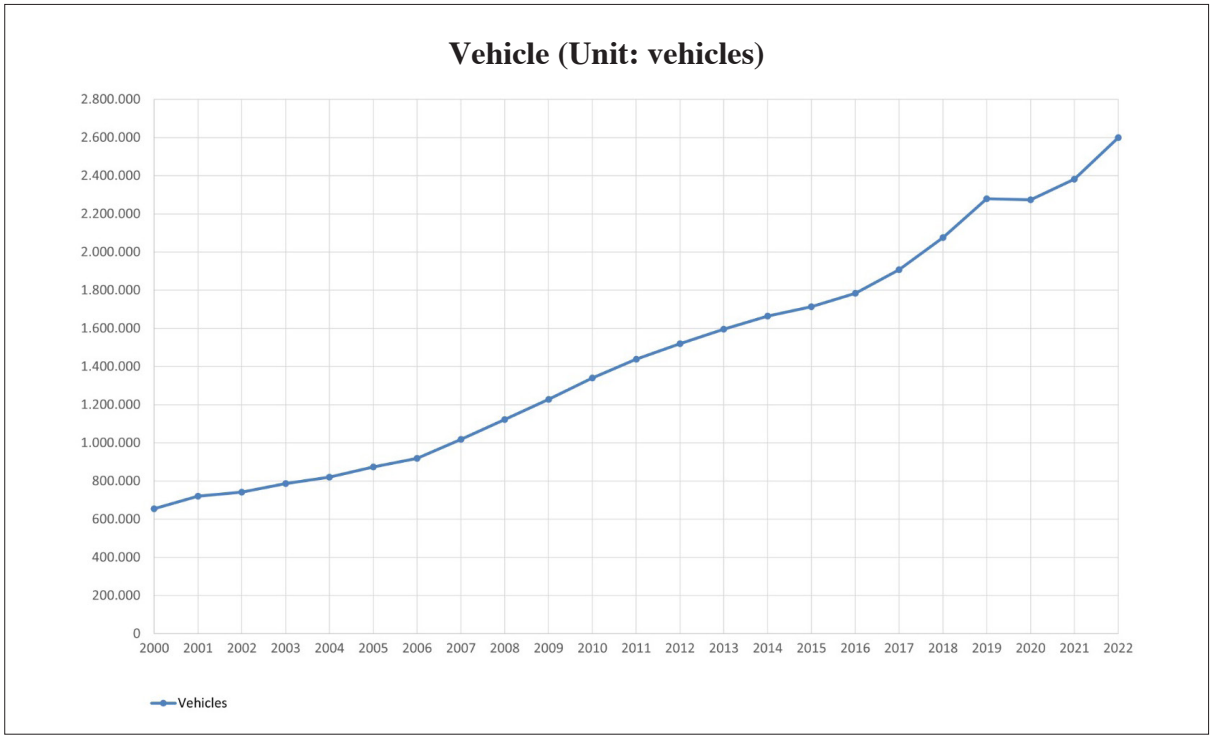


Chart 1: Number of vehicles on the streets in Belo Horizonte.
Source: Secretaria Nacional de Trânsito (Senatran)

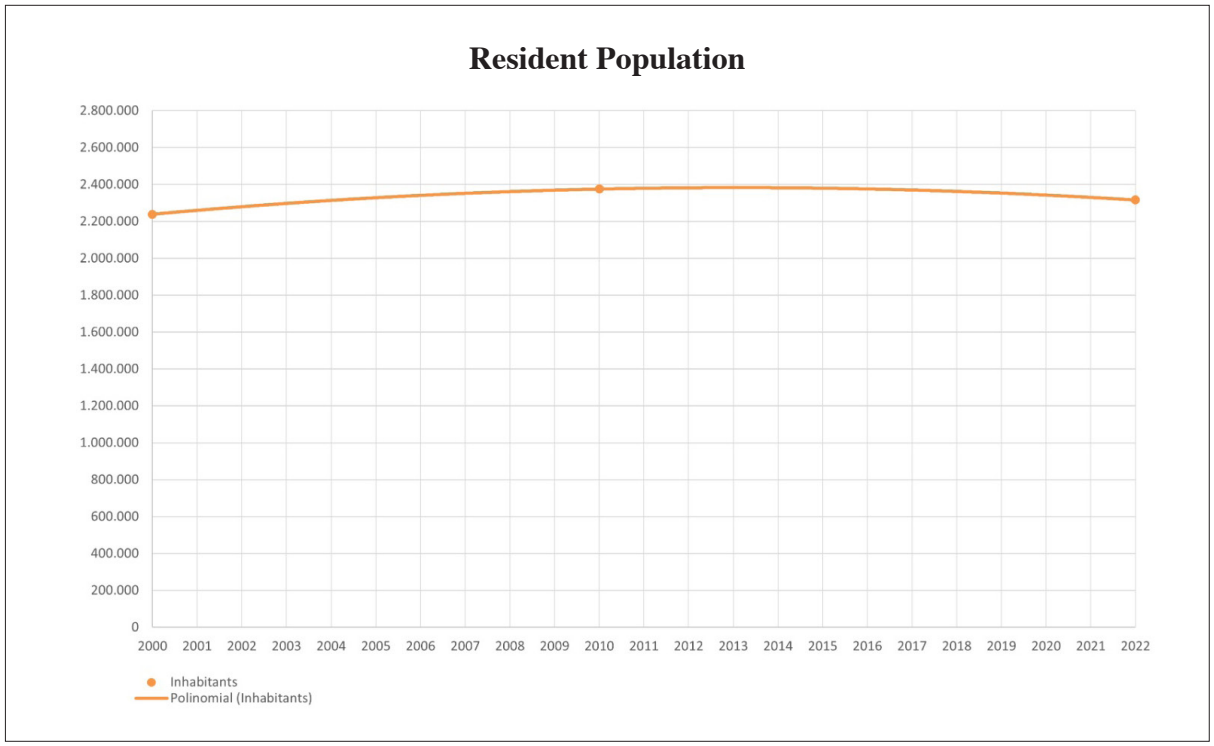


Chart 2: Population Evolution of Belo Horizonte.
Source: Author's elaboration with data from IBGE and the 2022 Census.

BELO HORIZONTE HAS

1,12

CARS PER INHABITANT

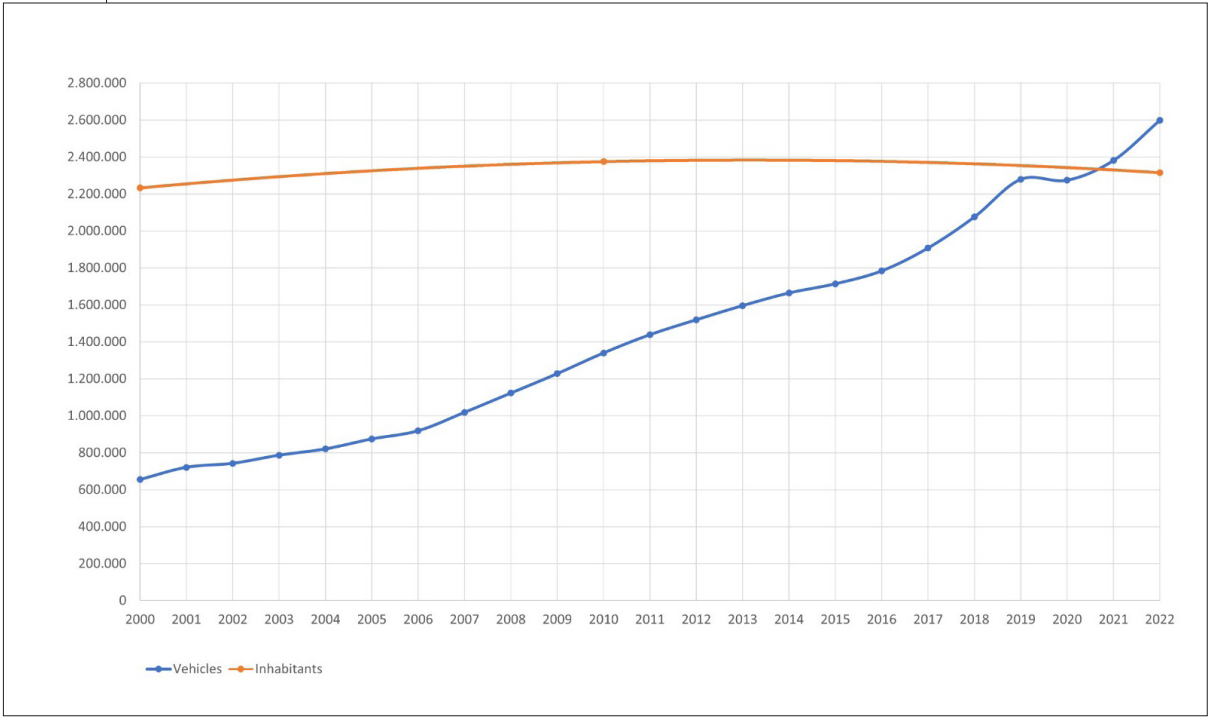


Chart 3: The ratio of cars per inhabitant in Belo Horizonte.
Source: Author's elaboration data from Secretaria Nacional de Trânsito (Senatran) and Census

Many cars on the streets, a large population and inefficient public transport is how we can describe Belo Horizonte's mobility problem. (*The cost of chaos - Damage to the pocket and the environment - ages no longer support the growth of the vehicle fleet*, [n.d.]) The Metropolitan Region of Belo Horizonte is the third largest in the country, comprising a total of 34 municipalities and 5.128.282 million inhabitants.[3] This is a panorama that brings with it several challenges for mobility, one of which is poor quality, inefficient public transport with outdated contracts that, made in a context of disorderly deregulation, left control of the system exclusively under the control of private concessionaires, without public investment and with flaws in the regulatory design. This poorly served population and congested traffic result in a scenario in which, at every opportunity, citizens who can access private transport

[3] IBGE - Brazilian Institute of Geography and Statistics (December 22, 2023). «CENSUS 2022 - Table 4714 - Resident Population, Territorial area and Demographic density

are expelled, contributing to congestion on public roads.[4] This environment demands planned and implemented fluidity in the main corridors, in addition to efficient integration with the metropolitan region, but, above all, an action that puts as many people as possible back on public transport. Although there are examples around the world of coercive forms, in which barriers are created to individual transport, restricting its supply, the focus of this consultancy is to work on the demand side of collective public transport of passengers by bus, improving incentives for citizens, voluntarily choose this mode.

BELO HORIZONTE'S BUS SYSTEM LOST APPROXIMATELY

40.17%

OF ITS MONTHLY DEMAND FROM 2011 TO 2023

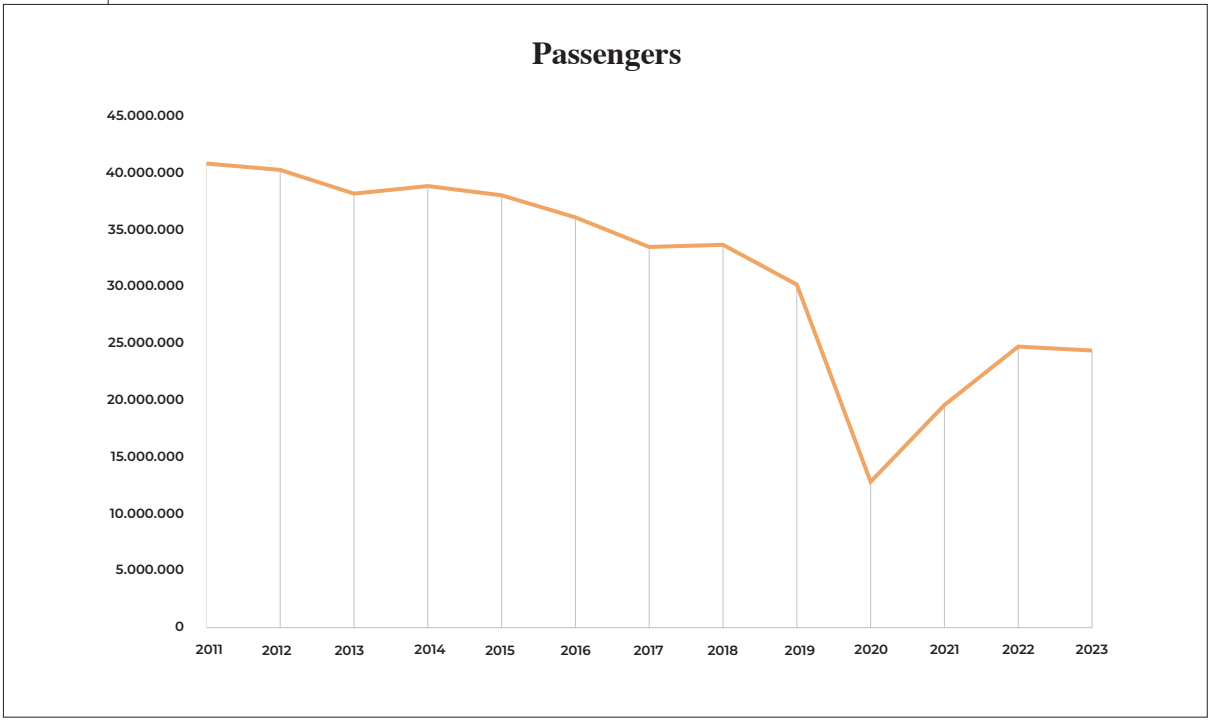


Chart 4: Evasion of passengers on the bus in Belo Horizonte.
Source: Author's elaboration with data from the Municipality of Belo Horizonte. (report-of-august-2023-para_publicacao.pdf, [n.d.])

The Role of Belo Horizonte City Council in the Reformulation of Public Transport

Currently, public transport in the city is the result of a contract dated 2008, in the

[4] https://www.mpmg.mp.br/portal/menu/comunicacao/noticias/procon-mg-multa-consorcio-bh-leste-em-r-162-mil-devido-a-irregularidades-na-linha-9103-do-transporte-coletivo-da-capital.shtml, https://g1.globo.com/mg/minas-gerais/noticia/2023/05/18/empresas-de-onibus-devem-r-20-milhoes-em-multas-a-pbh-por-descumprir-regras-contratuais.ghtml, https://www.hojeemdia.com.br/minas/todos-os-coletivos-da-capital-devem-ter-ar-condicionado-ate-2027-1.775806

context that a grant was paid for the provision of the service for twenty years and the system's remuneration was based exclusively on charging equal fares to passengers. This resulted in a perverse system of indirect subsidies and incentives for vehicle overcrowding, since, with financing solely through the fare, the citizen who pays for the system is exclusively the one who rides the bus, a section of the population that today coincides with the poorest part of the city. (Pereira et al., 2021) Thus, tariff benefits would be paid for by citizens who are many times poorer than the beneficiaries themselves. In the same context, the exclusive remuneration for the paying passenger at the turnstile made it economically advantageous to reduce the number of trips and overcrowded vehicles, given that concessionaires' costs are proportional to the distance driven and not to the number of passengers transported.

In 2022, an initiative at the Belo Horizonte City Council (CMBH) consists of a proposal to modify the type of remuneration for collective public passenger transport services in the municipality, through Bill 442/2022. (*Bill that proposes paying bus companies per kilometer driven could be approved in 1º shift*, 2023). Signed by 15 councilors, the project was processed in the legislature and on March 17, 2023, law 11.458 was sanctioned, which provides for remuneration for distance. (*Ordinary Law 11458 2023 of Belo Horizonte MG*, [n.d.]) In this way, the scenario began to be changed by a small contractual change implemented at the request of the legislative power, in which the tariff remuneration is complemented by municipal public investment.

Law 11.538/23 approved[5] (which provides for the control, management and transparency of the amounts collected to cover the bus costs) the cost of the system for the year 2023 was calculated at R$1.5 billion (half a billion being covered by a subsidy and the remainder by the fare) and in the context of the legislation new things came: punishments for lack of quality were added to the process (the subsidized part is not paid in case of irregularities) and gratuities. In this way, for the first time, the Belo Horizonte City Council made all citizens the financiers of the system, understanding that everyone benefits from its positive externalities in urban mobility, not just those who directly use the buses. The free services created refer to women in vulnerable situations and who have suffered some type of violence, people undergoing cancer

[5] (*Ordinary Law 11538 2023 of Belo Horizonte MG,* [n.d.])

treatment who use the Unified Health System (SUS), full passes for high school students and Young Adult Education (EJA) of the public network (previously students had only a half pass[6]), and a free pass for the bus lines that run in slums[7]. (*One hundred days of the subsidy law*, 2023) This is, however, an initial and embryonic project, which does not change the basic foundations of the current contract in its entirety.

None of these five free services constitutes a universal free pass since the benefit is not attributed to the person, as is the case with the elderly[8], but rather to activities (students, free only when going to school, etc.) There are currently 84 Brazilian municipalities that have adhered to free pass, an issue that is in the spotlight and will dominate the 2024 elections[9] [10].

Currently, Belo Horizonte focuses on modeling the bus system to serve classes C, D, and E – the poorest[11], not prioritizing the allocation of additional resources by the City Hall to attract other segments of the population, as the current administration assumes that such groups did not move independently of the efforts undertaken by the public authorities. The analysis carried out by this consultancy precisely examines the possibility that, if Belo Horizonte implemented zero fares, would people stop using the car and start using the bus? Furthermore, it evaluates the potential reasons that would lead people to leave their cars at home and use the bus, through the selection and exploration of perceptions from a Focus Group formed by people who do not use public transport and belong to the middle and upper classes, that is, they are not covered by existing free services. By serving these people, consequently the poorest (who currently use the bus most) will also have an improved system.

[6] https://www.otempo.com.br/cidades/passe-livre-estudantil-em-bh-cerca-de-9-mil-alunos-precisam-renovar-beneficio-1.3306696

[7] https://prefeitura.pbh.gov.br/urbel/vilas-e-favelas#:~:text=Atualmente%2C%20a%20cidade%20de%20Belo,representam%20aproximadamente%2020%25%20da%20popula%C3%A7%C3%A3o.

[8] (*L10741*, [n.d.])

[9] (*With an eye on the 2024 elections, debate about "free pass" grows among pre-candidates | Policy*, 2023)

[10] (*June 2013 Journeys: zero tariff promises to dominate 2024 elections after reaching 72 cities in the country*, [n.d.])

[11] ("Accessible for whom?", [n.d.])

The Car as a Preference: Why People Don't Use Buses

In a recent survey conducted by SERASA[12] (a private company that carries out credit analyzes using data it receives from stores and banks), 2.023 people were interviewed in December last year, where 67% of Brazilian families listed car costs as one of their three main annual expenses. (*Spending on cars is the second largest expense in the Brazilian family budget, reveals research by Serasa*, [n.d.]) This data highlights the economic relevance of individual cars in people's reality.

When relating this data to the reality of the city's population increase and the consequent increase in the number of drivers, it is clear that the middle and upper classes do not use buses. This consultancy seeks to understand why these classes do not use public transport and how we could encourage them to adopt this means of transportation.

Of the 225 people who responded to the form, 20 were selected to form a Focus Group where insights can be extracted and explored through discussions that we will talk about in Chapter 3, which together with the bus travel tests carried out with 4 people extracted from this group, would lead us to small implementations in the system that would give us the prospect of these people using the bus at least twice a week. It is worth clarifying that out of the 225 responses we decided to select only people who used the car instead of the bus for the Focus Group. The other option, which was the motorbike, where 45 people said they used this method instead of the bus, was discarded as it was a social issue.[13] Currently in Brazil, you can buy a motorcycle with less than 2 thousand reais down payment and installments of approximately 500 reais, which is affordable for the low-income population.[14] Of these 45 people, almost 70% of them responded that they use the motorcycle as a means of subsistence: the vast majority of them making deliveries. However, the motorcycle is a dangerous means of transport and,

[12] January 2024.

[13] (*"When the poorest families have some income gain, they stop using public transport", says researcher*, 2022)

[14] https://garagem360.com.br/pagar-a-prestacao-de-uma-moto-ou-pegar-onibus-todo-dia-o-que-e-mais-barato/ (Quirino, 2023), G1 > Cars - NEWS - Riding a motorcycle is cheaper than taking the bus, says research (globo.com) (*G1 > Cars - NEWS - Riding a motorcycle is cheaper than taking the bus, says research*, [n.d.])

according to the State Secretariat of Justice and Public Security, in 2023, there were more than 27 thousand motorcycle accidents in Minas Gerais, 5.734 of which in Belo Horizonte. (*Cars and motorcycles: Anel Rodoviário and Cristiano Machado lead records of accidents with victims in Minas | State Secretariat of Justice and Public Security – Sejusp*, [n.d.])

For this reason we chose people who use the car to go from home to work and from work to home, the challenge of this consultancy being to understand the reason why these people do not choose the bus. This is due to the fact that we are dealing with a real, everyday scenario of life, represented by public transport in Belo Horizonte and by the citizens who use it daily to go from home to work and which will be done by four characters that we chose by carrying out a Focus Group that agreed to experience, for one day, the reality faced by many users of this system.

In this sense, the research has the task of balancing daily reality with a scenario created in one day added to some experiences. The scenario represented by participants who use private cars to go to work offers an insight into the difficulties and advantages of individual transport. This can include factors such as flexible scheduling, comfort and convenience, but also challenges such as congestion, traffic stress, difficulty finding parking spaces and costs associated with this and vehicle maintenance.

On the other hand, the other scenario, based on the experience of using public transport for a day, can reveal benefits such as reduced stress related to traffic, less environmental impact, gaining time to do other activities such as reading or participating in a meeting during the journey without taking the risk of driving and financial savings. However, it is important to consider that a single day's experience may not fully capture the complexity and nuances of public transport over the long term.

The research takes into account not only the objective differences between the two scenarios (the real one and the test one), but also the subjective perceptions of the participants. Individual preferences, emotions, expectations and previous experiences that play a crucial role in shaping opinions about public transport versus personal transport.

Likewise, it is important to consider external factors that may affect participants' perception, such as the quality of the public transport service, available infrastructure, safety,

accessibility and socioeconomic conditions. Therefore, the consultancy has the power to identify specific areas for improvement in the public transport system and suggest possible solutions to encourage its use.

Methodology

A Behavioral Approach

The study that gave rise to this consultancy project aims to investigate whether people who commute to work daily using their cars and represent the majority of traffic in the city of Belo Horizonte[15], would use the bus if the fare was free, thus reducing the dense traffic on the city's streets.

Using a form created on Google Forms and shared on social media for anyone who wanted to participate, some questions were formulated with the aim of understanding the reasons why people who have a car do not choose to use public transport to work. The questionnaire requested data such as age, gender and income, as well as which means of private transport the person uses to get to work: car or motorcycle. The objective of the questions is the possibility of obtaining important insights into individual preferences, being able to use them as a basis for thinking about the development of effective strategies for improving public transport services, aiming to meet specific needs and overcome the barriers that prevent their wider adoption. Furthermore, by including demographic information such as age, gender and income, it is possible to carry out an analysis that highlights possible disparities and contributes to the formulation of more inclusive public transport policies adapted to the different realities of bus users in the capital of Minas Gerais, making them to an inclusive and cleaner city.

The questions we listed on the form were:

- What is your age?
- What is your income?
- What is the advantage of using a car in Belo Horizonte?
- And what is the disadvantage of using a car in Belo Horizonte?
- Why did you choose to use your car instead of public transport?
- If Public Transport in Belo Horizonte were free pass, would you use it?

[15] (*INFORMATION ABOUT TRAFFIC ACCIDENTS WITH VICTIMS IN THE MUNICIPALITY OF BELO HORIZONTE*, 2017)

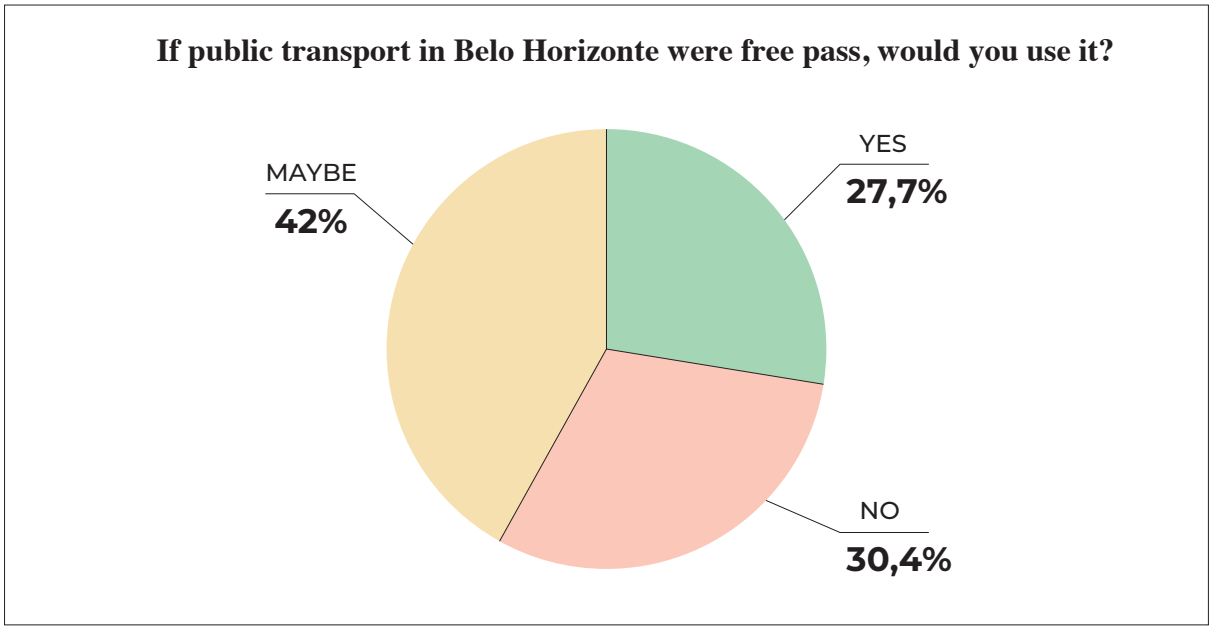


Chart 5: If public transport in Belo Horizonte were free pass, would you use it?
Source: Author's elaboration

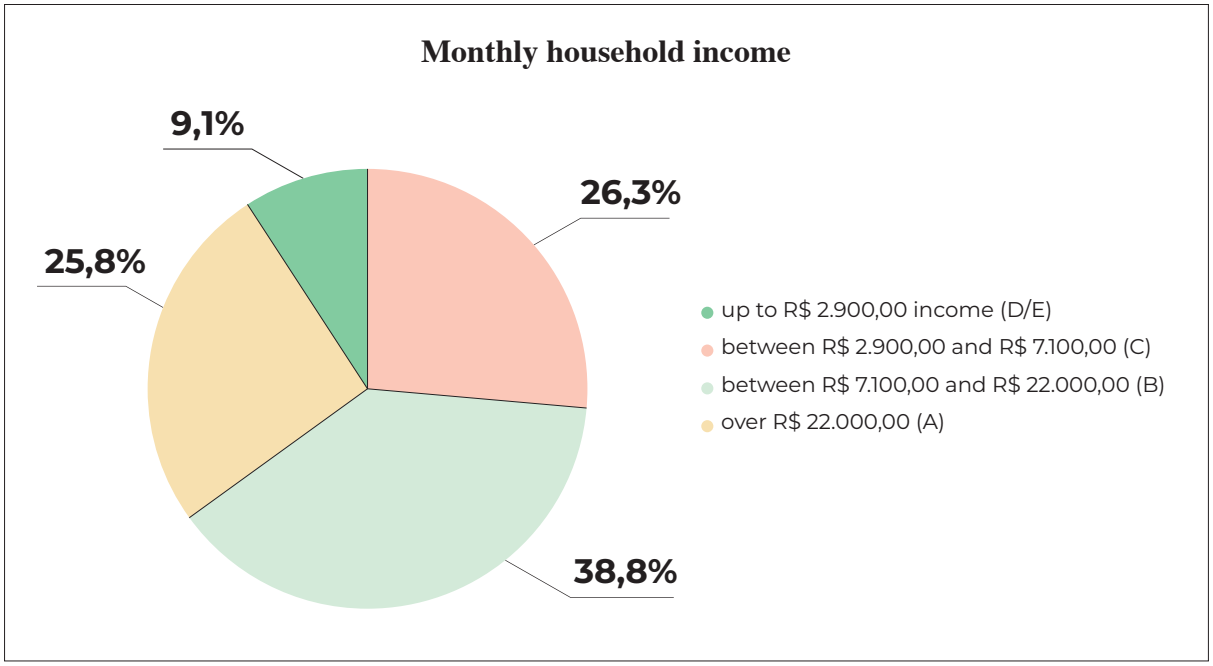


Chart 6: Income
Source: Author's elaboration

For this consultancy, a behavioral approach was chosen as it provides a perspective that incorporates insights and techniques into people's behavior to better understand how they make decisions - in the case of this work, opting for the car instead of the bus to go to work. This type of approach, considering that human behavior can be influenced by a variety of factors, such as emotions, mental shortcuts in addition to the social context, was ideal for fulfilling our purpose because it is capable of evaluating what would work (or not) generating better results.

The TESTS Model as a Methodology: Criteria Used to Develop the Focus Group

Developed by the Behavioral Insights Team[16] (BIT) (*BIT-Handbook-How-to-run-simple-BI-projects.pdf*, [n.d.]), we applied the TESTS model to this consultancy with the aim of obtaining insights that will contribute to the formulation of better public policies based on the decision-making of the group of individuals we selected. The model proposes to think about small interventions that can positively influence people's behavior, without imposing significant restrictions or mandatory changes, making them choose to go to work by bus at least twice a week. In this way, the TESTS model applies principles of behavioral science to improve social outcomes in the field of public policy: these interventions are thus designed to be simple and effective.

TESTS proposes five phases for its execution: *Target*, *Explore*, *Specify*, *Test* and *Scale*. For the purposes of this consultancy, we will only deal with two phases of the process: *Target* and *Explore*, as this will give us content through the identified targets and the possibility of exploring solutions that will be presented in the recommendations in our Chapter 5.

[16] The Behavioural Insights Team (bi.team)

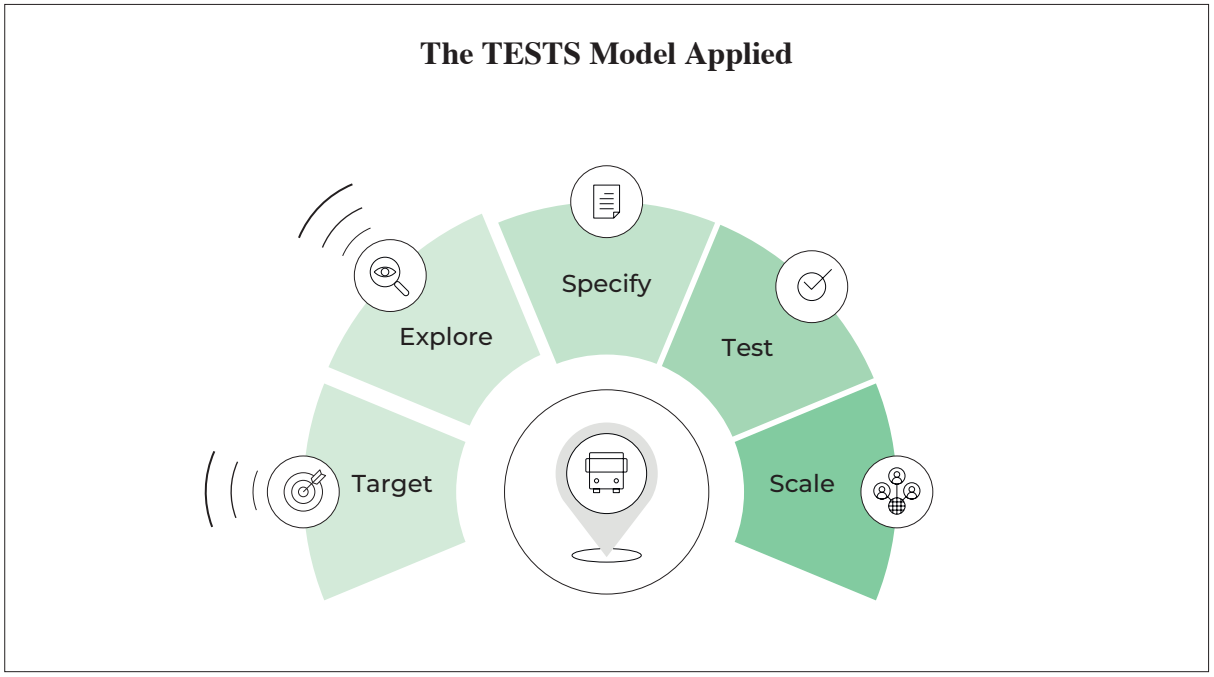


Figure 1: The TESTS Model Applied (Source: (BIT-Handbook-How-to-run-simple-BI-projects.pdf, [n.d.])

1st phase - Target:

At this stage our objective is to detect what individuals have in common, to encourage behaviors that can be easily quantified or evaluated in terms of observable or measurable results. Among the 225 people who responded to the form, 20 were selected to form a focus group, using the essential criterion that all of them used the car to commute from home to work, and from work to home. Furthermore, the group was made up of 10 men and 10 women of varying

ages and within two income ranges, set as B[17] and A[18] by IBGE, the Brazilian government agency responsible for official statistics. We decided to use Focus Groups due to their ability to promote discussions and share views, which can encourage participants to express themselves more freely and which allows for a richer and more constructive debate for the consultancy, in addition to allowing a behavioral analysis of individuals. With this, we define clear and measurable objectives to guide the desired behavior and be able to evaluate the success of interventions in the future based on the insights obtained.

To this end, we brought together a group of participants to discuss and share their perspectives on a specific topic, in our case, public transport and why they don't use it. The moderator held it on December 6, 2023. In figure 2, based on the tables offered by BIT, we present the following survey for analysis and demarcation of this group:

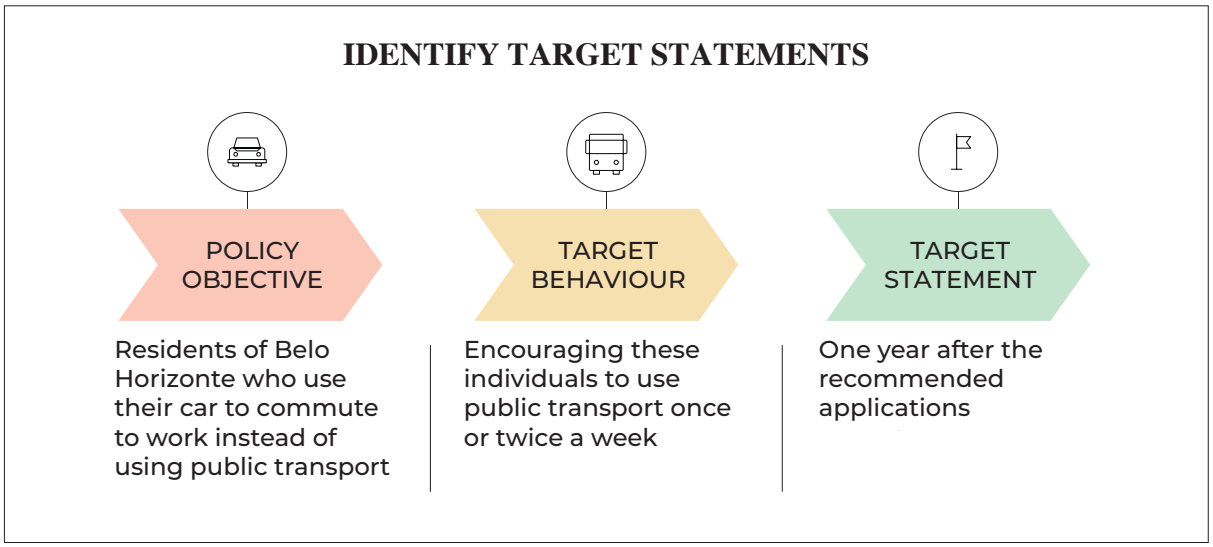


Figure 2: Identify target statements
Source: BIT-TESTS-worksheets.pdf, [n.d.]

2nd phase - Explore:

The COM-B model was used for analysis and group discussion (Chapter 4). On that occasion, the chosen group met and discussions began. Participants answered questions and exchanged experiences. The objective was to explore their opinions, feelings and perceptions on the topic in question, generating a deeper and enriching understanding to support future

[17] monthly household income between R$2.9 thousand and R$7.1 thousand
[18] monthly household income between R$7.1 thousand and R$22 thousand

conclusions. (Table 1 and see figure 3)

COM-B MODEL CARDS

Participants	Capabilities				Motivations						Opportunities							
	KNOWLEDGE		PHYSICAL ABILITY		IDENTIFICATION		BELIEFS ABOUT CONSEQUENCES		HABITS		RESOURCES AND TIME		STIMULATION CITY		ROLE MODELS		S OCIAL NORMS AND CULTURES	
	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO	KNOWS ONE	DOESN'T KNOW ANY	YES	NO
PARTICIPANT 1	X			X		X	X			X	X			X	X		X	
PARTICIPANT 2		X	X		X		X			X	X			X		X		X
PARTICIPANT 3	X			X		X	X			X	X		X			X		X
PARTICIPANT 4	X		X			X	X			X	X			X		X	X	
PARTICIPANT 5	X		X		X		X			X	X			X		X		X
PARTICIPANT 6		X	X			X	X			X	X			X		X		X
PARTICIPANT 7		X	X			X	X			X		X	X		X			X
PARTICIPANT 8	X		X		X		X			X	X			X	X			X
PARTICIPANT 9		X	X		X		X			X	X			X		X	X	
PARTICIPANT 10	X		X			X	X			X	X			X		X		X
PARTICIPANT 11		X	X			X	X		X		X			X	X			X
PARTICIPANT 12		X		X	X		X		X		X			X		X		X
PARTICIPANT 13		X	X		X			X	X		X			X	X			X
PARTICIPANT 14	X		X			X		X	X		X			X	X			X
PARTICIPANT 15		X	X		X			X		X	X			X		X		X
PARTICIPANT 16		X		X		X		X		X		X		X	X			X
PARTICIPANT 17		X	X			X		X		X	X			X		X	X	
PARTICIPANT 18	X		X			X		X		X	X			X		X	X	
PARTICIPANT 19		X	X		X			X		X	X		X			X		X
PARTICIPANT 20		X	X			X		X		X	X			X	X			X
TOTAL	**8**	**12**	**16**	**4**	**8**	**12**	**12**	**8**	**4**	**16**	**18**	**2**	**3**	**17**	**8**	**12**	**5**	**15**

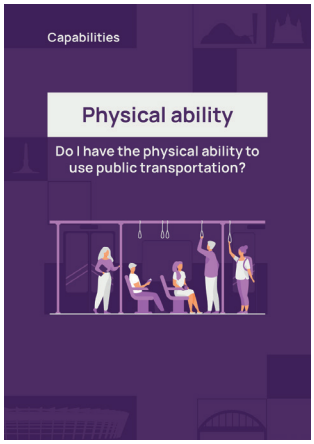
Table 1: Replies from Focal Group participants based on the COM-B Model.

8 x 12

YES/NO

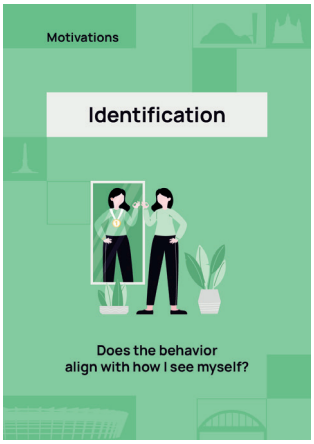
16 x 4

YES/NO



8 x 12

YES/NO

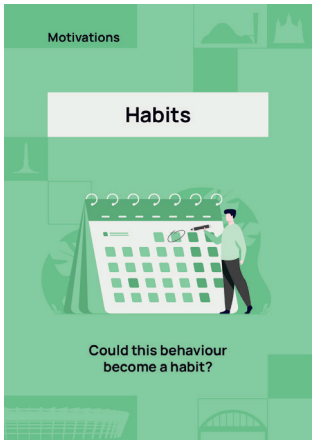


12 x 8

YES/NO

4 x 16

YES/NO



18 x 2

YES/NO

3 X 17

YES/NO

Figure 3: COM-B Model cards

One of the highlights of the discussion was raised by one of the participants (who was later selected to take the bus trips) when asked about *Models in the World to Follow*, which encouraged the use of public transport. On the occasion, a participant (WOMAN CLASS B) mentioned London, as she once lived in this city and spoke about the ease and agility of buses, including the fact that buses are a frequently used option for getting around the city, especially in areas not served by the metro. The discussion lengthened as other participants also had the experience of visiting the location, in addition to others mentioned such as Hong Kong

- emphasizing the issue of efficiency and bus coverage, opening the debate to topics such as integration, with options to meet travel needs easily and are systems widely used by citizens covering practically all income brackets. Many complained about the number of applications that the citizens of Belo Horizonte can access, but that none of them offer a quality service, highlighting the following points: applications that the time shown does not match reality, with many of them planning to arrive at point at a certain time, but they end up waiting at the bus stop, because in addition to the app not showing the time correctly, they are unable to follow the routes. Another point raised was that the applications also do not inform if a bus is going to be late, also involving the issue of *Resources* and *Time*.

In the activity, among the 20 participants, four individuals were identified who agreed to try using public transport for a day, accompanied by the mediator, on the home/work and work/home route. The criteria used to select the four characters were gender and income. Therefore, one of each gender and two income groups[19] were selected with the aim of ensuring a more equitable and comprehensive representation. Therefore, the activity with the Focus Group aimed to provide a more complete understanding of the experiences and challenges faced by individuals who generally choose to use a car instead of a bus.

Analysis of the responses and participation in the focus group that will be presented in the next chapter were crucial to obtain relevant information about possible changes in behavior in the face of free public transport. The experiences of the "test" trips carried out in December 2023 with the four selected characters and their opinions were essential to deepen the understanding of individual preferences in relation to the means of transport used for daily commuting in Belo Horizonte. In the future, it would be necessary to carry out tests to assess whether there was an increase in the use of public transport by the city's middle and upper classes.

[19] (Monthly household income between R$2.900 thousand and R$7.100 thousand and monthly household income between R$7.100 thousand and R$22.000 thousand)

Mapping Preferences

COM-B Model to Analyze Possible Changes in Individuals' Behavior

For this consultancy, the COM-B Model was used with the purpose of verifying possible changes in behavior in people who use the car (whether it is their own or through an application[20]) to travel to work in Belo Horizonte. For its approach, the COM-B Model offers three components, *Capacity*, *Opportunity and Motivation*. (*02.09.19_COM-B_and_changing_behaviour_.en.pt.pdf*, [n.d.]) The model suggests that these components provide a comprehensive framework that facilitates understanding of the elements that can influence and shape human behavior, as well as the decisions that guide it. This structured approach enables an integrated view of psychological, physical, social and behavioral factors, providing the identification of essential factors that can boost or limit individual decision-making and actions, and, consequently, behavior change. (West & Michie, 2020)

The model was executed in such a way that it was possible to extract the best information from the analysis of individuals' behavior, according to the problem situation of our work: citizens of Belo Horizonte who use the car to travel from home to work. Considering this scenario, our problem lies in the fact that Belo Horizonte has too many cars on the streets, more precisely during busy times. (Morais, 2023) This occurs predominantly due to the fact that people from the middle and upper classes, who have access to individual transport, choose to use the car simultaneously, creating congestion and polluting the air. Following this line of reasoning, our high level goal was to encourage people who drive to work to opt for public transport at least one day a week. And finally, the desired behavior change consists of making a specific portion of citizens belonging to our chosen target group start using public transport to work at least twice a week.

To generate our COM-B model, we start from the following assumptions presented in Figure 4:

[20] In Belo Horizonte, the most common apps for individual transport services are UBER and 99, which also offers taxis. In the case of the latter, it is important to note that in addition to the private transport modality, users also have the option of requesting taxis through the platform.

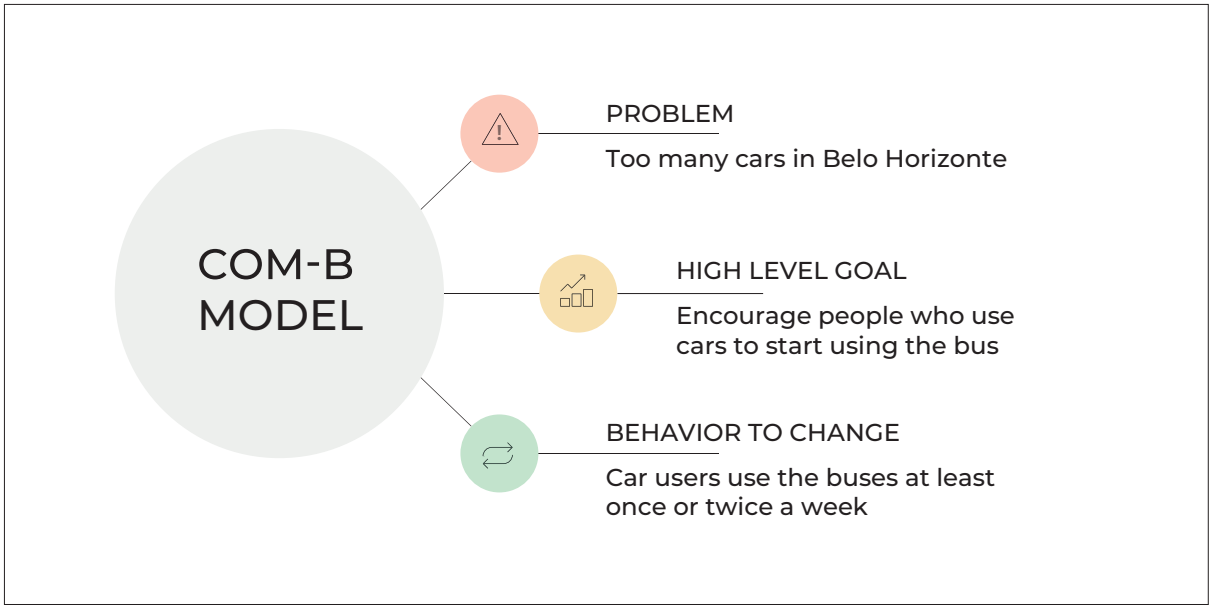


Figure 4: COM-B Model generated
Source: Author's elaboration

Below, in Figure 5, are each of the barrier cards selected as part of this activity.

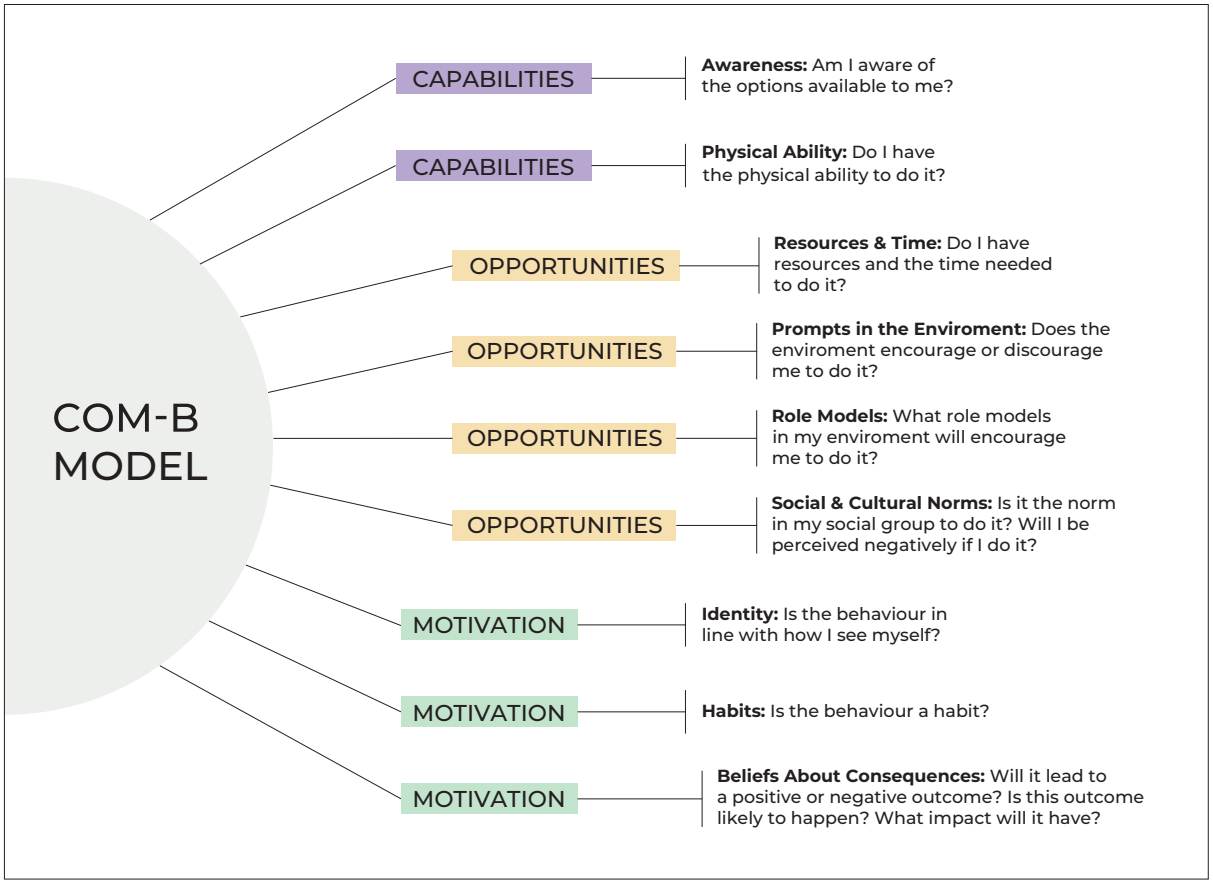
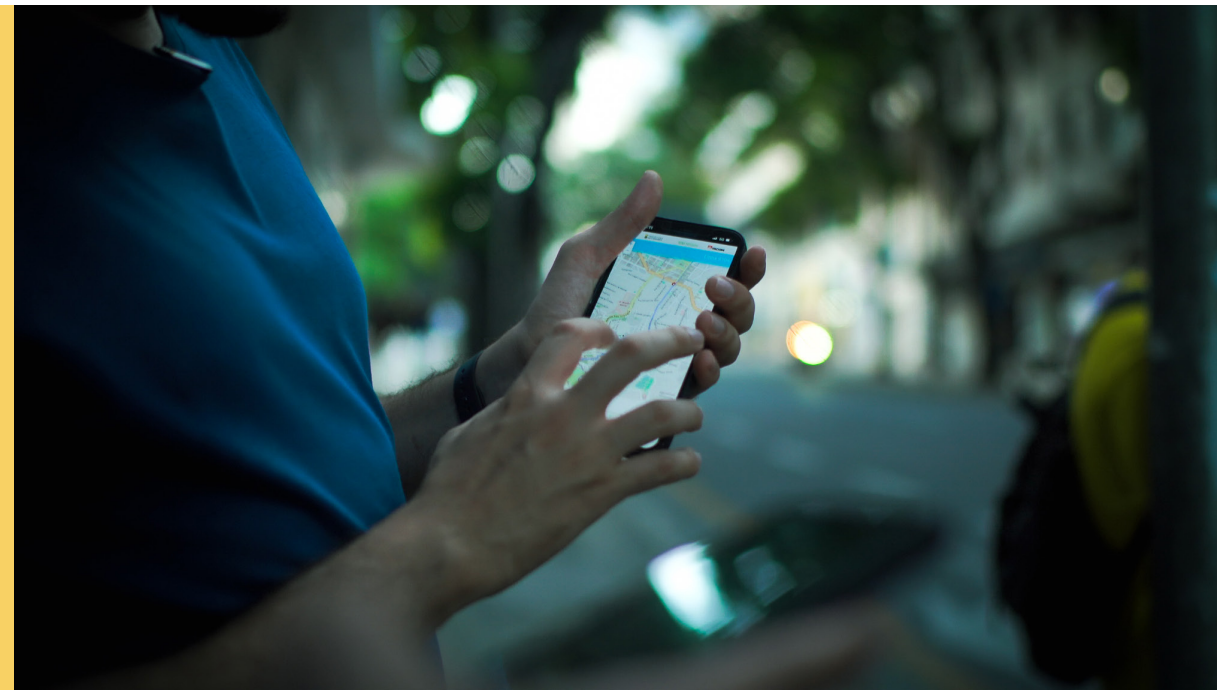


Figure 5: Barrier cards selected for use with the focus group
Source: Author's elaboration

Within the analysis of barriers related to *Capacity*, being aware implies being aware of the options available to you. This means that, if a citizen needs to leave their car in the garage to go to work using public transport, would they know what options they have?

Physical ability can be understood as the ability to perform the task. In this case, it may not only be related to physical skills, but also to cognitive skills, such as reading signs on buses, the search for the best route, calculating the best time to leave home, etc.



In barriers related to *Opportunities*, the vast majority of what could more directly influence the behavioral change of the individual in the situation in question was found. It was understood that it is important to consider the necessary resources and time that the journey will take, observing whether the environment around you encourages or discourages people from using public transport. Furthermore, becoming aware of the existence of successful public transport models in other cities, if implemented in Belo Horizonte, could encourage people to abandon the use of cars to travel between home and work. Finally, it was understood that when faced with the selected group, they would take into account the social and cultural norms of the social group to which they belong. Whether this could affect motivation and the way he is perceived by others when seeking public transport as an alternative to going to work.

In relation to the barriers imposed by motivation, we consider it important to evaluate, in this consultancy, whether, within the group studied, the practice of using public transport to go to work is aligned with the identity and self-perception of each individual. Furthermore, it was deemed necessary for the group to reflect on their beliefs regarding the consequences of this behavior. Ask participants whether changing their habit of opting for the bus instead of the car would have positive or negative impacts on their routines, and what the perceived probability of these results occurring. In the context of motivations, we also consider the possibility that the habit of using the bus to go to work is consolidated, as this could influence your motivation to maintain it.

Focus Group Analysis

The focus group analysis shows that the majority of people are unaware of bus transport options, despite the vast majority having the physical skills to use it. Although the group was divided on how everyone sees themselves using buses and was divided on the opinion that this behavior could become a habit, most believe that this change could be worth it, depending on some changes in the current system. Practically everyone considers that they have the resources and time to use the bus, however practically everyone thinks that the environment discourages citizens from using public transport. Although the group has expressed divergent opinions about encouraging the use of the bus within their social circles, most do not see themselves using public transport in the city of Belo Horizonte.

Based on this assessment, it was decided to select four characters who were distinct from each other, highlighting, evidently, a similar factor between them, which is the fact that they use the car as a means of traveling between home and the workplace. Through this qualitative investigative approach, it was possible to examine individual perspectives that, in a comprehensive way, can portray the experiences, thoughts and perceptions of citizens who choose to use cars instead of public transport in Belo Horizonte.

It is worth clarifying here that in the case of the characters selected for this consultancy, they all had a monthly household income between R$2.900 and R$7.100 and a monthly household income between R$7.100 and R$22.000), that is, a very different reality from lower class citizens, those who need public transport, where it is their only option.

After completing the trip with the four participants, their impressions and feelings regarding the experience they had using public transport were analyzed, as shown on Table 2.

Safety	It was observed that both women from classes A and B, who generally choose to use the car, highlighted the issue of safety as one of the reasons for avoiding public transport, in order to avoid harassment and possible assaults. Furthermore, due to the distance from the bus stop to their homes, they are still subject to this insecurity. If you have the possibility, this is a relevant factor in your choices. One of the characters (woman, class A) occasionally uses public transport to go to work, but refuses to use it on the way back, with safety being one of the factors that influence her decision.
Timetable in disagreement with those available on the internet	One of the participants (man, class B) described his experience in one word: "luck". According to him, on the test day, he found going to work peaceful as it occurred outside of peak hours, however, on the way back, the bus was significantly delayed and did not follow the scheduled time. Another character (man, class A) described the trip as "calm" and the return home as "turbulent".
Time	Absolutely all participants raised negative points regarding time. They expressed concern about the significant time it took them to get to work. For example, some mentioned that travel time is substantially longer than when using their own vehicles. One of them took an hour to make a trip that he makes every day in 20 minutes. There are cases where, due to exclusive bus lanes, public transport is often agile, however, due to delays in schedules, long waits at boarding points, and the need to make multiple connections to reach their destination, people who have the possibility to choose to go by car. To take the bus to work, all participants would have to change their daily routines.
Access and ease	One of the characters (man, class A) thought it would be easy to take the bus, since he had already used it for a long time to go to college. According to him, at the time (15 years ago), he already knew the bus schedules and they were very punctual. Therefore, as advised, he did not previously research which bus lines he should use, which payment methods, price, bus stop, etc. He imagined that using Google everything would be solved, after all, he usually adjusts the time and car route options and even recalculates routes. What he told us was that when he searched on Google how to get to work by bus compared to using the car, the time reference was not reliable, neither for the total estimated time of the trip, nor for the waiting time for the bus at the point. In other words, the application shows predicted data, but does not have a real-time monitoring function. Still at this point, two of the characters (woman, class A and woman, class B) observed that the application indicates the most favorable point to take the bus. For them, the ideal would be for the application to clearly indicate the bus stops with the highest frequency of vehicle traffic for users.
Quality	This factor was unanimous among the participants: the quality of the buses is much to be desired. There are vehicles with loose and banging parts, doors that don't close property, loose seats, dirt and even new ones with air conditioning, have the device turned off. One of them (man, class B) said to summarize his experience: "The travel time is longer, the time to start the journey is longer, the comfort (despite relevant improvements compared to the bus service 15 years ago) is smaller than that of the car and access to information about travel time forecasts is not accurate."

Table 2: Impressions and feelings from the four participants

In Figure 6, some highlights reported by the characters who made the trips were exemplified:

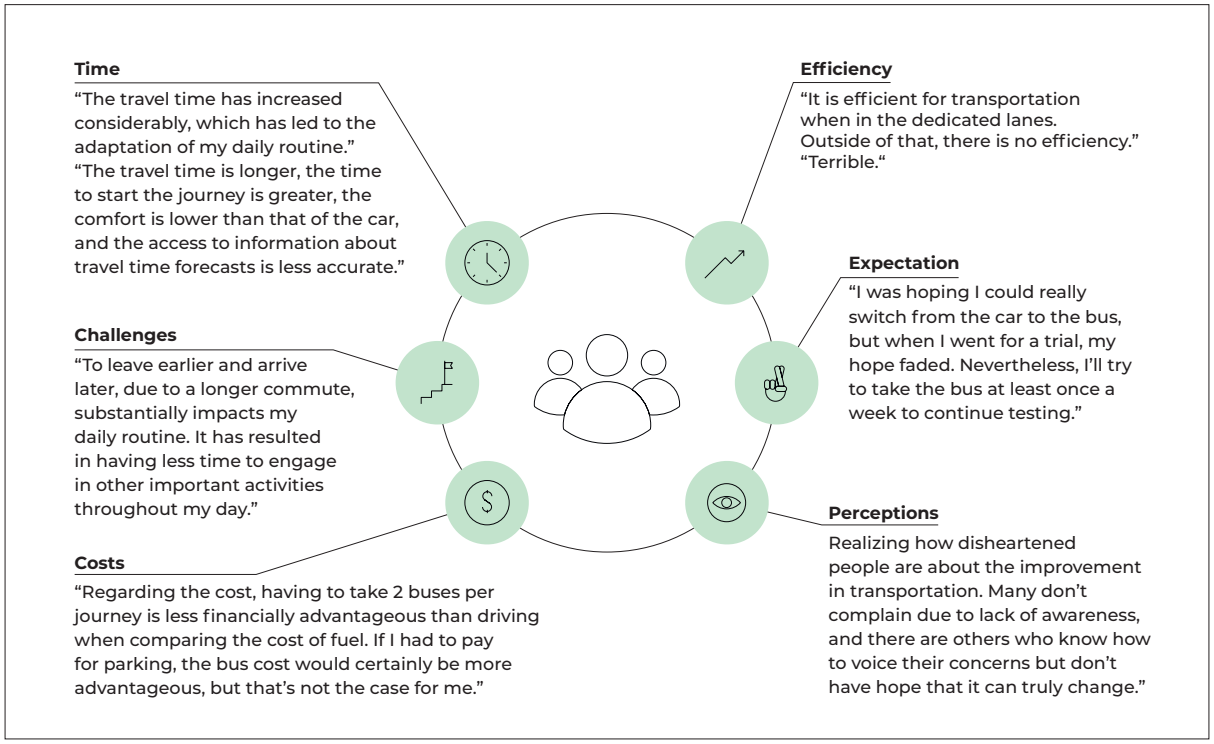


Figure 6: Focus Group Participant's Views on Public Transport Aspects
Source: Author's elaboration

The experiences and perceptions of the Focus Group characters largely reflect the current image of public transport in Belo Horizonte, mainly due to an antiquated contract that does not meet the needs of the population. Public transport in Belo Horizonte needs care and for governments to look at citizens and their needs. Citizens suffer daily from crowded buses, delays at the bus stop, broken schedules, buses breaking down mid-route, scrapped vehicles, and a reporting system for complaints that doesn't work.

Recommendations

Considering the survey form that obtained a total of 225 responses, which led us to select 20 people to compose a focus group added to a methodology based on the COM-B model and the TESTS model was used for a behavioral analysis of the results, that are shown on Table 3 below.

Opening and integrating data into existing platforms	**Capabilities – Knowledge**
Enforcing already approved laws: contactless payments on buses and exclusive bus lanes	**Opportunities - City Stimulation**
Reinstatement of with Operation Safe Trip [21]	**Opportunities - City Stimulation**
Reduce the average age of the fleet	**Capabilities - Physical Abilities**

Table 3: Recommendations based on the COM-B Model methodology and TESTS Model Applied

It is recommended that data be organized in a simplified way to the point where public authorities, instead of consuming time and investment to create applications, have the sole concern of keeping their data open, providing interfaces and APIs (Application Programming

[21] (Operation *Safe Trip*, 2018)

Interface). What data would that be? Those that allow citizens to know where the bus is in real time, how full the buses are, whether they left in advance, whether they are going to be late, for example. In Brazil, as established by Law No. 12.527/2011 - Access to Information Law (*L12527*, [n.d.]), data from public offices are considered public, with some exceptions[22], thus enabling anyone to request access to documents and data that governments hold.

What is happening today in Belo Horizonte, and what was experienced by the test characters on their trips, is that what is shown on the application map is not in accordance with reality. This is because the applications do not monitor the route to know where the buses are and do not show the boarding and disembarking points clearly. Investing in real-time monitoring and route planning technologies to ensure that buses arrive on time and more frequently would reduce waiting times at stops and increase the reliability of the system as a whole for citizens. It is then recommended that the data be accessible and available for use by already popular applications so that external developers can access and integrate this data into their own applications. This approach allows government data to be used more effectively and broadly, benefiting the population as a whole.

It is recommended that laws that take away money on board be inforced[23] and exclusive bus lanes[24]. In the first of them, which in addition to raising the issue of safety for both the passenger and the driver, reducing the risk for those on public transport; This is in line with the first recommendation, which is that in this case, citizens could use their own card to pay for their ticket. In the same sense, the idea is defended that the city should take advantage of the payment methods that people use, and not worry about innovating payment methods[25]. This would make it possible for any citizen, such as those represented by our focus group for this consultancy, to pay with their continuously used card for any type of purchase (from the major brands, VISA, MASTERCARD, etc.) they will have a simple and above all option, reliable.

Enforcing of the law that provides exclusive lanes for buses may improve the speed

[22] such as national security or privacy reasons

[23] (*Ordinary Law 11459 2023 of Belo Horizonte MG,* [n.d.])

[24] (*Ordinary Law 11461 2023 of Belo Horizonte MG,* [n.d.])

[25] Currently, Belo Horizonte has three main applications to access bus schedules: SIU Mobile (Siu Mobile, 2019), BHBUS+ (Transfácil, [n.d.]) and KIM KIM TECNOLOGIA EM MOBILIDADE LTDA (KIM – Apps on Google Play, [n.d.])

of the system: since the bus can have a clear path, it makes the system more attractive, people want agility.

In 2017, the "Operation Safe Trip" program was implemented, which consisted of the presence of two municipal guards during bus routes. The objective of the action was to increase passengers' sense of safety. This operation received a satisfactory response from the population. Therefore, its reinstatement is recommended to meet the demand reported by users, although the sustainability of the idea requires an increase in the number of security bodies responsible for the action.

Furthermore, it is recommended that the City Hall determines through an administrative act that the age limit for buses be lower than it is today (12 years old)[26]. As a result, older buses will be exchanged for new ones, which will generate more comfort, safer vehicles and better travel quality.

[26] (*Agreement between PBH and bus companies extends maximum age for fleet in the capital,* [n.d.])

Conclusion

This consultancy made it possible to understand the perceptions of people who choose to use cars instead of public transport, and if the fare were zero, whether this would encourage them to use the bus more. Analyzing the reasons why they did not show, in the current scenario, a propensity to change this habit, we observed that a free pass public transport system would not be enough. In this consultancy, we identified relevant aspects that have more weight in the characters' choices, highlighting factors such as convenience, service efficiency, accessibility, comfort of public vehicles, which play a fundamental role in influencing their decisions. Although there is a perceived social role of zero fares, the factors highlighted as playing a fundamental role in decision-making regarding the use of daily transport, highlighted in this consultancy, highlight the importance of improving the quality and convenience of public transport to attract more users. By improving to meet the standards specified by people in the focus group belonging to classes A and B, quality is also improved for all users, including the poorest.

The application of the TESTS and COM-B models together with contact with people and especially the four selected characters, were essential to show us that there is the possibility of applying small interventions that will influence the behavior of citizens who do not currently use the bus.

The complete analysis of the data and insights collected makes it clear that in order to improve Belo Horizonte's public transport system there are diverse needs, which requires profound transformations that involve the Executive Branch and also bus companies. Our consultancy focused on alternatives that enable improvements to ensure the adoption of people who do not yet use the city's public transport and also improvements that will make it more widely used.

The publication of public data organized in such a way that real-time monitoring technologies can be accessed by companies developing applications that should be simple

and practical intervention to make the system more attractive and reliable. It is clear that two of these alternatives (opening data and using the Municipal Guard for Operation Safe Trip) use the apparatus of already paid the Municipality of Belo Horizonte employees. The other recommendation (yes payment) involves changing the validators and modernizing the software of machines already in the vehicle at a not so high cost. Applying the exclusive stripes requires paint on the floor. Finally, the most expensive recommendation is fleet renewal. Despite 84 municipalities having implemented free pass in Brazil, none of them has a population the size of the city of Belo Horizonte (Caucaia, in the State of Ceará, has 355 thousand inhabitants, being the largest Brazilian municipality to implement free pass). It is undeniable that this policy presents positive results in the socio-economic field in the places where it is implemented. However, if the objective is to encourage people who use their cars, therefore the biggest generators of congestion, to adopt public transport, this may not be a sufficient measure.

In a context where public resources are scarce, the effectiveness of applying a public policy cannot represent waste nor can it mean not achieving a goal. In an electoral context in which candidates propose attractive and easy solutions to complex problems, especially in a context of political polarization in which some may vehemently refute the idea of a free pass while others may defend it as the only solution, it is important to demonstrate that it has advantages, but considering the data from this consultancy, it cannot be fully effective like the mobility policy in Belo Horizonte. Therefore, in a debate that is becoming increasingly necessary in the world, when it comes to freeing the city from traffic jams, it is crucial to bring together more and more incentives for people to opt for public transport. It's democratic, it's efficient, it's necessary.

References:

2022 Census Overview. ([n.d.]). 2022 Census Panorama. Retrieved January 16, 2024, from https://censo2022.ibge.gov.br/panorama/

2022 Census Overview. ([n.d.]). Panorama of the 2022 Census. Retrieved January 17, 2024, from https://censo2022.ibge.gov.br/panorama/

Alves, V. F. B., Silva, A. N. R. D., & Van Der Waerden, P. (2012). Exploratory techniques to locate potential users of urban public transport.*Journal of Transport Literature*, *6*(3), 181–203. https://doi.org/10.1590/S2238-10312012000300011

Anon. 2019. "Siu Mobile". Belo Horizonte City Hall. Retrieved January 25, 2024 (https://prefeitura.pbh.gov.br/bhtrans/informacoes/transportes/onibus/aplicativos/siu-mobile).

Anon. [n.d.]-a. "Belo Horizonte and Region, Brazil: your public transport guide". Retrieved January 25, 2024 (https://moovitapp.com/index/pt-br/transporte_p%C3%BAblico-Belo_Horizonte-843).

Anon. [n.d.]-b. "Commission approves proposal that provides for disembarking outside the bus stop at night - News". Portal of the Chamber of Deputies. Retrieved January 25, 2024 (https://www.camara.leg.br/noticias/983108-comissao-aprova-proposta-que-preve-desembarque-fora-da-parada-de-onibus-durante-a-noite /).

Anon. [n.d.]-c. "2022 Census Overview". 2022 Census Panorama. Retrieved January 16, 2024 (https://censo2022.ibge.gov.br/panorama/).

Anon. [s.d.]-d. "The Behavioural Insights Team". The Behavioural Insights Team. Recuperado 24 de janeiro de 2024 (https://www.bi.team/).

Anon. [n.d.]-e. "Transfacile". Retrieved January 25, 2024 (https://transfacil.com.br/noticia/7). Fenabrave Yearbook 2022. ([s.d.]).

Araújo, M. R. M. D., Oliveira, J. M. D., Jesus, M. S. D., Sá, N. R. D., Santos, P. A. C. D., & Lima, T. C. (2011). Collective public transport: Discussing accessibility, mobility and quality of life.*Psychology & Society*, *23*(3), 574–582. https://doi.org/10.1590/S0102-71822011000300015

Bus loses brakes, hits truck, hits pole and collapses wall in BH. (2023, October 31). G1.

https://g1.globo.com/mg/minas-gerais/noticia/2023/10/31/onibus-perde-freio-bate-em-caminhao-atinge-poste-e-derruba-muro-em-bh. ghtml

Caetano, A. J., & Rigotti, J. I. (2007). GT3—678 Dynamics and Demographic Growth of the Metropolitan Region of Belo Horizonte—1960/2000.*Anais ENANPUR*, *12*(1), Article 1. https://anais.anpur.org.br/index.php/anaisenanpur/article/view/1201

Dias, C. A. (2000). FOCUS GROUP: Data collection technique in qualitative research. Information & Society: Studies. https://periodicos.ufpb.br/ojs/index.php/ies/article/view/330

Dias, C. A. (2000). FOCUS GROUP: Data collection technique in qualitative research. *Information & Society: Studies*. https://periodicos.ufpb.br/ojs/index.php/ies/article/view/330

Echeverri, C., Valencia-Hernández, G., & Acosta, A. (2012). METHODOLOGY TO EVALUATE THE ENVIRONMENTAL IMPACT ON AIR QUALITY IN PROJECTS TO REDESIGN COLLECTIVE PUBLIC TRANSPORTATION ROUTES IN CITIES. CASE STUDY: MEDELLÍN. Engineering Magazine University of Medellín, 11(20), 31–42.

Eliasson, J. (2008). Lessons from the Stockholm congestion charging trial. Transport Policy, 15(6), 395–404. https://doi.org/10.1016/j.tranpol.2008.12.004

Gomide, A. D. Á., & Galindo, E. P. (2013). Urban mobility: An unfinished agenda or the return of what was not.*Advanced Studies*, *27*(79), 27–39. https://doi.org/10.1590/S0103-40142013000300003

Gondim, S. M. G. (2002). Focus groups as a qualitative research technique: Methodological challenges.*Paidéia (Ribeirão Preto)*, *12*(24), 149–161. https://doi.org/10.1590/S0103-863X2002000300004

IBGE | Cities@ | Minas Gerais | Belo Horizonte | Panorama. ([n.d.]). Retrieved January 17, 2024, from https://cidades.ibge.gov.br/brasil/mg/belo-horizonte/panorama

IBGE | Cities@ | Minas Gerais | Belo Horizonte | Search | Vehicle fleet | Vehicle. ([n.d.]). Retrieved January 17, 2024, from https://cidades.ibge.gov.br/brasil/mg/belo-horizonte/pesquisa/22/28120?tipo=grafico

Ingram, G. K., Hong, Y., & Lincoln Institute of Land Policy (Orgs.). (2012). Value capture and land policies: Proceedings of the 2011 Land Policy Conference. Lincoln Inst. of Land Policy.

Minas, E. de. (2023a, September 20).*Bus loses brakes, hits tree and eight people are injured in BH*. State of Mines. https://www.em.com.br/app/noticia/gerais/2023/09/20/interna_gerais,1564696/onibus-perde-freio-atinge-arvore-e-oito-pessoas-ficam-feridas-em-bh.shtml

Morais, Lucas. 2023. "Mobility applications transform routines, traffic and work relationships | THE TIME". Retrieved January 25, 2024 (https://www.otempo.com.br/especiais/rotas-da-mobilidade/longas-jornadas/aplicativos-de-mobilidade-transformam-rotinas-transito-e-relacoes-de-trabalho -1.2875026).

Neshovski, R. ([s.d.]). *Home*. United Nations Sustainable Development. Retrieved January 22, 2024, from https://www.un.org/sustainabledevelopment/

Oliveira, R. (2023, May 5).*With one of the most expensive tickets in the country, BH even has buses without brakes on the streets | THE TIME*. https://www.otempo.com.br/cidades/com-uma-das-passagens-mais-caras-do-pais-bh-tem-ate-onibus-sem-freio-nas-ruas-1.2863147

OLX, E. (2021, November 3).*Personalized service: The profile of car consumers in Brazil*. OLX Tips. https://dicas.olx.com.br/para-o-seu-negocio/atendimento-personalizado-perfil-do-cliente/

Pagliara, F., Preston, J., & Kim, J. (2010). The Impact of Transport Policy on Residential Location. Em International Review of Public Administration (Vol. 9, p. 115–136). https://doi.org/10.1007/978-3-642-12788-5_6

Pereira, R. H. M., Warwar, L., Parga, J., Bazzo, J., Braga, C. K., Herszenhut, D., & Saraiva, M. (2021). TD 2673 - Trends and inequalities in urban mobility in Brazil i: The use of collective and individual transport.*Text for Discussion*, 1–51. https://doi.org/10.38116/td2673

Spending on cars is the second largest expense in the Brazilian family budget, reveals research by Serasa. ([n.d.]). Retrieved January 18, 2024, from https://www.serasa.com.br/

imprensa/gastos-com-o-automovel/

Tarifa_Zero_AJUP_UFMG_Relatorio_Pesquisa_Perrengues_Busao_Pandemia_2020.pdf. ([s.d.]). Google Docs. Retrieved October 5, 2023, from https://drive.google.com/file/d/1dwtHf_tLfI5f7d_TmMBhpOirZz56YiwW/view?usp=embed_facebook

Trad, L. A. B. (2009). Focus groups: Concepts, procedures and reflections based on experiences using the technique in health research.*Physis: Public Health Magazine*, *19*(3), 777–796. https://doi.org/10.1590/S0103-73312009000300013

Video: Bus stops on Avenida Antônio Carlos days after fare increase and leaves 40 users stranded: "ironic". (2023, April 26). Itatiaia Radio. https://www.itatiaia.com.br/editorias/cidades/2023/04/26/video-onibus-trava-em-plena-avenida-antonio-carlos-dias-apos-aumento-da-tarifa-e- leave-40-users-in-hand-ironic

West, R., & Michie, S. (2020). A brief introduction to the COM-B Model of behaviour and the PRIME Theory of motivation. *Qeios*. https://doi.org/10.32388/WW04E6

West, R., & Michie, S. (2020). A brief introduction to the COM-B Model of behaviour and the PRIME Theory of motivation. *Qeios*. https://doi.org/10.32388/WW04E6

Wheelchair user can't get off bus after elevator breaks down and spends almost five hours waiting for help. (2023, August 11). G1. https://g1.globo.com/mg/minas-gerais/noticia/2023/08/11/cadeirante-nao-consegue-sair-de-onibus-apos-elevador-estragar-e-fica-horas-esperando- por-ajuda.ghtml

Wheelchair user crawls on the bus floor to get out of the vehicle in BH - News—R7 Minas Gerais. ([n.d.]). Retrieved January 23, 2024, from https://noticias.r7.com/minas-gerais/cadeirante-se-arrasta-no-chao-de-onibus-para-conseguir-descer-do-veiculo-em-bh-20092023

Zero fare: Lessons from the 67 cities in Brazil with free buses. (2023, April 13). BBC News Brasil. https://www.bbc.com/portuguese/articles/cy65e4qnjjpo

Zhou, Y., Popuri, Y., & Proussaloglou, K.E. ([s.d.]).*Transit Customers – Who, Why, Where, and How: A Market Analysis of the San Mateo County Transit District*.