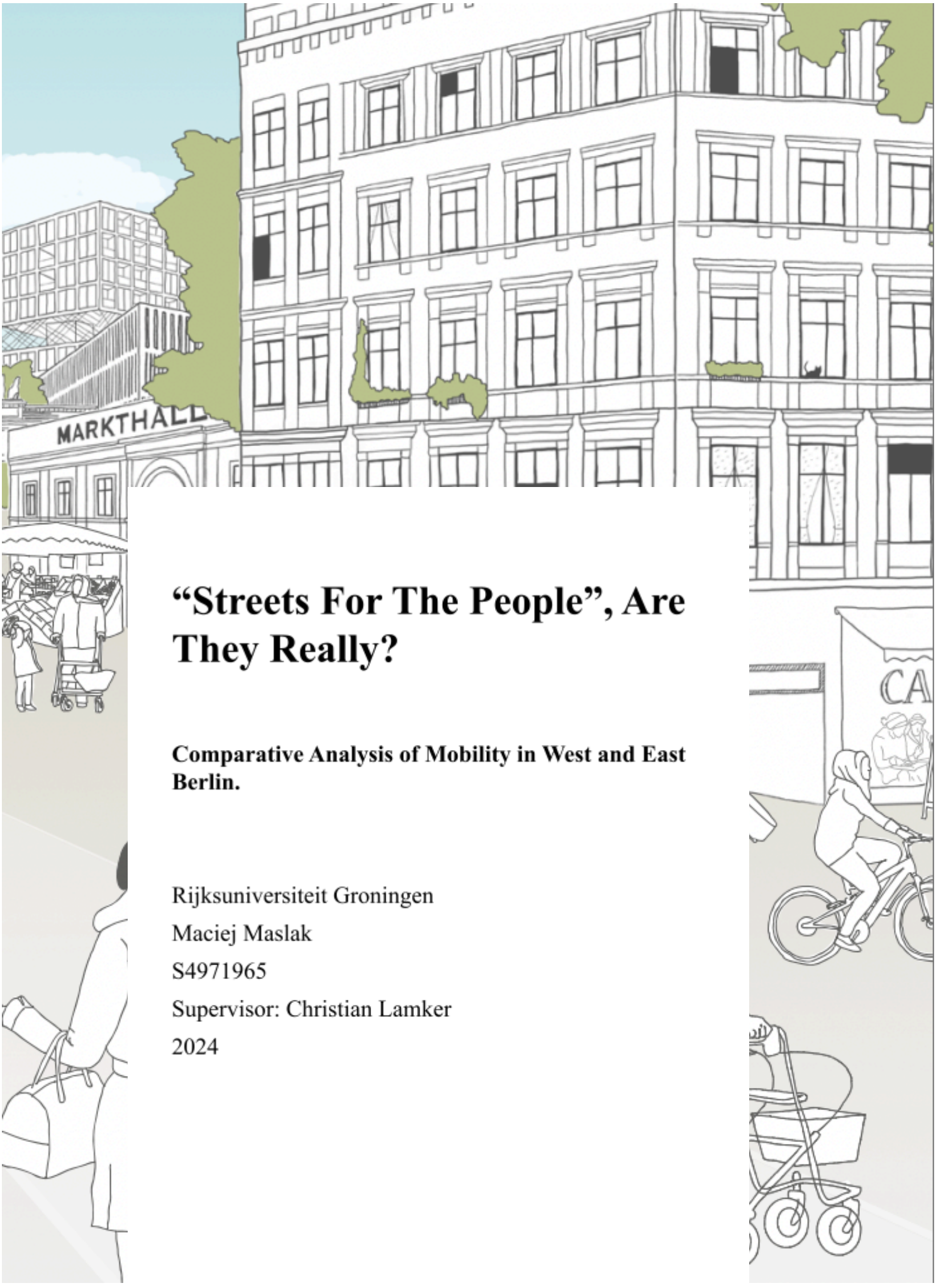

“Streets For The People”, Are They Really?

Comparative Analysis of Mobility in West and East Berlin.

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Figure : Vision for the desired look of streets in Berlin. Source: Senate Department for Urban Development and the Environment, 2023.

Abstract

Berlin was uniquely divided between two countries in the 20th century, with the two parts completely fenced off in the years 1961-1989. Separate paths of development can to a certain extent can still be seen today on the map of Berlin. This research aims to contribute to bridging the gap between two parts of Berlin and give direction to future sustainable urban policies in Berlin. This study uses short surveys with qualitative and quantitative data to assess how Berliners view various aspects of transport and accessibility in their vicinity. Quantitative method of street counting is used as a complementary method to study the choices of transport that Berliners make. This research focuses on former centres of West and East Berlin, to study places of similar role, character and importance for Berlin. It is found that the way people travel in and out of West and East Berlin areas varies. However, the overall satisfaction with mobility situation in both areas is similar due to different factors affecting it, such as walkability or preferences, complementing each other.

Keywords: Mobility, Berlin, Accessibility, Last-Mile Burden.

Table of Contents

1. Introduction

1.1. Background

This paper investigates the mobility network and its perception in West and East Berlin to assess the impact of the division of the city in 20th century on its current urban space and the life of its inhabitants. After WWII, Germany was divided into four different occupational zones. French, American and British zone formed the Federal Republic of Germany (West), and the Soviet zone formed the German Democratic Republic (East) in 1949 (CES, 2020). The city's transportation network consisting of S-Bahn (commuter rail), U-Bahn (metro), trams and buses previously connected all parts of the city. With the erection of the Berlin Wall in 1962, two sides of the city were suddenly completely separated until 1989. Many stark differences arose during the division. West Berlin abolished the tram network in favour of extensive U-Bahn (metro) and car infrastructure development, whereas East Berlin focused on expanding its tram and S-Bahn (commuter rail) network instead (Fabian, 2000). Rotherngatter (1994) claimed it was clear that the unification of Germany would massively impact the shape of freight and passenger transportation network in both sides. However, the differences, such as West Berlin being more car-oriented and having an extensive U-Bahn network, and East Berlin being dominated by the trams, are still prevalent on the current map of Berlin (Fig. 2).

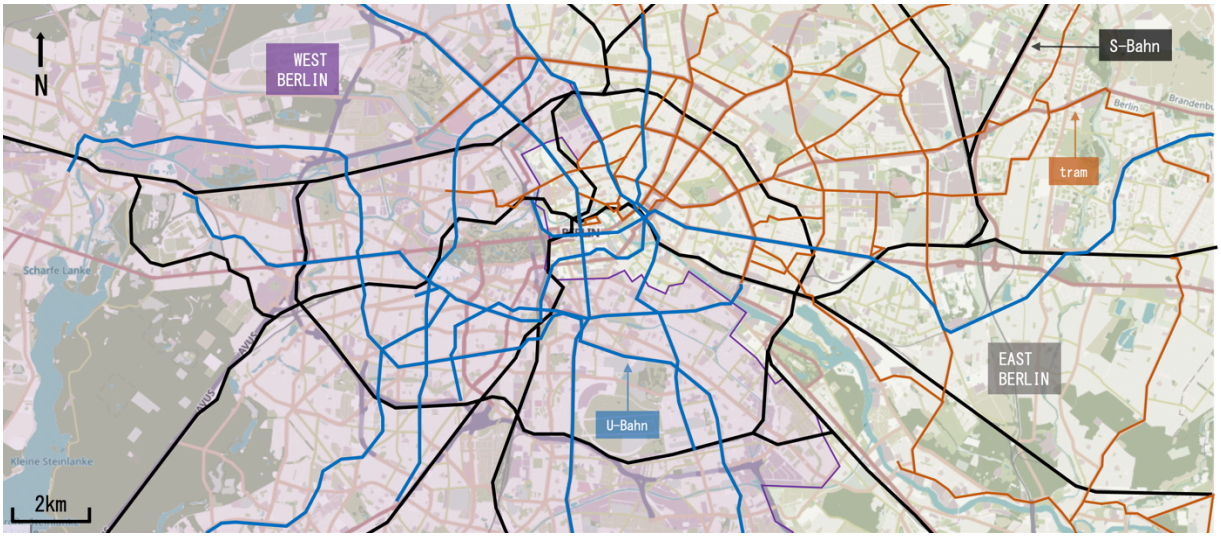


Figure 2: Current U-Bahn (black) and tram (orange) network in the inner city of Berlin. Source: Author, 2024, based OpenStreetMap, 2024 & Berlin Wall Map, 2019.

Current Berlin comprehensive development policy, Berlin Strategy – Urban Development Concept Berlin 2030 (Senate Department for Urban Development and the Environment, 2023) explicates current challenges of Berlin and sets future strategies for the city as a green, compact, inclusive and integrated city. One of the objectives for mobility in the future is making public transit more attractive, and active modes of transportation (walking and cycling) easier for the citizens. Bertolini (2020) defines this change as a shift from car-dominated "streets for traffic" to "streets for people" which focus on active modes of

transport and public transit. The city's goals match the goals established by the European Commission (2020) in New Leipzig-Charter that are now prevalent in various European cities under different forms (Adolfsson et al., 2021). However, most European cities were not relatively recently divided between two countries for 40 years, which leads to a question whether the differences prevailing could hinder the progress of Berlin towards becoming an integrated and sustainable city.

1.2. Research problem

The aim of this study is to research how satisfied Berliners are with their mobility options when travelling in and out of areas in West and East Berlin. The crucial, independent variable of the research is the path dependence of the transportation network and related urban space on the historical division of the city between the two countries. The main research question, encompassing the main message of the study, was formulated:

How satisfactory is the quality of the mobility network in West and East Berlin according to the city residents?

To further answer the research question, the following sub-question have been formulated:

1. *How do Berliners evaluate the accessibility and pleasantness of particular transport modes in the centres of West and East Berlin?*
2. *How do West and East Berlin differ in terms of walkability?*
3. *How does accessibility of different transport modes differ in West and East Berlin?*

The research aims to explore the interactions between streets and its users. It is important to gain a deeper understanding of what street elements and transport mode characteristics stand behind the mobility choices of Berliners and citizens of cities worldwide. This is especially relevant in light of trendiness of sustainability and sustainable urban mobility (Adolfsson et al., 2021).

The knowledge from this study is crucial for understanding the mobility situation in West and East Berlin, and to use it for further integration of the city in line with its goals for future development as a sustainable city. It is important to evaluate whether the city analysis of the mobility situation matches the perception of Berlin's citizens, and if they share the goals outlined by the current mobility policies. This comparative research can contribute to further bridging of the gap between the two areas in the future to fulfil Berlin's goals to be an inclusive, green, compact and socially responsible city.

1.3. Structure of the paper

First, a theoretical framework providing an overview of the crucial for the research concepts and theories is presented. The conceptual model showing the relationships between those is inserted to show how together they align into the formulated research question(s). Further, methodology that was used in this study to answer the research question is introduced. The main data collection instrument, short survey – a mix of the qualitative and quantitative data, is overviewed along with a secondary method of street counting – a quantitative data instrument. Later, results of both methods are presented and overviewed in relation to the

research question(s). Research design and results are later discussed to assess the quality and impact of the research. In the end, conclusions are presented along with further recommendations for future relevant research on the topic, both using similar or dissimilar methodology.

2. Theoretical Framework

This part of the paper presents the main theories and concepts to build a conceptual base laying behind the research topic. They are followed by the Conceptual Model, which defines the relationships between various concepts and establishes the structure of the study.

2.1. Spatial Mobility & Trends

Spatial mobility has been a crucial element of urban life since centuries. Zenobi (2021) claims a reciprocal relation between mobility and urban spaces. Thus, mobility does not just "take place" in cities, but its streams have a transformative role on the urban spaces, giving new meanings to the built environment and permanently altering its shape. On the other hand, the shape of urban spaces also massively influences the mobility. Therefore, the dichotomy between past development of West and East Berlin and their mobility networks might have had a substantial impact on both the mobility network itself but also the urban spaces. Nyamai & Schramm (2023) claim that in contemporary cities, planning for mobility has acquired a constant need for adjustments stemming from diverse mobility preferences, needs and options for every individual citizen in the city.

European Commission (2020) in New Leipzig-Charter also highlights the transformative power of European cities, where well-organised urban structure has the potential to make the society and individuals within it to flourish through interaction and integration. High-quality, open, and safe public spaces unlock the transformative relationship between spatial mobility and social mobility. The desired qualities of cities are to be *just*, *green*, and *productive*. The *just* city provides equal opportunity for everyone, with particular focus on the disadvantaged groups such as the immobile or immigrants, to integrate and participate in the life of the society. The *green* city reduces the skyrocketing pace of climate change through e.g. establishing high-quality green spaces and modal shift to sustainable transport, such as walking, cycling or efficient and environmentally-friendly public transit that is accessible to *everyone*. The new desired modal split is called a shift from "streets for traffic" to "streets for the traffic" by Bertolini (2020). It comes from the growing support for sustainable transportation and unlocking the transformative potential of city streets as shared community goods rather than thoroughfares for private motorised transport. One of the goals of the European Commission is to also reduce transport and mobility needs. Interestingly, this goes against Fortunati & Taipale's (2016) claim from a few years before stating that increased short-range spatial mobility is a sign of "success in contemporary networked societies" (Elliott & Urry, 2010, as cited in Fortunati & Taipale, 2016, p. 261). The new wave of questioning if all mobility is necessary present in 2020 but not 2010 could be partially attributed to the COVID-19 pandemic lockdown that has heavily changed the value of mobility (Cresswell, 2020).

2.2. Walkability & Accessibility

Rahiman & Naseer (2022) claim that "walkability is a foundation to a sustainable city". Walking can be a stand-alone transport mode (used for the entire duration of a journey), or a

complementary transport mode used to reach other transport mode nodes from the destination. Walkability is a multi-dimensional quality that does not have a uniform definition in academic literature. Various studies point to a positive impact of walkability on the view of the city in the eyes of both tourists and residents (Vevitnev & Bobina, 2017; van der Steen & Richards, 2019; as cited in Barrera-Fernández & Hernández-Escampa, 2020). Rahiman & Naseer (2022) identify walkability factors from various literature using the Delphi method. The main factors affecting Walkability are Built-Environment Characteristics, Immediate Walking Environment, Perceptions and Urban Design Qualities, as shown in Table 1 (for further descriptions see Appendix 5).

Table 1: Main factors affecting Walkability. Source: Rahiman & Naseer, 2022, p.5-6.

Criteria	**Sub-criteria**
Built-Environment Characteristics	1. Land-use Mix Diversity 2. Household Density 3. Street Connectivity
Immediate Walking Environment	4. Maintenance of Walkways 5. Walkway Characteristics 6. Obstacles to Walking
Perceptions	7. Sense of Safety 8. Sense of Security 9. Comfort 10. Visual Interest
Urban Design Qualities	11. Imageability 12. Visual Enclosure 13. Human Scale 14. Transparency 15. Complexity

Nyamai & Schramm (2023) define accessibility as a main factor to achieving spatial justice within urban environments. They categorise accessibility in relation to mobility into three dimensions:

- *spatial dimension*: organisation of the functions within the city layout,
- *modal dimension*: reachable modes of transport to the individual in terms of price, safety and efficiency,
- *individual dimension*: preferences, values and cultural upbringing of the individual that affects the mobility behaviour of an individual.

However, spatial justice, and thus accessibility, is not term possible to define a maximum or an end goal of. Thus, seeking accessibility is an ever-lasting endeavour. Bereitschaft (2017)

highlights that walkability can be a factor contributing to spatial and social equity for disadvantaged and socially vulnerable groups. The distances that people deem acceptable to traverse by foot can be heavily influenced by the walkability of the route (Ha et al., 2023). "First- or last-mile burden" is the distance required to traverse by foot between the nearest public transit stop and the initial or final destination. Ha et al. (2023) highlight there is a significant relationship between walkability of the "first" or "last mile" and the willingness of commuters to choose public transit. Unwalkable environments not only decrease the pleasure of walking (Barrera-Fernández & Hernández-Escampa, 2020) but can discourage commuters from using public transit at all and choose private vehicles instead. More vulnerable citizens are more likely to use the public transport in the first place (Ha et al., 2023), so denying them the only option to move to certain amenities may hinder their integration within society, as there is a strong link between spatial mobility and social mobility (Borck & Wrede, 2018). Increased walkability can thus provide people with more opportunities, contributing to achieving a *just* city in line with New Leipzig-Charter by European Commission (2020).

2.3. Conceptual model

The starting point of the Conceptual Model (Fig. 3) is the factors building Walkability and Accessibility. Walkability also affects the scale of the "first- or last-mile burden", which in turn has an impact on Accessibility as well. Together, these along with their underlying factors form the mobility choices that people make.

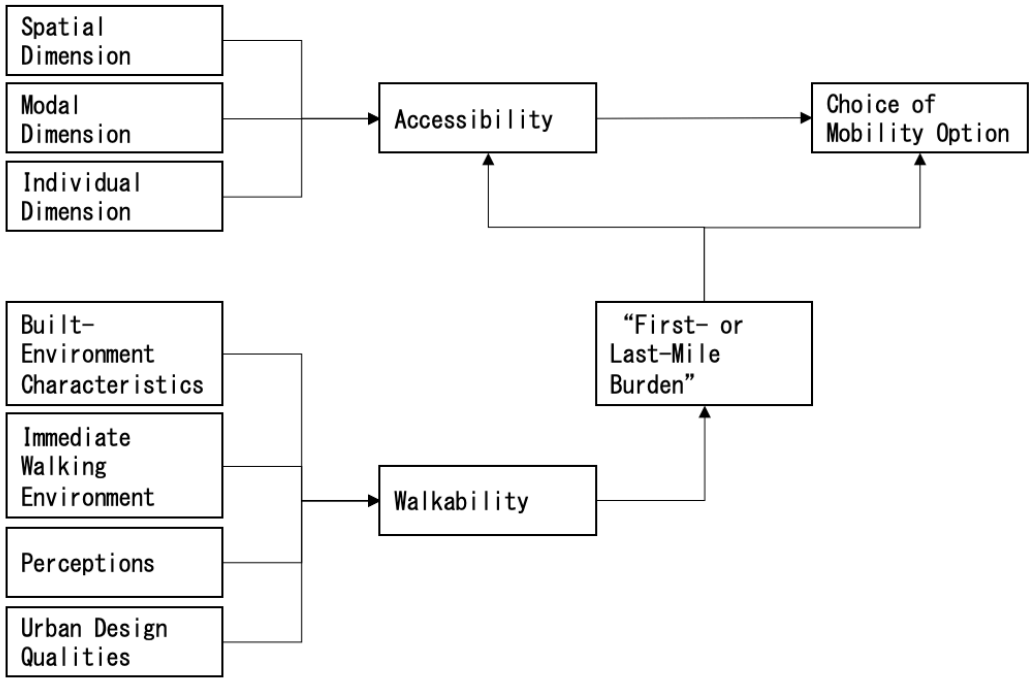


Figure 3: Conceptual Model for the paper. Source: Author, 2024.

3. Methodology

This section of the paper overviews how the research used to answer the research questions was carried out. First, Data Collection Instrument is presented, followed by Data Analysis scheme, which shows how results were extracted from raw data. Research ethics are further considered to ensure the study was in line with academic rules and standards. It is followed by case selection, which puts the Data Collection Instrument and Data Analysis Scheme into specific context of the study.

The research was conducted within the Erasmus+ programme called STONIE (Sustainable Transformation of Neighbourhoods in Europe), a collaboration between University of Groningen, the Polytechnic University of Milan, University of Stockholm and Humboldt University of Berlin (host university). The research included in this study and additional research not relevant to the topic was conducted by a group of four students, two being from Groningen, one from Milan and one from Stockholm. The students were given five days for on-site familiarisation with chosen areas, data collection and analysis before the final presentation of the research.

3.1. Case selection: areas

This study selected two areas, one in West Berlin and one in East Berlin. The main focus when choosing the areas in West and East Berlin was to compare places with a similar character, and a similar role on the current map of Berlin to eliminate unrelated factors that could skew the results. This way, the differences can be attributed to one, independent variable – the path dependence of the mobility network on the historical division. It was chosen to study areas with many mobility options, so that preferences and differences can be fully explored rather than studying areas where the choices are more limited. Thus, areas with major transport hubs were identified, and confirmed through the current Berlin mobility plan, where such areas are called “stimuli” (Berlin Strategy - Urban Development Concept Berlin 2030). Throughout the period of Berlin division, new “city centres” emerged in both West and East Berlin. Today, they still function as the “city centres” of the city, as Berlin has a rather unusual structure of an undefined central point. Thus, it was chosen to compare old city centres of West and East Berlin. According to Berlin Strategy - Urban Development Concept Berlin 2030, they have a similar role in the cityscape as multifunctional places and transportation hubs.

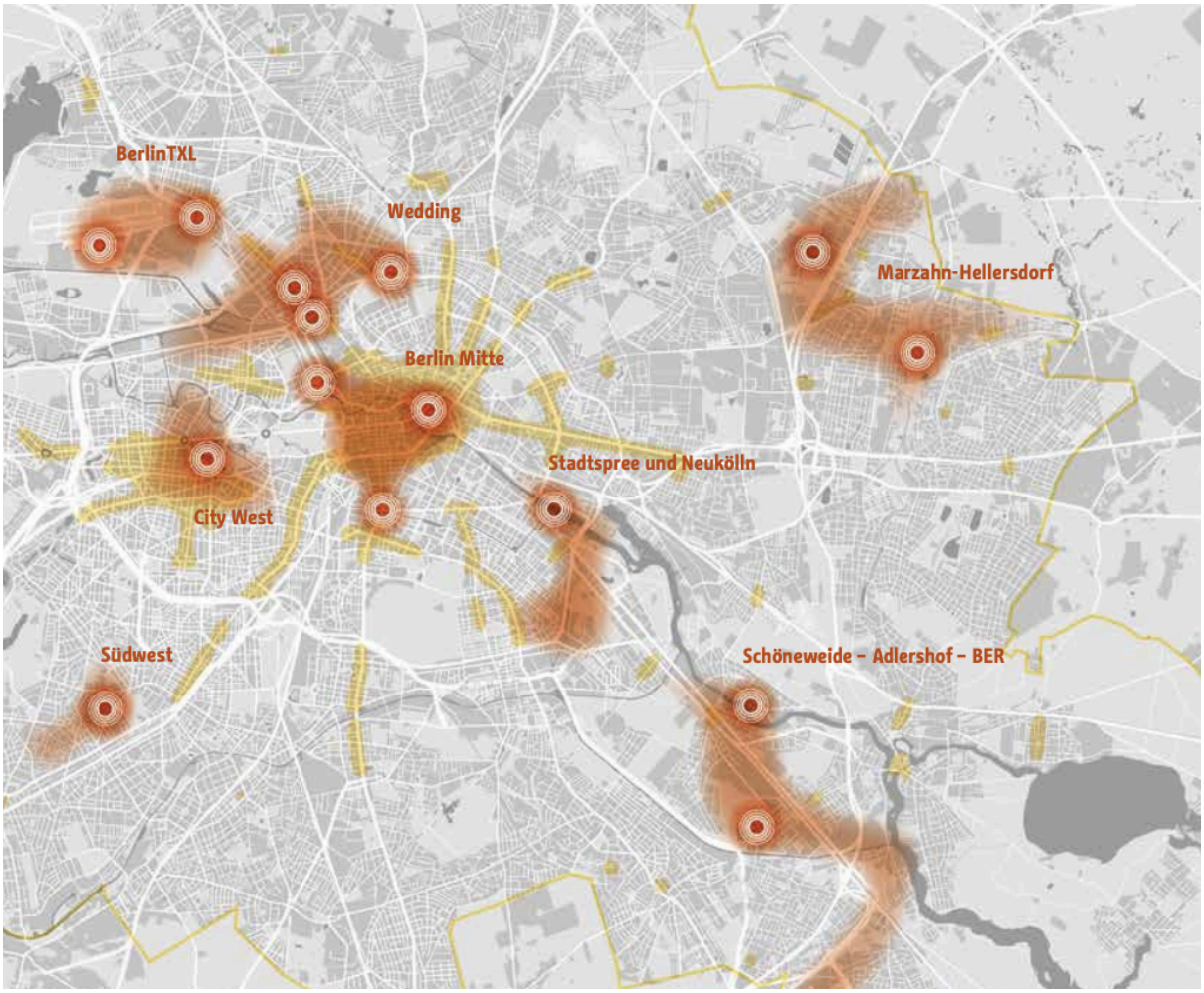


Figure 4: "Stimuli" of Berlin mobility. Source: Senate Department for Urban Development and the Environment, 2023.

Site in West Berlin – Hardenbergplatz/Ernst-Reuter-Platz

The area is a multifunctional place, with a mix of urban life, shopping venues and offices. Signature landmarks of Berlin can be found in the busiest street of the centre of the West, Kurfürstendamm. City West is claimed to be complement the neighbouring district of Mitte (which includes the East Berlin site) well.

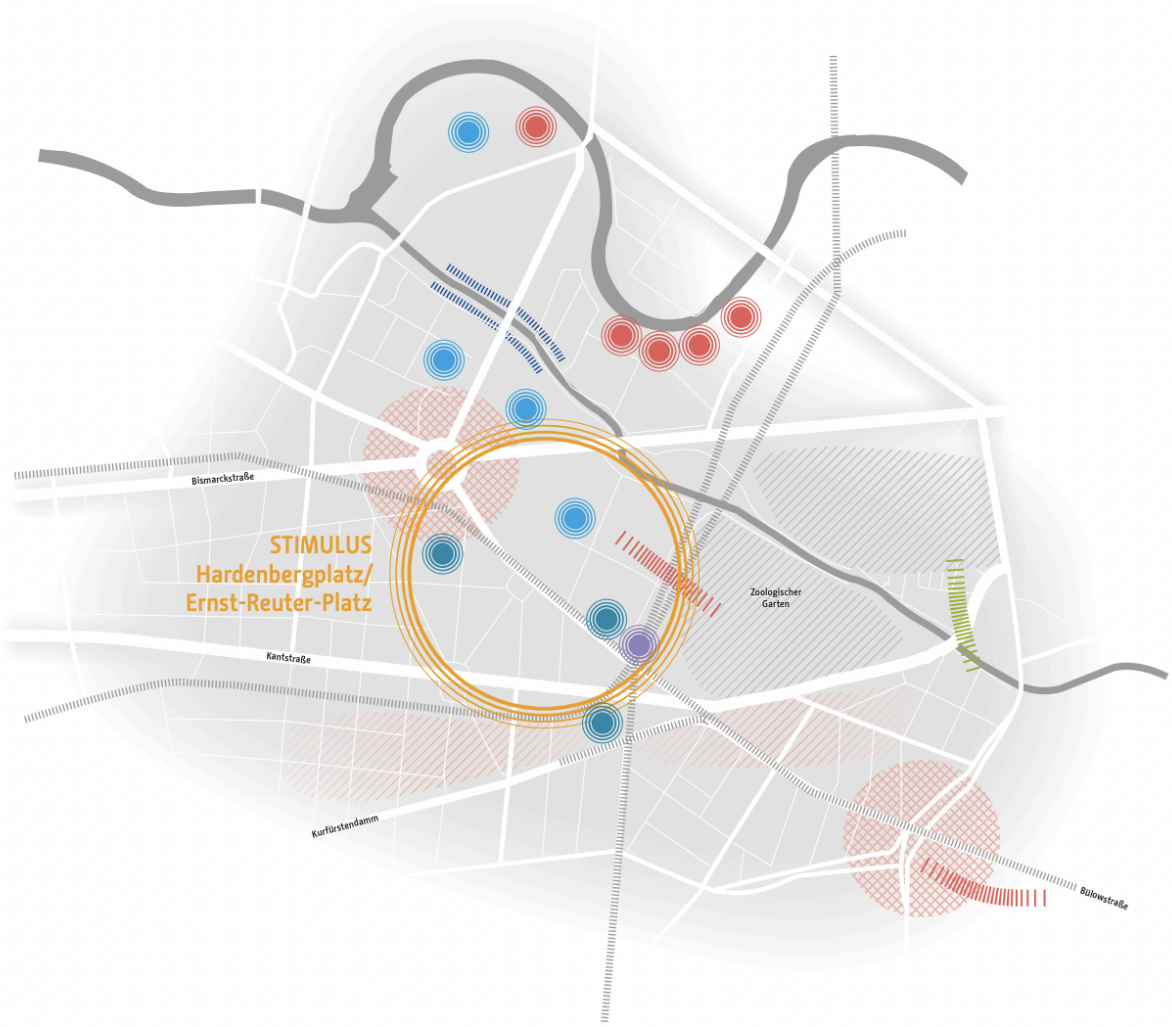


Figure 5: "Stimulus" of West Berlin, chosen as the West Berlin site – Hardenbergplatz / Ernst-Reuter-Platz. Source: Senate Department for Urban Development and the Environment, 2023.

Site in East Berlin – Town Hall Forum

Town Hall Forum is one of three "stimuli" of Mitte, current central area of the city. The site was chosen as it used to be the city centre of East Berlin. The other two "stimuli", Friedrichstadt and Central Station / Europacity belonged to West Berlin only have gained in their importance after the unification due to their previous location directly next to the country border. Town Hall Forum is located around new (Rotes Rathaus) and old (Altes Stadthaus) Berlin town halls, which goes in line with findings of Zhou et al. (2020), who argue that city centres almost invariably emerge around former or current town halls.

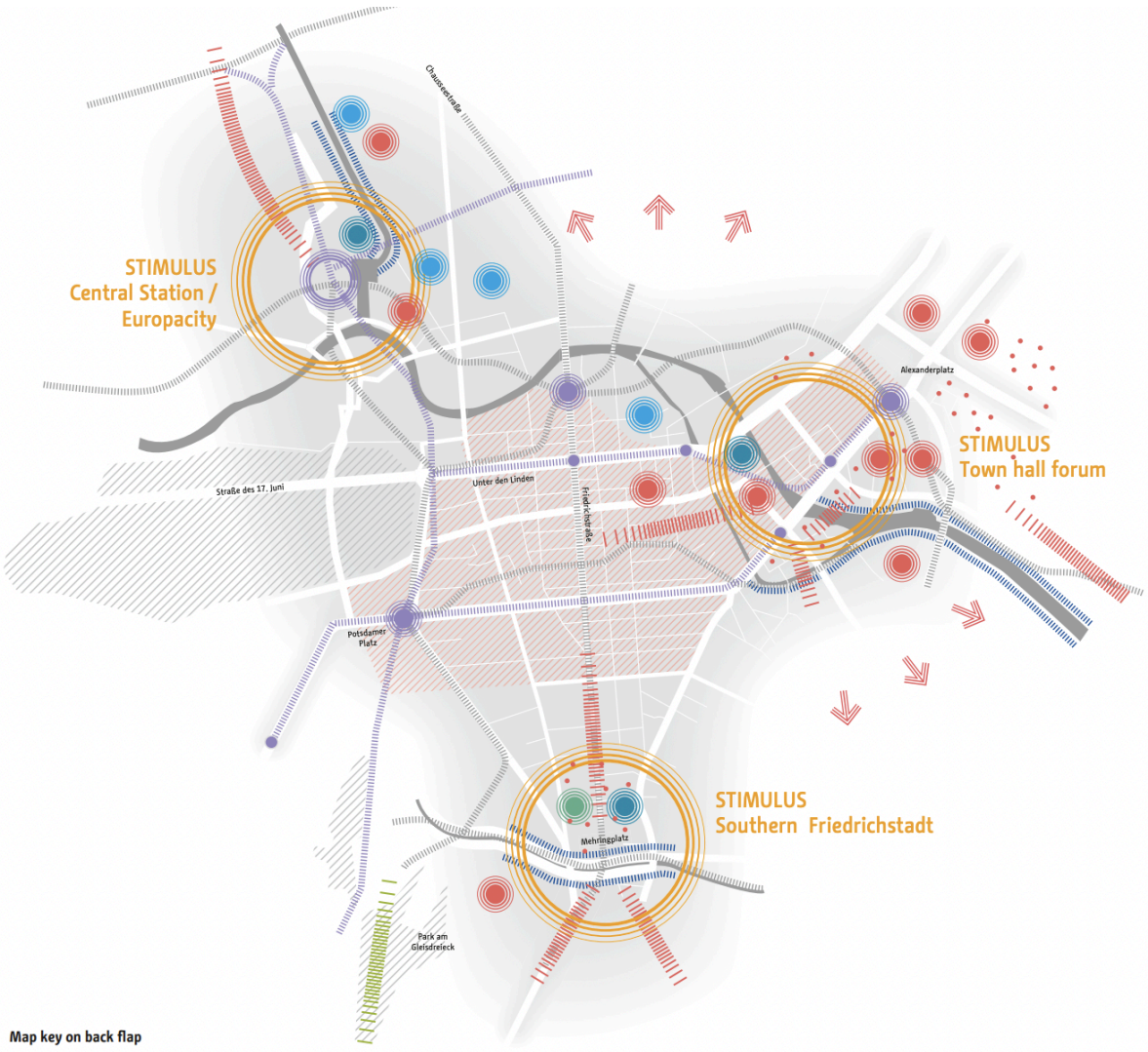


Figure 6: "Stimuli" of Berlin Mitte, including the East Berlin site – Town Hall Forum. Source: Senate Department for Urban Development and the Environment, 2023.

3.2. Data Collection Instrument

Surveys

The first method of analysis of mobility situation was conducting short surveys in the chosen six streets of West and East Berlin. The survey is a mix of quantitative and qualitative method. It consists of four types of questions:

- Ordinal scale questions: participants are asked to rate how sufficient they find a particular aspect of the mobility situation,
- Nominal scale questions: participants are asked to provide time it takes them to traverse certain distances,
- Multiple choice question: participants are asked to mark which mode of transport they want to see improved,

- Open questions: participants are asked to elaborate on their opinion of certain mobility aspects.

The first method of data collection was conducting short surveys in the six selected streets in West and East Berlin. Participants were approached in *public spaces*: walking along the street or sitting in public plazas, and asked to fill out the survey either online, by scanning the QR-code with the survey, or in-person with the researcher, on paper. Whenever possible, in-person method was chosen to ensure sufficient sample size, as it was assumed not every person scanning the QR-code would fill out the survey. A minimum sample size of $n \geq 30$ was set out in accordance with the "rule of thumb" in statistics, ending in $n = 31$ for West Berlin and $n = 32$ for East Berlin. Participants were approached in an attempt to find a diverse range of ages. Three age groups were selected: 18-24, 25-64, and 65+. In each area, researchers attempted to find a distribution similar to the age group distribution in Berlin, which for citizens of age is 8.6% (18-24), 68.6% (25-64), 22.7% (65+).

The issue of language barrier was considered carefully as the researchers spoke German only at a basic level. To minimise its impact, the survey questions were translated into German by ChatGPT, and checked by the STONIE group supervisor, a native German speaker. However, in the end lack of advanced German skills proved not to be a barrier. Every person asked on the street spoke English at least on a basic level, so they could understand the purpose of the research, give consent and proceed to fill out the survey in German.

Street counting

As a complementary data collection method, street counting was used, as illustrated on Fig. 7. This entails counting how many users of different transport modes moving along the street, using Day T measurement. A line of clear sight perpendicular to the street is chosen. Then, the cross-section is observed for 10 minutes by the researcher and every vehicle or every person passing through the cross-section is counted.

To avoid bias stemming from one-time occurrences that could skew the results, the measurements were repeated 3 times for each location. Moreover, for each location measurements were taken during rush hour and during off-peak hours during the day. It was assumed that morning rush hour and afternoon rush hour were assumed to be interchangeable, as the same commuters leave and return home.

Morning rush hour = 7:00-9:00

Off-peak hours = 9:00-16:00

Afternoon rush hour = 16:00-18:00

For counting passengers in buses and trams, it was assumed that the number would be similar to the number of seats in the vehicle. One of the STONIE researchers, Klinkhamer, M., established these numbers before the data collection based on the models of trams and buses used in Berlin, equal to 71 and 40 seats respectively (Wikipedia, 2024a; Wikipedia, 2024b).

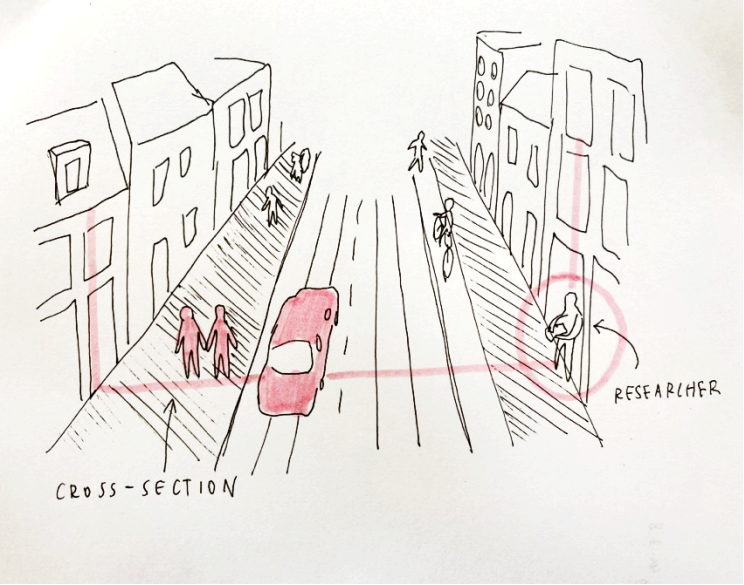


Figure 7: Street counting scheme illustration. Source: Author, 2024.

3.3. Data analysis

The survey was used to gain insight into the perception of mobility by Berliners in West and East. Ordinal scale questions were used to analyse the level of satisfaction. Nominal scale questions provided information about the travel times within the areas themselves. The multiple-choice question and related open questions provided an opportunity for the respondents to state which transport modes they would like to see improved for better mobility and how. As the sample sizes in the survey for both areas were above 30, with $n_{West} = 31$ and $n_{East} = 32$, a student two-sample T-test was performed using Excel to analyse whether the population are equal or differ significantly. In line with the research question, the following hypotheses were formulated:

H_0: There is no statistical significance between the results from West and East Berlin.

H_1: There is a statistical significance between the results from West and East Berlin.

Street count results were juxtaposed against the survey results to analyse how perceptions of the mobility situation translate into reality of day-to-day commutes in areas studied.

3.4. Research ethics

The primary data collection instrument, surveys, ensured full anonymity to the participants. There were not any questions in the survey that would reveal personal information about participants, such as their name, age or precise place of inhabitation. The participants were informed of their right to anonymity, and how the data would be used, after which they were able to express their informed consent to participation in the study.

The street counting was conducted without explicitly informing each person counted on the street, which is typical for non-participatory methods of research. However, there were not any details recorded that could enable identification of a person based on this research

method. Thus, lack of explicit consent was concluded to be not required as this research method ensures full anonymity to its participants.

In the end, no potential harm to the participants nor people related to the researched areas was found. This was ensured by full anonymity of participants in both survey methods. No potential conflict of interest arising from conducting or publishing the research was detected.

3.5. Case selection: streets

The only independent variable in the research that affects the results should be the location in either part of the city. Unrelated external factors should be made negligible, within the available timeframe and means of the research. Therefore, the idea for this study was to choose streets very similar in terms of size and street space allocation. Three pairs of "equivalent" streets were chosen before data collection (see Table 1, Fig 8 & Fig 9). The streets were chosen based on the aim to interview exclusively Berliners, who are more knowledgeable on daily commutes and the differences between various parts of the city than tourists. Thus, it was decided streets further away from the main "tourist" corridors would be suitable.

Table 2: Streets chosen in West and East Berlin areas. Source: Author, 2024.

Street in West Berlin (see Fig. 8)	Street in East Berlin (see Fig. 9)	
Schillerstraße	Klosterstraße	Two-lane street with on-street parking. Is connected to a U-Bahn station.
Carmerstraße	Dircksenstraße	One-lane street with on-street parking. Is connected to one or more plazas.
Hardenbergstraße	Spandauer Straße	Wide boulevard with (in some points) 6 lanes for car traffic.

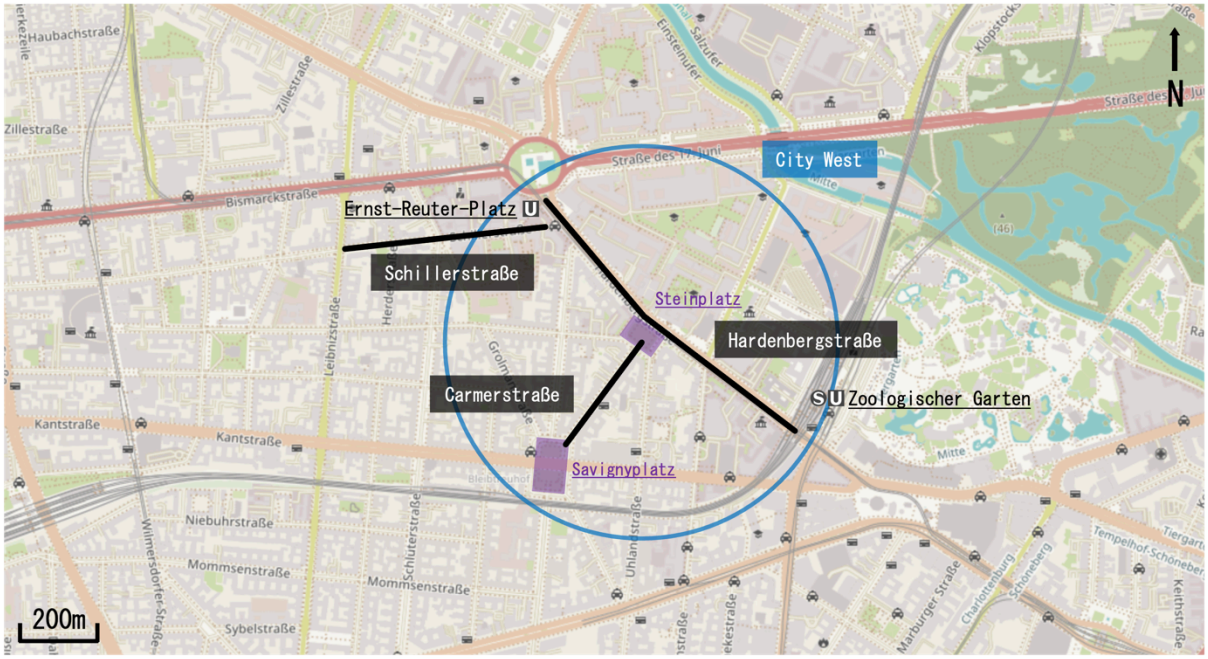


Figure 8: Streets chosen in the West Berlin area, along with the "stimulus" Hardenbergplatz/Ernst-Reuter-Platz. Source: Senate Department for Urban Development and the Environment, 2023.

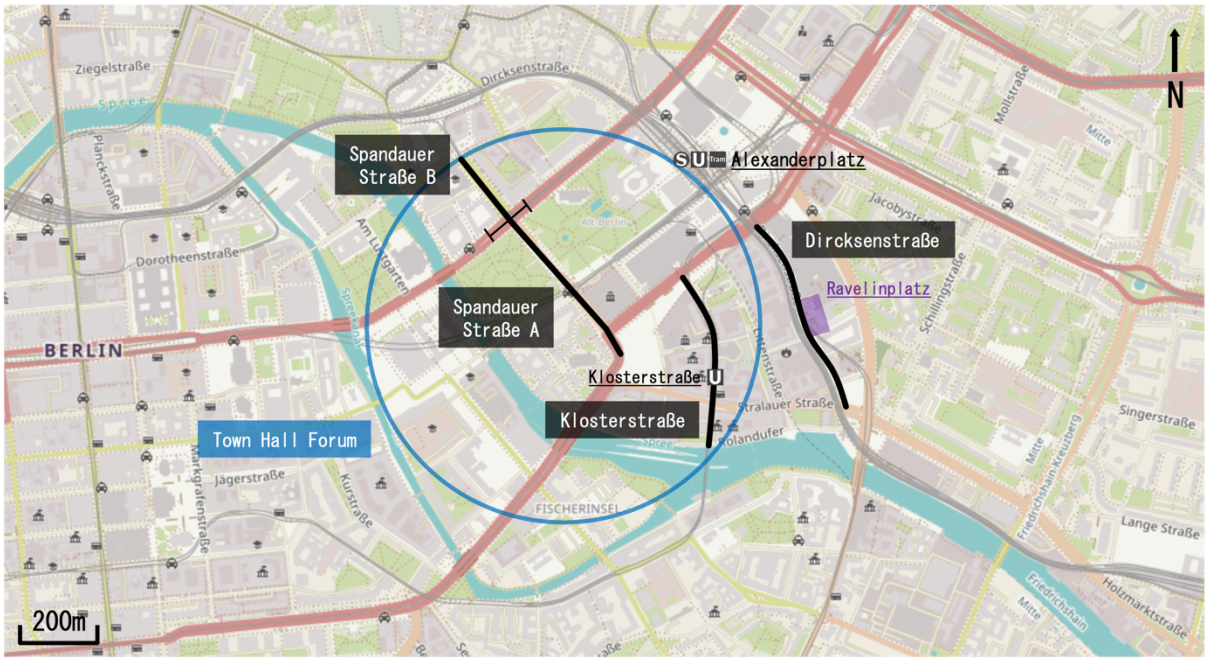


Figure 9: Streets chosen in the West Berlin area, along with the "stimulus" Town Hall Forum. Source: Senate Department for Urban Development and the Environment, 2023.

Schillerstraße (West) and Klosterstraße (East)

Schillerstraße (see Fig. 10) and Klosterstraße (see Fig. 11) are small streets not utilised by many people. Both have access to a small (with one line only) U-Bahn station. The streets had very few points of interest where people were staying, such as the U-Bahn stations or a theatre, outside of which not many people used the street.

Figure 10 (left): Schillerstraße. Source: Klinkhamer, 2024c.

Figure 11 (right): Klosterstraße. Source: Author, 2024.

Carmerstraße (West) and Dircksenstraße (East)

These streets were chosen as small streets without through-traffic. Both have many businesses in adjacent buildings, mostly restaurants and offices. In Carmerstraße these typically occupy the ground floor of residential buildings (see Fig. 12). On the other hand, along Dircksenstraße stands the shopping centre ALEXA Berlin (see Fig. 13), inside of which most shops and restaurants there are located. Both streets have adjacent plazas heavily utilised by citizens.

Figure 12: (left): Carmerstraße. Source: Klinkhamer, 2024a.

Figure 13 (right): Dircksenstraße. Source: Wikipedia Contributors.

Hardenbergstraße (West) and Spandauer Straße (East)

Spandauer Straße was decided to be divided into two parts due its dichotomy of character. The south-eastern part A (see Fig. 9 & Fig. 14), is car-dominated with six lanes of traffic, cycling path on the edge of the road, narrow pedestrian pavements and no trees. The north-western part B (see Fig. 9 & Fig. 15) had an entirely different character. There is a median with green tram tracks, that is surrounded by one lane of traffic in each direction, and then adjacent on-street parking. The north-western part has businesses located on the side of wide sidewalks, unlike the south-eastern part.

There was a dilemma whether to compare Hardenbergstraße to Spandauer Straße where they are similar (part A), or where they differ (part B). Hardenbergstraße is a wide boulevard, also with 6 lanes of traffic in each direction, surrounded mostly by offices (see Fig. 16). Ultimately, it was chosen to analyse both parts of Spandauer Straße. Whereas the aim was to find most alike streets for the case pairings, it was decided that the difference in the character may be indicative of the difference between West and East Berlin, and thus crucial for comprehensive comparison.

Figure 14 (left): Spandauer Straße, the south-eastern part. Source: Wollina, 2017.

Figure 15 (right): Spandauer Straße, the north-western part. Source: Klinkhamer, 2024d.

Figure 16: Hardenbergstraße. Source: Klinkhamer, 2024b.

4. Results

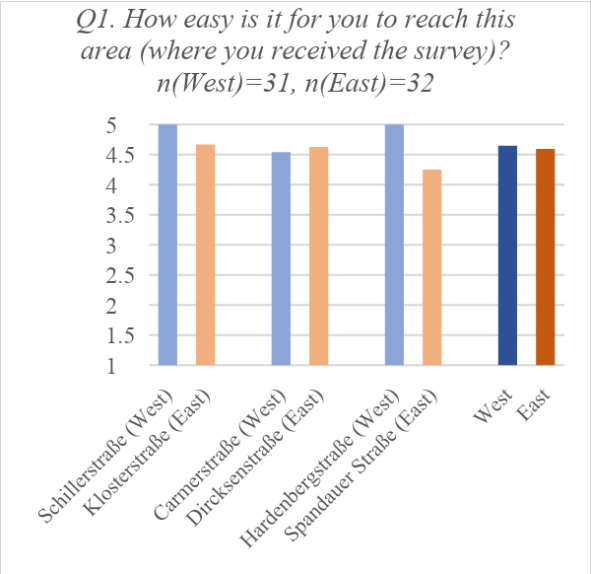
This section of the paper overviews the results from the Data Collection Instruments. The data from various questions is analysed and later interpreted to assess the mobility situation perception in West and East Berlin. The results from the survey were juxtaposed against each other and later, the statistical significance of the comparisons was calculated to establish if the difference was more than a matter of chance. Street counts are compared to survey to assess if the perception of the mobility situation matches the actual street use.

4.1. Survey results

Overall accessibility of the area

The measures of perception accessibility show varying results for areas selected in West and East Berlin (see Fig. 17 & 18). For all three street pairs, respondents have marked the street in the West to be easier to reach than the street in the East. In total, easiness of reaching the area in West was on average 4.65, whereas in East it was valued on average at 4.59. However, the difference was found not to be statistically significant according to the T-test, with $p_{two-t} = 0.36$. What is interesting is that on the other hand, the average satisfaction with the transport modes available to them was higher in East Berlin area. This may entail that the transport modes that are available in West Berlin are easier to reach than the modes in East Berlin, which is supported by the perception of Walkability extracted from the survey (see Fig. 19). However, the difference between the perception of the sufficiency of the number of transport modes was also found to be insignificant, with $p_{two-t} = 0.46$. Thus, it is not

possible to conclude with full confidence that citizens perceive East Berlin area to have more sufficient mode choices.



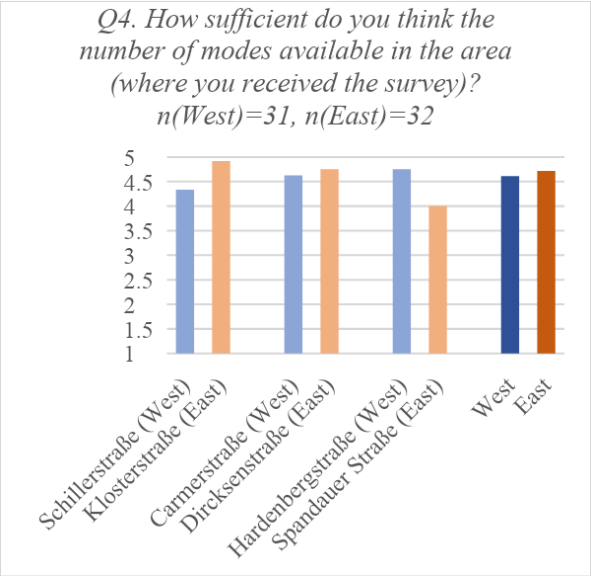


Figure 17 (left): Perception of overall accessibility of different streets in West and East Berlin areas. Source: Author, 2024.

Figure 18 (right): Perception of the adequateness of the number of transport modes available in West and East Berlin areas. Source: Author, 2024.

Easiness and pleasantness to reach the area via transport modes

The mobility situation in terms of easiness and pleasantness of use is perceived better in West than East Berlin area (see Fig. 19). The easiness of using specific transport modes is higher for West Berlin for all transport modes, except for the Bus, Tram and E-scooter. The variability of pleasantness between different transport modes more than the easiness. There are three major disparities between easiness and pleasantness within the studied areas

themselves, two of which occur within the East Berlin area. There is a huge disparity within Walking, which is valued 2.75 in terms of easiness and 4.1 in terms of pleasantness. The second one is taking the Bus, which is valued to be 4.22 in terms of easiness, but only 2.11 in terms of pleasantness. The third disparity occurred within West Berlin in terms of taking the Tram, which is valued at 2 in terms of easiness and 3.33 in terms of pleasantness. However, the nearest tram stop is located far away, 2.3 km away from the area (OpenStreetMap, 2024). It is possible that respondents assessed their feelings about taking the tram in general in Berlin, rather than when taking it specifically to reach the area where they received the survey.

For most transport modes, their easiness of use is perceived to be better than actual pleasantness of using such a transport mode. This implicates the success of Berlin mobility network in terms of its speed and reliability in general. However, many respondents in the open question complained about dirtiness (U-Bahn) and delays (S-Bahn) (see Appendix E) of specific various modes that significantly decreased how they valued the experience.

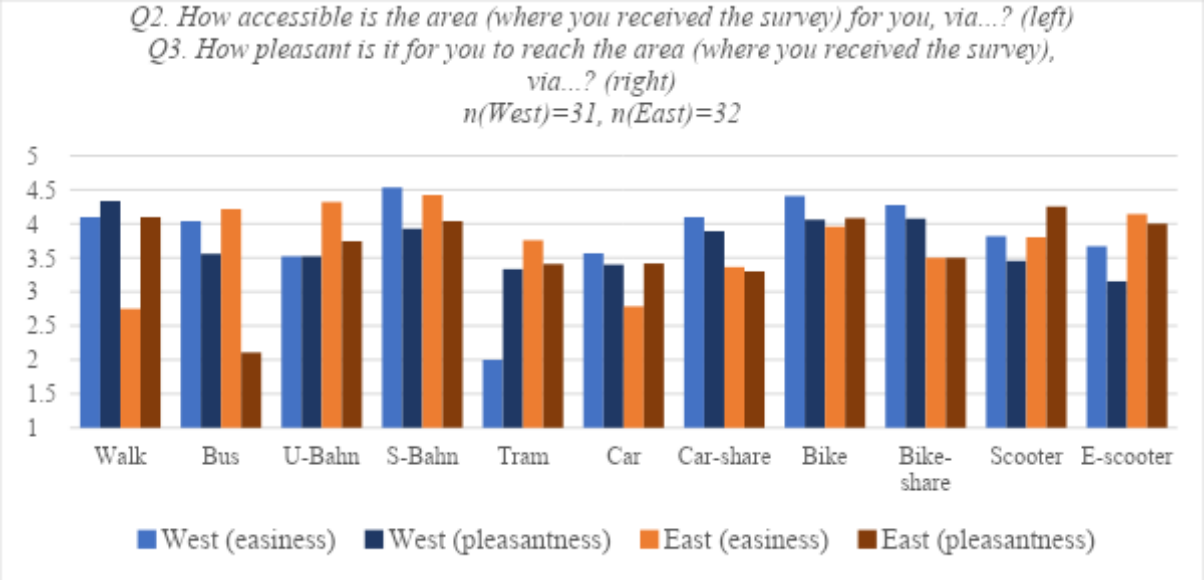


Figure 19: Perception of accessibility and pleasantness of using a specific transport mode in the areas selected in West and East Berlin. Source: Author, 2024.

Respondents were also asked to assess which transport modes they would like to see improved in the area (see Fig. 20), and later to suggest improvements (see Appendix E). The highest numbers of complaints were recorded for buses, U-Bahn and cycling. Respondents suggested U-Bahn should be made cleaner, safer, and more accessible. The most prevalent suggestions to improve buses were to improve frequency, connectivity and coverage. More complaints (by 133%) were recorded in West, which ties together with further findings that more buses traverse East Berlin (see Table 5) and that the transportation network (although for rail transit) has more coverage in East Berlin (see Fig. 23 & 24). For cycling, more complaints (by 50%) were recorded in East Berlin, but the difference is smaller than in terms of buses. This also ties together with the street count results, where the number of cyclists on the streets was similar with 310 and 336 for West and East.

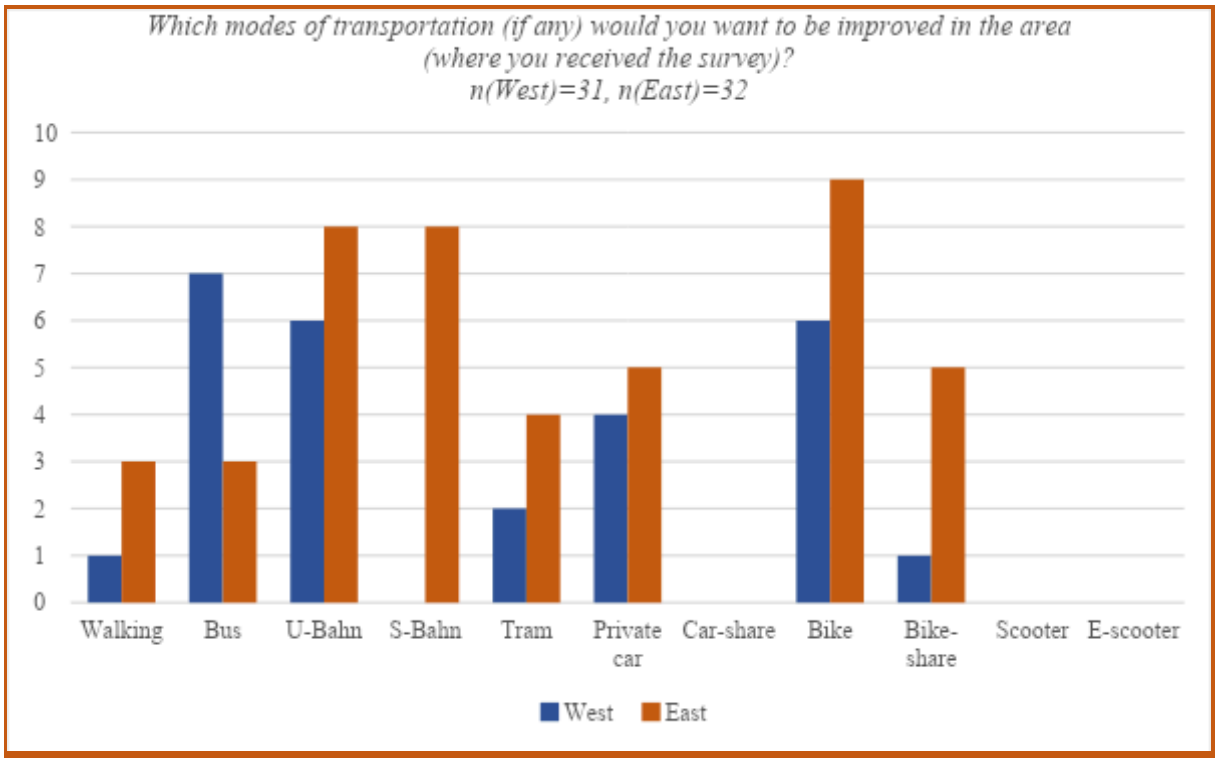


Figure 20: Number of respondents indicating a transport mode should be improved in the area. Source: Author, 2024.

Walkability

Respondents were asked to assess the walkability of the street where they received the survey and of the entire area. The averages for the entire areas were taken both from Q5, where an average response based on walkability of a street was taken, and from Q6, where the walkability for the entire areas were assessed directly by the respondents. The difference between the two averages is 0.04 for West Berlin and 0.03 for East Berlin, which is a very minor difference on a scale from 1 to 5. This suggests that the street chosen for the study may together form an accurate representation of the entirety of the areas chosen.

West Berlin was in all categories perceived to be substantially more walkable than East Berlin. The T-test proved the overall difference between the areas in terms of walkability to be significant both when respondents were asked about the street they visited (Q5 on Fig. 21) and when they were asked about the entire area (Q6 on Fig. 21).

Table 3: Results of T-tests for Q5 and Q6. Source: Author, 2024.

	P(T<=t) one-tail	P(T<=t) two-tail
Q5: Schillerstraße-Klostertraße	1.2653E-05	2.5307E-05
Q5: Carmerstraße-Dircksenstraße	0.08406399	0.16812797
Q5: Hardenbergstraße-Spandauer Straße	0.04649996	0.09299991
Q5: Average for the Area taken from the Streets	5.1323E-07	1.0265E-06
Q6: Average for the Area	6.6292E-07	1.3258E-06

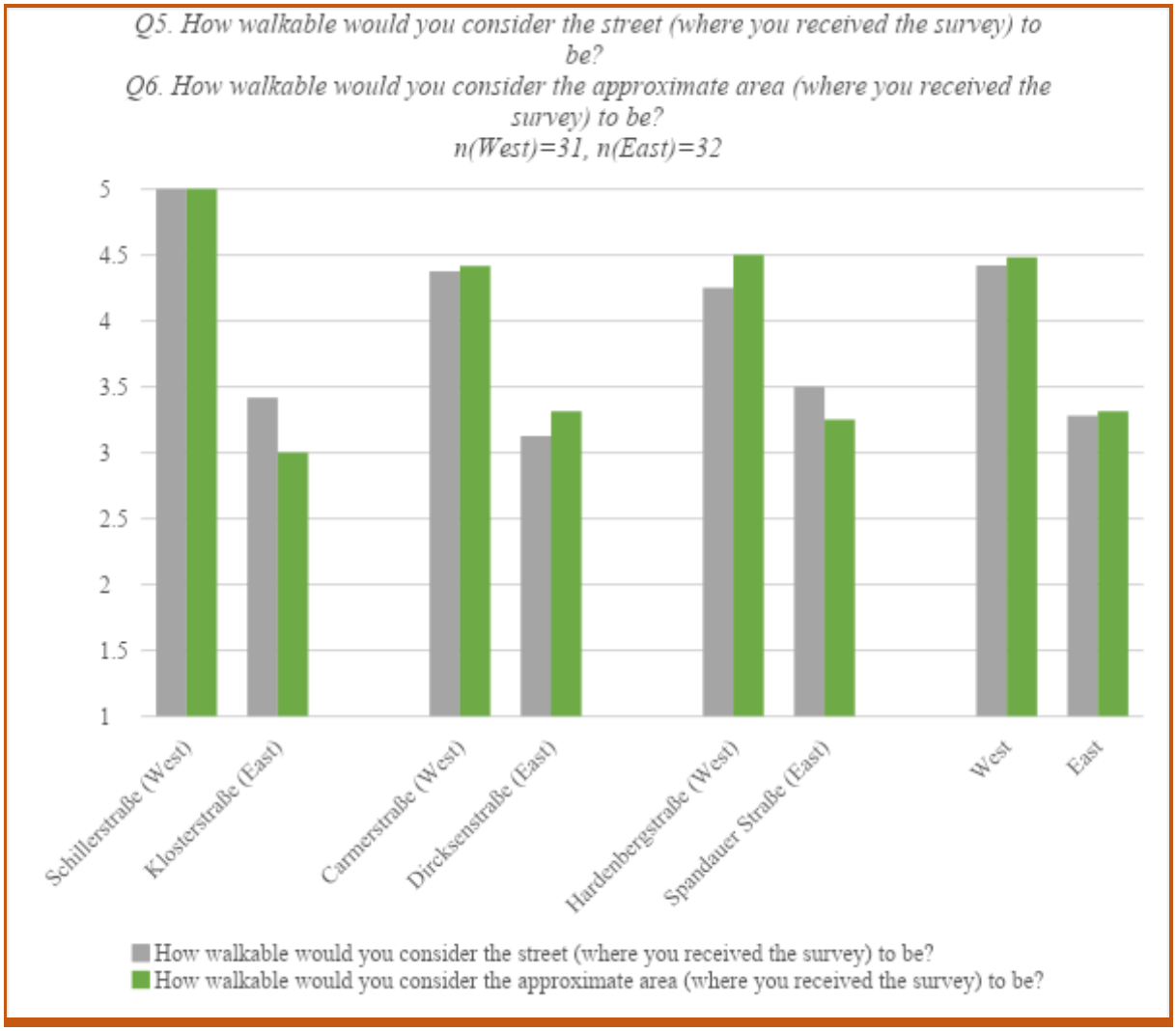


Figure 21: Perception of walkability of specific streets and studied areas. Source: Author, 2024.

Distances from the nearest transport nodes

The time taken to traverse from the nearest transport node to the respondent's destination varies heavily between West and East. It is similar for bike parking, which for both is between 2 and 3 minutes and is shown not to be statistically significant with $p_{two-t} = 0.75$. This may stem from the fact that many respondents said to leave their bikes directly in front of their destination. In this instance, the distribution of bike parking in urban spaces does not affect the first- or last-mile burden as the distance is minimised to almost non-existent. On the other hand, time to reach car parking and transport nodes is significantly higher for West than for East. Both differences are shown to be statistically significant, with $p_{two-t} = 2.94^{-4}$ for car parking and $p_{two-t} = 1.14^{-3}$ for transit nodes. Dissonance between first- and last-mile travel time for public transport may stem from the difference in the shape of the transport network in the areas chosen in West and East. In the West Berlin area, the rail transit stations

are located at the border of the area but not within (see Fig. 22). In the East Berlin area, there are rail transport nodes both at the border of the area and within (see Fig. 23), facilitating shorter distances required to reach public transit. Surprisingly, some respondents on Schillerstraße estimated their last-mile journey to last 30 minutes, which suggests they do not use the nearest rail transit stop, but for example walk to the nearest S-Bahn instead of a U-Bahn station. This may be the case for some respondents in the East too, but a higher concentration of diverse transport choices may minimise the effect.

Interestingly, major dissonance between time needed to reach the nearest utilised transit node between West and East (see Fig. 21) do not affect the perceived easiness of reaching the area, as shown in 17. Ha et al. (2023) argue that street-level walkability can heavily influence the willingness to walk longer distances to access a certain transport mode. This is supported by the assessed walkability of the studied areas, where West was assessed to be significantly more walkable within every category, as shown in Fig. 21.

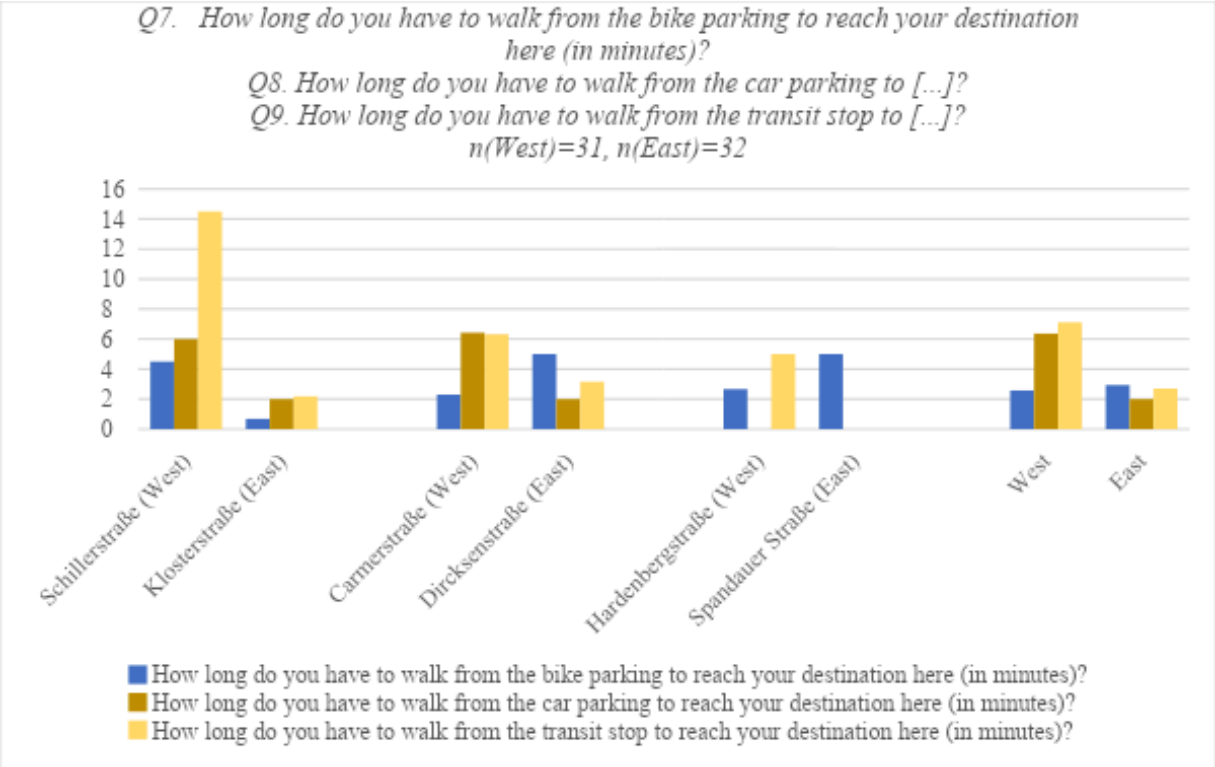


Figure 22: Time required to reach the destination from transportation nodes for different streets in West and East Berlin areas. Source: Author, 2024.

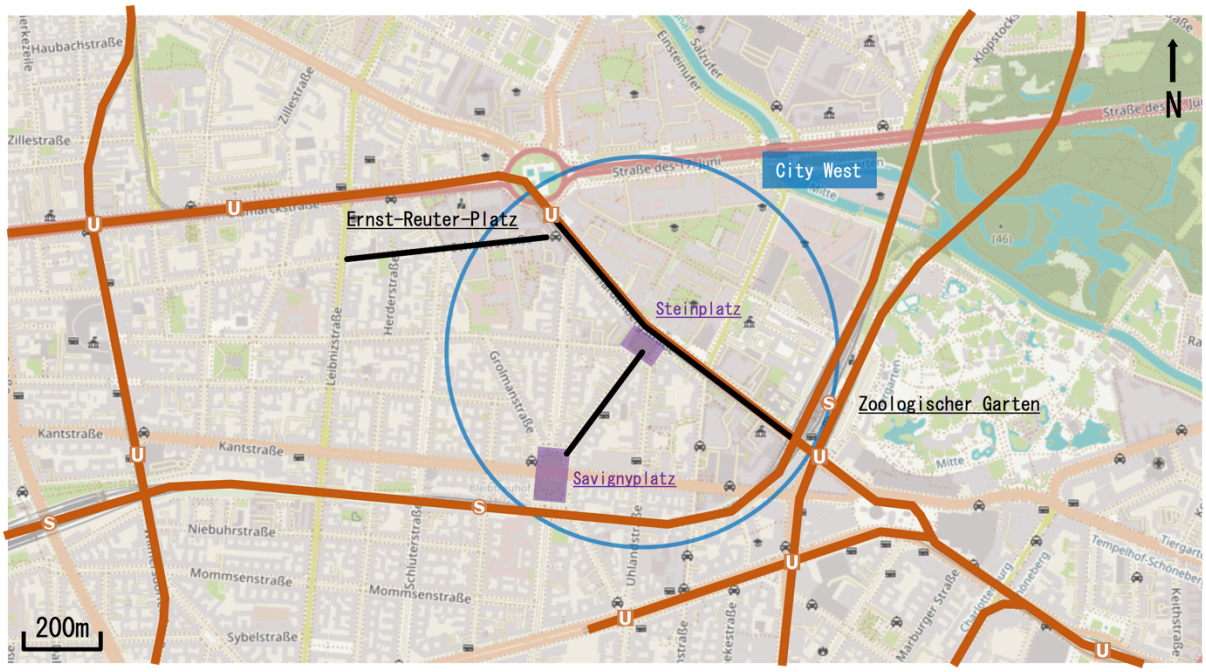


Figure 23: Rail transit in area in West Berlin (thick line: U-Bahn & S-Bahn). Source: Author, 2024, based on OpenStreetMap, 2024.

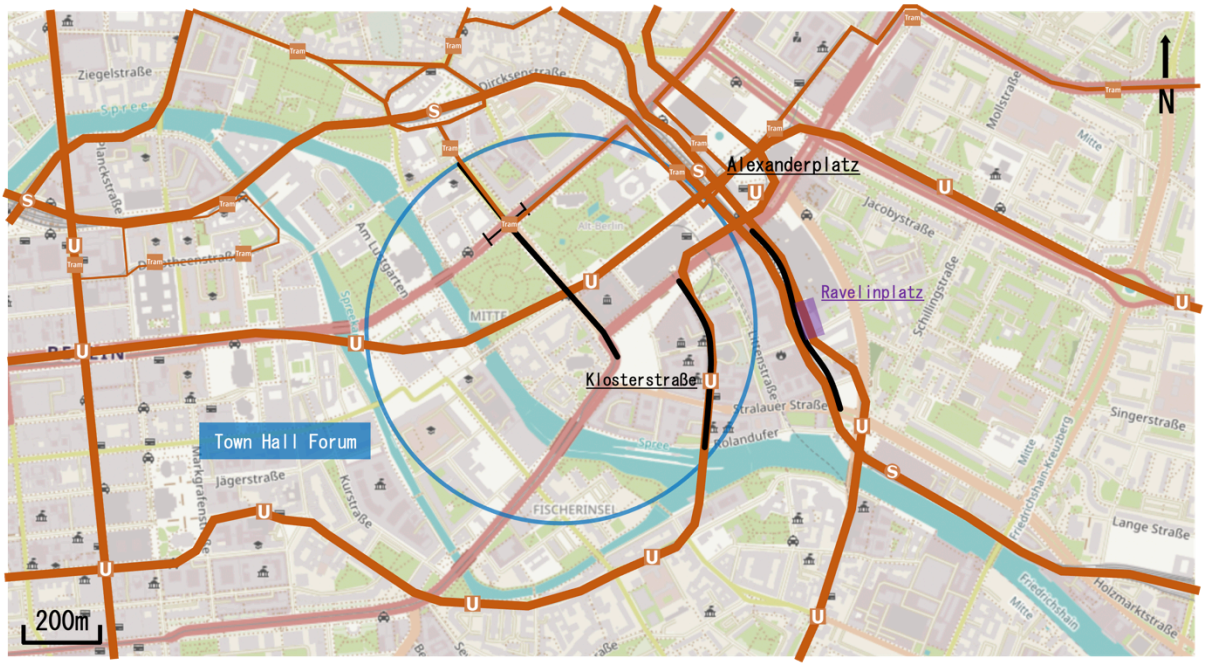


Figure 24: Rail transit in area in East Berlin (thick line: U-Bahn & S-Bahn, thin: tram). Source: Author, 2024, based on OpenStreetMap, 2024.

4.2. Street count results

The results of street counts reveal a major distinction between the use of streets in West and East Berlin. For each street pair, the percentage of total sustainable modes is considerably higher for East Berlin (see Table 4 & Fig. 25). The most notable difference was observed in Hardenbergstraße-Spandauer Straße pair. The share of sustainable transport modes was 50.8% higher in part A and 92.9% higher in part B of Spandauer Straße (East Berlin), on average 74.8% higher than in Hardenbergstraße (West Berlin). On average, the share of sustainable mobility within West Berlin was recorded to be 48.9% and 81.9% in East Berlin, meaning that the share is 68% higher for East Berlin (see Table 5).

Table 4: Comparison of street counts, by transport mode, in each West and East Berlin pair. Source: Author, 2024.

Street	Cars	Cyclists	Pedestrians	Bus	Tram	E-Scooter	Scooters	Motors	Total	% Sust. Mobility
Total Carmerstraße (West)	88	36	88	0	0	0	1	0	213	58.22%
Total Dircksenstraße (East)	52	31	374	0	1160	0	1	4	1622	96.49%

Street	Cars	Cyclists	Pedestrians	Bus	Tram	E-Scooter	Scooters	Motors	Total	% Sust. Mobility
Total Schillerstraße (West)	107	115	224	0	0	1	2	2	451	75.39%
Total Klosterstraße (East)	7	21	209	0	0	0	0	2	239	96.23%

Street	Cars	Cyclists	Pedestrians	Bus	Tram	E-Scooter	Scooters	Motors	Total	% Sust. Mobility
Total Hardenbergstraße (West)	1368	159	281	640	0	1	24	23	2496	43.31%
Total Spandauer Straße (East)	1019	284	470	940	1599	9	10	30	4361	75.72%
Total Spandauer Straße A (East)	625	146	176	900	0	1	7	18	1873	65.30%
Total Spandauer Straße B (East)	394	138	294	40	1599	8	3	12	2488	83.56%

Table 5: Comparison of street counts, by transport modes, in West and East Berlin. Source: Author, 2024.

Areas	Cars	Cyclists	Pedestrians	Bus	Tram	E-Scooter	Scooters	Motors	Total	% Sust. Mobility
Total West-Berlin	1563	310	593	640	0	2	27	25	3160	48.89%
Total East-Berlin	1078	336	1053	940	2759	9	11	36	6222	81.92%
Total Berlin	2641	646	1646	1580	2759	11	38	61	9382	70.80%

The major factor contributing to higher non-sustainable transport share in West Berlin is the number of cars that were counted. In West Berlin, they constituted 49.5% of all street users, whereas in East Berlin they constituted only 17.3% of all street users. Interestingly, in the survey 18 out of 31 citizens in West Berlin claimed using a car to commute, whereas 15 out of 32 citizens in East Berlin claimed doing so. However, the survey did not make a distinction between regular and infrequent usage of certain transport modes. Hence, that does not imply that a similar number of people use cars in both areas on a *regular* basis, which are the conditions studied in the street count.

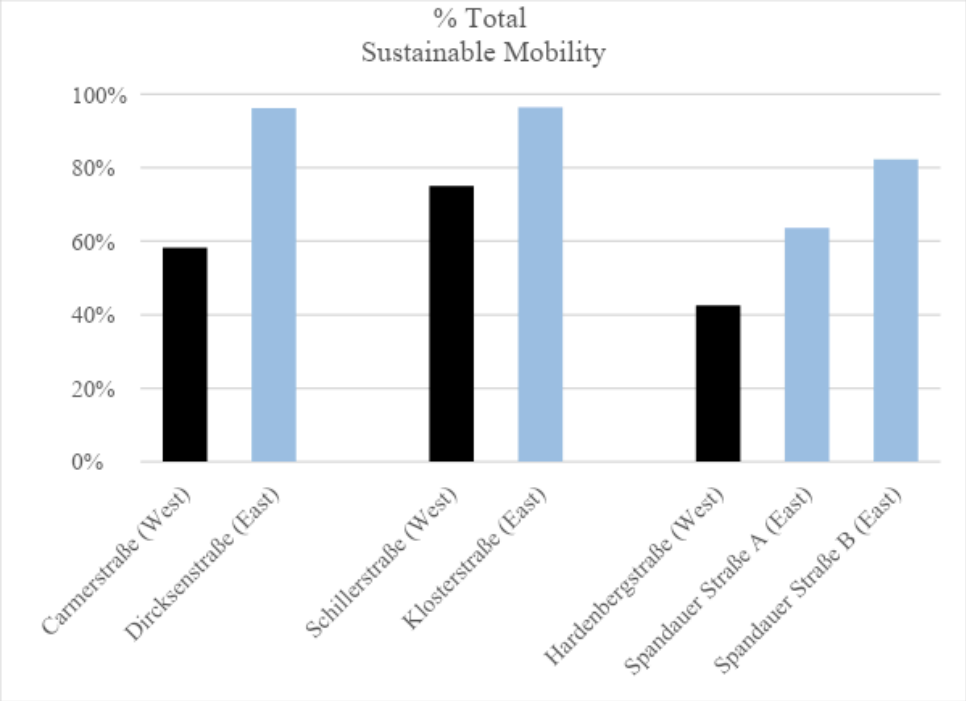


Figure 25: Comparison of the share of sustainable mobility in West and East Berlin areas. Source: Author, 2024.

5. Discussion

The results of the survey and street count show some relevant patterns, for example higher perceived walkability in all streets in West Berlin or more sustainable modal split in all streets of East Berlin. However, the sample sizes for the survey are very low due to the restricted timeframe of the STONIE project. A minimum of $n \geq 30$ for each area was set in accordance with statistics principles, which was successful as the final sample sizes were $n_{West} = 31$ and $n_{East} = 32$. On the other hand, separate streets had much smaller sample sizes, for example $n_{Schillerstraße} = 3$. Moreover, not every respondent was able to formulate opinion on each topic, for example many respondents were unable to assess easiness of access to the area with cars or scooters. Thus, much larger sample sizes would create more confidence in sample's representativeness of the population and would enable better analysis of the answers.

The case selection process the characteristics of the demographics of the people encountered in the selected areas were not considered. Wealth can be a major factor. Ha et al. (2023) highlight that the low-income areas are more affected by the last-mile burden, as low-income groups are more likely to use public transit in general. More affluent people may choose to use a car even in very walkable areas, hence decreasing the impact of the "last-mile burden" in neighbourhoods with higher socioeconomic status. This trend was observed in this study as well – West Berlin was perceived as more walkable, but more respondents claimed using a car to reach the area, suggesting a wealthier population inhabited the area.

Another factor that could have improved the validity of the results is precision of the survey questions. The word "walkable" was translated in German into *"begehbar"*, which means "possible to walk through", whereas the word "walkable" has a different connotation in the English academic literature. While some definitions define *walkability* only as *"how friendly an area is to move on foot"* (Bharucha, 2017, as cited in Barrera-Fernández and Hernández-Escampa, 2020, p. 249), the other ones are usually more extensive, such as *"when the built environment provides comfort and safety for pedestrians, connections to varied destinations are within a reason-able amount of time and effort, and the paths offer visual interest"* (Southworth, 2005, as cited in Barrera-Fernández and Hernández-Escampa, 2020, p. 249). Moreover, N/A (not applicable) category could have been defined better. Nearest tram stops are located very far away from the West Berlin area, and respondents marked either "1" or "N/A" in the area. It is possible they interpreted the same opinion (lack of tram in the area) and matched it to two different answers.

6. Conclusion

This research stemmed from the analysis of the transportation network of Berlin and the question whether development of city areas under historical division has an impact on current mobility situation. The data gathered pertained to the current perception of the mobility situation in areas chosen to represent former West and East Berlin and assessment of the street use within them. The results show that on average, the mobility perception in West and East is not significantly different. The details in the data vary more. For example, the area chosen in East Berlin has a much denser network of various rail transit corridors, which should boost the perception of the situation in its favour. On the other hand, the area in West Berlin has been shown to have a substantially higher walkability perception, which reduces the last-mile burden, ultimately leading to a better spatial and social mobility of people using the area. Ultimately, the overall accessibility of the areas chosen in the study was shown not to be significantly different. Some differences shown in the study might have stemmed from divided development of the city in for 40 years, such as no usage of trams in the West or increased car use in the East. On average neither of the city's halves can be assessed to serve its users better than the other, even though there are substantial differences in the built environment and mobility choices within the areas. On the other hand, West Berlin has shown to score significantly lower in terms of sustainable mobility, which is shown slightly in the survey and heavily in the street counts. This puts into question how successfully Berlin can in the future implement its goals to become a sustainable and inclusive city as a whole, as with substantially different modal splits and preferences different strategies may need to be applied to make it equal for everyone as a *just*, *green* and *productive* city representative of European sustainability goals.

There are many recommendations for further research stemming from this study. Due to a limited timeframe of the research project, only one area per city's half, the former city centre, was chosen as representative. Future studies could include more neighbourhoods of more varied characters to study how the division affected the mobility within the entire city. Street counts were used as complementary to the survey, more objective assessment of the mobility situation. Other research methods such as using Geographic Information Systems to calculate the Walkability Index, as reviewed by Shashank & Schuurman (2019), or studying the commuting patterns of people travelling in and out of the area, could be used as an aid in understanding the mobility patterns in West and East Berlin.

References

Literature

Adolfsson, P., Lindblad, J. and Peacock, S. (2021). Translations of sustainability in urban planning documents — A longitudinal study of comprehensive plans in three European cities. *Cities*, 119. doi:https://doi.org/10.1016/j.cities.2021.103360.

Barrera-Fernández, D. and Hernández-Escampa, M. (2020). Mobility in urban events: walkability and accessibility in the Guelaguetza. *Annals of Leisure Research*, 25(2), pp.1–26. doi:https://doi.org/10.1080/11745398.2020.1800497.

Bertolini, L. (2020). From 'streets for traffic' to 'streets for people': can street experiments transform urban mobility?. *Transport Reviews*, 40(6), pp.1–20. doi:https://doi.org/10.1080/01441647.2020.1761907.

Bharucha, J. (2017). An investigation into the walkability problem in Indian cities. *Safer Communities*, 16(2), pp.77–86. doi:https://doi.org/10.1108/sc-02-2017-0010.

Borck, R. and Wrede, M. (2018). Spatial and social mobility. *Journal of Regional Science*, 58(4), pp.688–704. doi:https://doi.org/10.1111/jors.12382.

CES (2020). *The End of WWII and the Division of Europe | CES at UNC*. [online] Unc.edu. Available at: https://europe.unc.edu/the-end-of-wwii-and-the-division-of-europe/#:~:text=A%20Divided%20Germany.

Cresswell, T. (2020). Valuing mobility in a post COVID-19 world. *Mobilities*, 16(1), pp.1–15. doi:https://doi.org/10.1080/17450101.2020.1863550.

Elliott, A. and Urry, J. (2010). *Mobile Lives*. Routledge.

European Commission (2020). *THE NEW LEIPZIG CHARTER The transformative power of cities for the common good*. [online] Available at: https://ec.europa.eu/regional_policy/sources/brochure/new_leipzig_charter/new_leipzig_charter_en.pdf.

Fabian, T. (2000). The Evolution of The Berlin Urban Railway Network. *The Evolution of The Berlin Urban Railway Network*, 25, pp.18–24.

Fortunati, L. and Taipale, S. (2017). A different glimpse into mobilities: On the interrelations between daily spatial mobility and social mobility. *The Information Society*, 33(5), pp.261–270. doi:https://doi.org/10.1080/01972243.2017.1354110.

Ha, J., Ki, D., Lee, S. and Ko, J. (2023). Mode choice and the first-/last-mile burden: The moderating effect of street-level walkability. *Transportation Research Part D: Transport and Environment*, [online] 116, p.103646. doi:https://doi.org/10.1016/j.trd.2023.103646.

Netzverb Deutsch (2023). *Definition 'begehbar' (walkable for pedestrians, more accessible) - Meaning, synonyms, preposition, case, translation, usage, grammar*. [online] Netzverb Dictionary. Available at: https://www.woerter.net/adjectives/begehbar.htm#google_vignette [Accessed 31 May 2024].

Nyamai, D.N. and Schramm, S. (2023). Accessibility, mobility, and spatial justice in Nairobi, Kenya. *Journal of Urban Affairs*, 45(3), pp.1–23. doi:https://doi.org/10.1080/07352166.2022.2071284.

Rahiman, R.V. and Naseer, M.A. (2022). Walkability to public transport: prioritization of parameters for walkability assessment in the urban areas of Kerala, India. *European Transport/Trasporti Europei*, (89), pp.1–15. doi:https://doi.org/10.48295/et.2022.89.3.

Rothengatter, W. (1994). Transport demand development in Germany after the unification. *Transportation Research Part A: Policy and Practice*, 28(6), pp.459–467. doi:https://doi.org/10.1016/0965-8564(94)90044-2.

Senate Department for Urban Development and the Environment (2023). *Berlin Strategy — Urban Development Concept Berlin 2030*. [online] Available at: https://use.metropolis.org/system/images/1935/original/BerlinStrategie_Broschuere_en.pdf.

Shashank, A. and Schuurman, N. (2019). Unpacking walkability indices and their inherent assumptions. *Health & Place*, 55, pp.145–154. doi:https://doi.org/10.1016/j.healthplace.2018.12.005.

Southworth, M. (2005). Designing the Walkable City. *Journal of Urban Planning and Development*, 131(4), pp.246–257. doi:https://doi.org/10.1061/(asce)0733-9488(2005)131:4(246).

Statista (2022). *Berlin: population by age group 2022*. [online] Statista. Available at: https://www.statista.com/statistics/519750/berlin-population-by-age-group/#:~:text=The%20largest%20age%20groups%20among [Accessed 7 Jun. 2024].

Stiftung Berliner Mauer (2021). *The Berlin Wall | Berlin Wall Foundation*. [online] www.stiftung-berliner-mauer.de. Available at: https://www.stiftung-berliner-mauer.de/en/topics/berlin-wall.

van der Steen, T. and Richards, G. (2019). Factors affecting resident support for a hallmark cultural event: the 2018 European Capital of Culture in Valletta, Malta. *Journal of Policy Research in Tourism, Leisure and Events*, pp.1–17. doi:https://doi.org/10.1080/19407963.2019.1696352.

Vetitnev, A.M. and Bobina, N. (2017). Residents' perceptions of the 2014 Sochi Olympic Games. *Leisure Studies*, 36(1), pp.108–118. doi:https://doi.org/10.1080/02614367.2015.1105857.

Wikipedia (2024a). *Flexity Berlin*. [online] Wikipedia. Available at: https://en.wikipedia.org/wiki/Flexity_Berlin [Accessed 14 Jun. 2024].

Wikipedia (2024b). *Mercedes-Benz Citaro*. [online] Wikipedia. Available at: https://en.wikipedia.org/wiki/Mercedes-Benz_Citaro [Accessed 14 Jun. 2024].

Wikipedia Contributors (n.d.). *Dircksenstraße*. [online] www.wikidata.org. Available at: https://www.wikidata.org/wiki/Q60560486 [Accessed 17 May 2024].

Wollina, M. (2017). *Mehr Ruhe für die Spandauer Straße?* [online] Bezirksverband Mitte. Available at: https://www.dielinke-berlin-mitte.de/politik/mittendrin/artikelseite/mehr-ruhe-fuer-die-spandauer-strasse/ [Accessed 16 May 2024].

Zenobi, L. (2021). Mobility and Urban Space in Early Modern Europe: An Introduction. *Journal of Early Modern History*, 25(1-2), pp.1–10. doi:https://doi.org/10.1163/15700658-bja10035.

Zhou, Q., Zhai, M. and Yu, W. (2020). Exploring point zero: a study of 20 Chinese cities. *Geo-spatial Information Science*, pp.1–15. doi:https://doi.org/10.1080/10095020.2020.1779011.

Figures and Images

Berlin Wall Map (2019). *Berlin Wall Map*. [online] The Berlin Wall: Map and history, with images and places such as Checkpoint Charlie. Available at: https://berlinwallmap.info/map/.

Klinkhamer, M. (2024a). *Carmerstraße* [photograph].

Klinkhamer, M. (2024b). *Hardenbergstraße* [photograph].

Klinkhamer, M. (2024c). *Schillerstraße* [photograph].

Klinkhamer, M. (2024d*). Spandauer Straße* [photograph].

Wikipedia Contributors (n.d.). *Dircksenstraße*. [online] www.wikidata.org. Available at: https://www.wikidata.org/wiki/Q60560486 [Accessed 17 May 2024].

Appendix A – Survey form

Berlin: "Streets For People" - What Do People Think?

"Straßen für Menschen" - Was denken die Menschen?

We are students from universities of Groningen, Stockholm and Milan. We are here in Berlin to compare the perception of mobility in West and East Berlin. As we want to get to know more than statistics, we want to ask YOU today how you feel about the way you travel in Berlin.

The survey takes about 5 minutes to fill out.

The survey is completely anonymous. The findings may be relevant in our Bachelor's thesis (final university project).

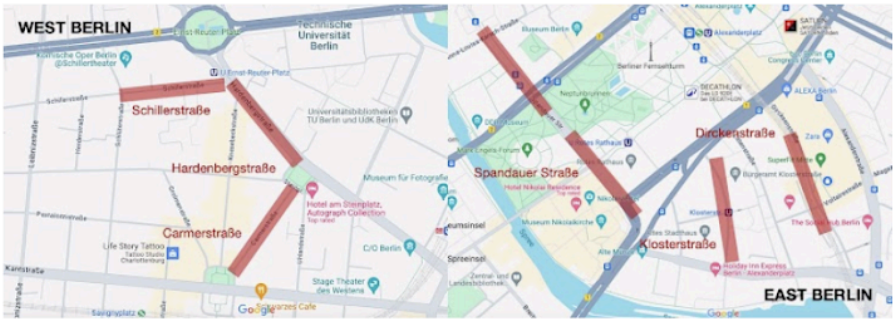
Wir sind Studierende von Universitäten in Groningen, Stockholm und Mailand. Wir sind hier in Berlin, um die Wahrnehmung der Mobilität in West- und Ost-Berlin zu vergleichen. Da wir mehr als nur Statistiken kennenlernen möchten, möchten wir heute von IHNEN erfahren, wie Sie sich über Ihre Reiseweise in Berlin fühlen.

Die Umfrage dauert etwa 5 Minuten.

Die Umfrage ist vollständig anonym. Die Ergebnisse können in unserer Bachelorarbeit (Abschlussprojekt an der Universität) relevant sein.

* Indicates required question

1. On which (or nearest) street were you handed the QR-code?
*Auf welcher (*oder am nächsten) *Straße wurde Ihnen der QR-Code übergeben?*



Mark only one oval.

- ◯ Schillerstraße (West)
- ◯ Carmerstraße (West)
- ◯ Hardenbergstraße (West)
- ◯ Klosterstraße (East)
- ◯ Dirckenstraße (East)
- ◯ Spandauer Straße (East)

2. How old are you?

Wie alt sind Sie?

Mark only one oval.

- ◯ 18-24
- ◯ 25-64
- ◯ 65+

3. How easy is it for you to reach this area (where you received the survey)?

Wie einfach ist es für Sie, diesen Bereich (wo Sie die Umfrage erhalten haben) zu erreichen?

Mark only one oval.

	1	2	3	4	5	
Diffi	◯	◯	◯	◯	◯	Very Easy

4. How accessible is the area (where you received the survey) for you, via...? *
Wie zugänglich ist der Bereich (wo Sie die Umfrage erhalten haben) für Sie, über...?

If don't know, or not applicable, put "N/A"

Mark only one oval per row.

	1	2	3	4	5	N/A
Walking	◯	◯	◯	◯	◯	◯
Bus	◯	◯	◯	◯	◯	◯
U-Bahn	◯	◯	◯	◯	◯	◯
S-Bahn	◯	◯	◯	◯	◯	◯
Tram	◯	◯	◯	◯	◯	◯
Private car	◯	◯	◯	◯	◯	◯
Car-share	◯	◯	◯	◯	◯	◯
Bike	◯	◯	◯	◯	◯	◯
Bike-share	◯	◯	◯	◯	◯	◯
Scooter	◯	◯	◯	◯	◯	◯
E-scooter	◯	◯	◯	◯	◯	◯

5. How pleasant is it for you to reach the area (where you received the survey), via...? *

Wie angenehm ist es für Sie, den Bereich (wo Sie die Umfrage erhalten haben), über... zu erreichen?

If don't know, or not applicable, put "N/A"

Mark only one oval per row.

	1	2	3	4	5	N/A
Walking	◯	◯	◯	◯	◯	◯
Bus	◯	◯	◯	◯	◯	◯
U-Bahn	◯	◯	◯	◯	◯	◯
S-Bahn	◯	◯	◯	◯	◯	◯
Tram	◯	◯	◯	◯	◯	◯
Private car	◯	◯	◯	◯	◯	◯
Car-share	◯	◯	◯	◯	◯	◯
Bike	◯	◯	◯	◯	◯	◯
Bike-share	◯	◯	◯	◯	◯	◯
Scooter	◯	◯	◯	◯	◯	◯
E-scooter	◯	◯	◯	◯	◯	◯

6. How sufficient do you think the number of modes available in the area (where you received the survey)?
Wie ausreichend halten Sie die Anzahl der verfügbaren Verkehrsmittel in der Umgebung (wo Sie die Umfrage erhalten haben)?

Mark only one oval.

	1	2	3	4	5	
Not	◯	◯	◯	◯	◯	Well connected

7. How walkable would you consider the street (where you received the survey) to be?
Wie begehbar würden Sie die Straße (wo Sie die Umfrage erhalten haben) einschätzen?

Mark only one oval.

	1	2	3	4	5	
Not	◯	◯	◯	◯	◯	Very walkable

8. How walkable would you consider the approximate area (where you received the survey) to be?
Wie begehbar würden Sie das ungefähre Gebiet (wo Sie die Umfrage erhalten haben) einschätzen?

Mark only one oval.

	1	2	3	4	5	
Not	◯	◯	◯	◯	◯	Very walkable

9. What street elements make a street walkable (enjoyable to walk) in your eyes?
Welche Straßenelemente machen Ihrer Meinung nach eine Straße begehbar?

10. Which modes of transportation (if any) would you want to be improved in the area (where you received the survey)?

    Welche Verkehrsmittel (falls vorhanden) möchten Sie im Bereich verbessert sehen?

    Check all that apply.

    - [ ] Walking
    - [ ] Bus
    - [ ] U-Bahn
    - [ ] S-Bahn
    - [ ] Tram
    - [ ] Private car
    - [ ] Car-share
    - [ ] Bike-share
    - [ ] Scooter
    - [ ] E-scooter

11. If you marked boxes in the last question, how would you want to see those modes to be improved?
    Wenn Sie in der letzten Frage Kästchen angekreuzt haben, wie würden Sie sich wünschen, dass diese Verkehrsmittel verbessert werden?

12. How long do you have to walk from the bike parking to reach your destination here (in minutes)?
    Wie lange müssen Sie vom Fahrradparkplatz bis zu Ihrem Ziel hier gehen (in Minuten)?

13. How long do you have to walk from the car parking to reach your destination here (in minutes)?
Wie lange dauert es, vom Parkplatz für Autos zu Ihrem Ziel zu laufen (in Minuten)?

14. How long do you have to walk from the transit stop to reach your destination here (in minutes)?
Wie lange dauert es, von der Haltestelle für den öffentlichen Nahverkehr zu Ihrem Ziel zu laufen (in Minuten)

15. Do you have any mobility impairments? (If comfortable please write below)
Haben Sie irgendwelche Mobilitätseinschränkungen? (Wenn Sie sich wohl fühlen, schreiben Sie bitte unten)

Mark only one oval.

- ◯ No
- ◯ Yes
- ◯ Other: _____

16. Thank you very much for answering our questions!
Is there anything else you would like to share on the topic of transport choices in Berlin?

Vielen Dank für die Beantwortung unserer Fragen!
Ist da noch etwas, das Sie zum Thema Verkehrsmittelwahl in Berlin teilen möchten?

Appendix B – Closed Questions Results

Nr	Question	Scale
Q1	How easy is it for you to reach this area (where you received the survey)?	1(difficult)-5(very easy)
Q2	How accessible is the area (where you received the survey) for you, via…?	1(not at all)-5(very)
Q3	How pleasant is it for you to reach the area (where you received the survey), via…?	1(not at all)-5(very)
Q4	How sufficient do you think the number of modes available in the area (where you received the survey)?	1(not very connected)-5(well connected)
Q5	How walkable would you consider the street (where you received the survey) to be?	1(not walkable at all)-5(very walkable)
Q6	How walkable would you consider the approximate area (where you received the survey) to be?	1(not walkable at all)-5(very walkable)
Q7	How long do you have to walk from the bike parking to reach your destination here (in minutes)?	nr of minutes
Q8	How long do you have to walk from the car parking to reach your destination here (in minutes)?	nr of minutes
Q9	How long do you have to walk from the transit stop to reach your destination here (in minutes)?	nr of minutes

Area	Street	Respondent	Q1	Q2										
				walk	bus	u-B	s-B	tram	car	car-s	bike	bike-s	sc	e-sc
WEST	Schillerstraße	SC1	5	4	4	1	4	1	4	4	4	4	4	4
		SC2	5	5	5	3	3		4	5	5			
		SC3	5	4	5	4	5							
	Carmerstraße	C1	5	5	5	5	5	5			5		5	5
		C2	5	5	5	1	5	1			5	5		1
		C3	4	3	4	3	5		1			5		5
		C4	5	4	5	3	5		3			5		5
		C5	5	5	5	4	5		4		5			
		C6	4	1	2		4		3					
		C7	5	1	4	4	4		5					
		C8	4	5	3	3	4							
		C9	4	2	3	2	5	2			3	3	2	2
		C10	5	5					3	5				
		C11	5	4	5	4	3							
		C12	3	5	5	3	5			4				
		C13	5	5			5		3	3				
		C14	5	5	5	4	5	1			5	5		
		C15	4	4	4	3	5				4	4	2	2
		C16	4	5	5	4	5							
		C17	5	5	5	5	5	1	5		5		5	5
		C18	5	5			5		5		4			
		C19	4	5		4	4	2	3	3	4	3	3	3
		C20	4	2	4	4	5				5			
		C21	5	5	3	4	5			5	4		5	5
		C22	5	5		4	5	1	2	3	5		3	5
		C23	5	4	2	4	5	2	5	5	4	4	4	
		C24	4	1	3	3	5	3	4	4	3	4	4	2
	Hardenbergstraße	H1	5	4	5	4	3	3					5	
		H2	5	5		5					5			
		H3	5	5	1	2	3		3			5		
		H4	5			5								

Area	Street	Respondent	Q3											Q4	Q5	Q6	Q7	Q8	Q9
			walk	bus	u-B	s-B	tram	car	car-s	bike	bike-s	sc	e-sc						
WEST	Schillerstraße	SC1	4	4	2	4	1	4	4	4	4	4	4	4	5	5	8	2	1
		SC2	5	3	3	5		3		5				5	5	5	1	10	12.5
		SC3	5	3	4	5								4	5	5			30
	Carmerstraße	C1	5	4	4	4				2	2	2		5	5	5	1		5
		C2	5	5	1	1				5	5		1	5	5	5	1		7.5
		C3	3	4	3	5		1			5		5	4	3	3	3		
		C4	4	5	3	5		3			5		5	5	4	4	3		
		C5	5	5	4	5		4		5				4	5	5	0	10	6
		C6	1	2		3		3						3	4	3		10	15
		C7	1	3	3	3		5						5	5	5		7.5	6.5
		C8	3	4	4	4								4	4	4			
		C9	4	4	2	4	4			4	3	2	2	5	4	3	3		1.5
		C10	5					5	5					5	5	5		3	
		C11	5	3	2	3								4	4	5			7
		C12	5	3	3	5			5					5	5	5		5	5
		C13	5			3		2	2					5	5	4		2	2
		C14	5	5	5	1				5	5		1	5	5	5			7.5
		C15	5	4	3	4	4			4	4	2	2	5	4	4	3		1.5
		C16	5	4	5	5								5	5	5	2.5	5	10
		C17	5	5	5	5		5		5	5	5	5	5	5	5	1	1	3
		C18	3			4				3				4	4	4	1		10
		C19	4	2	3	3	3	3	3	4	4	4	4	4	3	4	3	7.5	10
		C20	5	4	5	5				5				5	5	5	1		10
		C21	5	4	3	3			5			5	4	5	5	5		10	7
		C22	5		4	5		2	3	5		4	5	5	3	4	3	10	1
		C23	5	1	5	5	4	4	4	2	2	1	1	5	4	4	1	2.5	10
		C24	5	3	3	4	4	4	4	4	4	4	2	4	4	5	8	10	1
	ardenbergstraß	H1	5	4	4	4						5		5	5	5	1		5
		H2	3		5					3				5	3	4	0		5
		H3	5	1	2	3		3			5			4	4	4	7		
		H4			5									5	5	5			5

Area	Street	Respondent	Q1	Q2										
				walk	bus	u-B	s-B	tram	car	car-s	bike	bike-s	sc	e-sc
EAST	Klosterstraße	K1	5	5	4	5	5		3	4	5			
		K2	5	5	4	5	5		3	4	5			
		K3	5		5	5					3			
		K4	5		5	5					3			
		K5	5		5	5					5			
		K6	5		5	5					5			
		K7	5		5	5					3			
		K8	5		5	5					5			
		K9	4	5	5	5	5	5	1	1	2			
		K10	4	5	5	5	5	5	1	1	2			
		K11	4	2	1	5	4		2	4	2	3	3	3
		K12	4	2	3	5	4	4						
	Spandauer Straße	SP1	5	3	4	5	5	5						
		SP2	4	3	1	2	4	5	3	4		4		
		SP3	3	2	3	4	1	1	5	3	3		5	
		SP4	5	2	4	3	5			3			4	4
	Dircksenstraße	D1	5	2	5	5	5	3			4	4		
		D2	5	3	5	5	5	3			4			
		D3	5	3	5	5	5	3			5			
		D4	5	3	5	5	5	4						
		D5	5		5	5	5							
		D6	5	2	5	3	4	4	2		4			
		D7	5	2	5	3	4	4	2		4			
		D8	5	1	5	2	4	5	5		4			
		D9	5	1	5	2	4	5	1		4			
		D10	5	3	5	5	5	4			5			4
		D11	4	1	3	5	4	2	3		3		3	4
		D12	4	4	5	5	4	3	5		5			
		D13	4	3	4	5	4	2		4	5			5
		D14	4		4		5	3		5	5			5
		D15	4	3	3	4	4	4	3	4	4	3	4	4
		D16	4	1	2	1	5	5						

Area	Street	Respondent	Q3											Q4	Q5	Q6	Q7	Q8	Q9
			walk	bus	u-B	s-B	tram	car	car-s	bike	bike-s	sc	e-sc						
EAST	Klosterstraße	K1	5	4	4	4	5	4	4	5				5	5	4	1.5	2.5	3
		K2	5	4	4	4	5	4	4	5				5	5	4	0	0	3
		K3	5	1	5					3				5	3	2	0		0
		K4	5	1	5					3				5	3	2	0		0
		K5	5	1	5					5				5	3	2	0		0
		K6	5	1	5					5				5	3	2	0	3	
		K7	5	1	5					3				5	3	2	0	3	4
		K8	5	1	5					5				5	3	2	0	3	4
		K9	5	3	4	4	3	2	2					5	3	5	5	2.5	4
		K10	5	3	4	4	3	2	2					5	3	5	0		3
		K11	3	2	3	4				4	4			4	4	3	1		3
		K12	3	1	3	4	1							5	3	3		0	0
	pandauer Straß	SP1	4	4	4	4	4							5	5	4			
		SP2	1	1	3	3			5					3	3	2			
		SP3	4	4	1	4	4	5	3	3		5		4	3	4	5		
		SP4	4	2	2	3	4			3		3	3	4	3	3			
	Dircksenstraße	D1	4	2	5	5	3							5	1	3	10	0	3
		D2	4	2	5	5	3							5	2	4	20	0	3
		D3	4		5	5	3			5				5	2	4		3	3
		D4			5	5	4			4				5	3	4			3
		D5			5	5				4				5	3	4			3
		D6	5	2	2	4	3	4	3	5		5		5	4	4	1	2	2
		D7	5	2	2	4	3	4	3	5		5		5	4	4	1	2	5
		D8	5	1	1	2	4	2		5				5	3	2	3	2	3
		D9	5	1	2	4	4	5		5				5	3	2	1	2	5
		D10	5	5	4	5	4			5			4	5	4	5		2	5
		D11	1	1	5	3	1	3		1		4	4	4	3	2	1	3	4
		D12	2	2	5	4		3		1		4	4	4	3	2	1	3	1
		D13	4	3	3	3	1		4	5		4	4	5	4	3	5	3	1
		D14	4			4	4			5			5	5	4	4	10		
		D15	4	3	4	4	4	3	3	4	3	4	4	5	5	5	2		
		D16	2	1	1	5	5							3	2	1			

Appendix C – Walkability Question Results

What street elements make a street walkable (enjoyable to walk) in your eyes?

	H (W)	SC (W)	C (W)	SP (E)	K (E)	D (E)		total (E)	total (E)	total Berlin
Green areas	2		2		1			4	1	5
Trees	1		7	1	9	5		8	15	23
Shade		1			1			1	1	2
Benches			1		2			1	2	3
Good planning						1		0	1	1
Space		1	1	1				2	1	3
Wide sidewalks	1	1	9	1	9	7		11	17	28
Distinct sidewalks			1					1	0	1
Comfortable sidewalks		1	2	1				3	1	4
Accessible curbs			1					1	0	1
Safe			2					2	0	2
Buildings			1		1			1	1	2
No construction						5		0	5	5
No homeless people			1			5		1	5	6
No/less cars	1	1	6	1	6	6		8	13	21
Not many taxis	1							1	0	1
Clear paths					1			0	1	1
No crossings/crosswalks				1		5		0	6	6
Less traffic lights				1				0	1	1
More traffic lights					1			0	1	1
Little space for cars						1		0	1	1
Separation from cars			1					1	0	1
Efficient signaling					1	1		0	2	2
Destinations						5		0	5	5
Shops		1	6		1	1		7	2	9
Restaurants & cafés		2	2		2			4	2	6
People		1	2			7		3	7	10

Not too crowded			3					3	0	3
Bike lanes	1		1		1	1		2	2	4
LED lights						1		0	1	1
Food stands						1		0	1	1
Diversity						1		0	1	1
Cleanliness		1	5			1		6	1	7
No garbage						2		0	2	2
Plants		1	3	2	5	2		4	9	13
Colours						1		0	1	1
Playground for adults						1		0	1	1
Water						2		0	2	2
Quietness			6		1			6	1	7
Flat			1					1	0	1
No stairs			1					1	0	1
Theatre	1				1			1	1	2
Music	1				5			1	5	6
Good lighting	1	1	3		1			5	1	6
Nice views	1							1	0	1
Young people			1					1	0	1
Connectivity			1					1	0	1

Appendix D – "Which modes of Transportation should be improved" Question Results

Which modes of transportation (if any) would you want to be improved in the area (where you received the survey)?

Transport mode	West	East
Walking	1	3
Bus	7	3
U-Bahn	6	8
S-Bahn		8
Tram	2	4
Private car	4	5
Car-share		
Bike	6	9
Bike-share	1	5
Scooter		
E-scooter		

Appendix E – "How to improve given Modes of Transportation" Question Results

If you marked boxes in the last question, how would you want to see those modes to be improved?

Transport mode	Improvement	West	East	Total
Walking	Better sidewalks	1	1	2
	Less cars		1	1
S-Bahn	Make cleaner		3	3
	Should be free	1		1
	Better ventilation		3	3
	Less homeless		1	1
	More lifts		2	2
	More frequent trains		2	2
U-Bahn	Make cleaner	3	6	9
	Make less crowded			0
	Better ventilation		3	3
	Should be free	1		1
	More convenient locations	2		2
	More lifts		2	2
	Less homeless		3	3
Tram	Should be free	1		1
	Improve reliability		1	1

	More connected		1	1
	Make longer		1	1
Bike	Better bike lanes	1	3	4
	More bike lanes on big streets	2	5	7
	Make safer	1		1
	Broader bike lanes		2	2
	Bike lanes with proper materials		2	2
	Barriers for cars		12	12
	More enforcement of rules	1		1
	Less car parkings	1		1
	More bike stalls	2	1	3
	More connection to green			0
	Less construction works		5	5
	More connected		1	1
Bus	More electric buses	2		2
	Less cars	2	1	3
	Should be free	1		1
	More regular	3		3
	More connections		1	1

	Should come at night	2		2
	Better stations		1	1
Car	More parking	1	5	6
	Less traffic	2		2
	Stop them from speeding	1		1

Appendix F – Street Count Results

East Berlin	Cars	Cyclists	Pedestrians	Bus	Tram	E-Scooter	Scooters	Motors	Total	% Sust. Mobility
Dircksenstraße NT1 - 13:12 to 13:22 - 29-04-2024	9	8	153	0	240	0	0	1	411	97.57%
Dircksenstraße NT1 - 10:32 to 10:42 - 2-05-2024	26	9	100	0	200	0	1	3	339	91.15%
Dircksenstraße RH1 - 9:00 to 9:10 - 3-05-2024	7	7	59	0	400	0	0	0	473	98.52%
Dircksenstraße RH2 - 9:15 to 9:25 - 3-05-2024	10	7	62	0	320	0	0	0	399	97.49%
Total Dircksenstraße	52	31	374	0	1160	0	1	4	1622	96.49%

East Berlin	Cars	Cyclists	Pedestrians	Bus	Tram	E-Scooter	Scooters	Motors	Total	% Sust. Mobility
Klostertstraße NT1 - 13:42 to 13:52 - 29-04-2024	5	8	79	0	0	0	0	0	92	94.57%
Klostertstraße NT2 - 10:53 to 10:03 - 29-04-2024	2	3	47	0	0	0	0	0	52	96.15%
Klostertstraße RH1 - 8:58 to 9:08 - 3-05-2024	0	7	44	0	0	0	0	1	52	98.08%
Klostertstraße RH2 - 9:18 to 9:28 - 3-05-2024	0	3	39	0	0	0	0	1	43	97.67%
Total Klosterstraße	7	21	209	0	0	0	0	2	239	96.23%

East Berlin	Cars	Cyclists	Pedestrians	Bus	Tram	E-Scooter	Scooters	Motors	Total	% Sust. Mobility
Spandauer Straße East NT1 - 11:45 to 11:55 29-04-2024	223	30	38	200	0	0	2	5	498	53.82%
Spandauer Straße East NT2 - 12:55 to 13:05 - 2-05-2024	161	32	93	400	0	1	2	3	692	76.01%
Spandauer Straße East RH1 - 8:21 to 8:31 - 3-05-2024	120	31	26	120	0	0	1	6	304	58.22%
Spandauer Straße East RH2 - 8:36 to 8:46 - 3-05-2024	121	53	19	180	0	0	2	4	379	66.49%
Total Spandauerstraße East	625	146	176	900	0	1	7	18	1873	65.30%

East Berlin	Cars	Cyclists	Pedestrians	Bus	Tram	E-Scooter	Scooters	Motors	Total	% Sust. Mobility
Spandauer Straße West NT1 - 11:45 to 11:55 - 2-05-2024	116	31	143	0	639	6	0	5	940	87.13%
Spandauer Straße West NT2 - 12:35 to 12:45 - 2-05-2024	114	40	104	40	360	1	2	2	663	82.20%
Spandauer Straße West RH1 - 7:45 to 7:55 - 3-05-2024	90	33	23	0	240	1	1	2	390	76.15%
Spandauer Straße West RH2 - 8:02 to 8:12 - 3-05-2024	73	34	24	0	360	0	0	3	494	84.62%
Total Spandauerstraße West	394	138	294	40	1599	8	3	12	2488	83.56%

West Berlin	Cars	Cyclists	Pedestrians	Bus	Tram	E-Scooter	Scooters	Motors	Total	% Sust. Mobility
Hardenbergstraße NT1 - 13:30 to 13:40 - 30-04-2024	349	31	81	160	0	1	11	8	641	42.59%
Hardenbergstraße NT2 - 13:46 to 13:56 - 30-04-2024	352	38	72	120	0	0	7	5	594	38.72%
Hardenbergstraße RH1 - 17:31 to 17:41 - 30-04-2024	343	46	66	80	0	0	4	2	541	35.49%
Hardenbergstraße RH1 - 17:11 to 17:21 - 3-05-2024	324	44	62	280	0	0	2	8	720	53.61%
Total Hardenbergstraße	1368	159	281	640	0	1	24	23	2496	43.31%

West Berlin	Cars	Cyclists	Pedestrians	Bus	Tram	E-Scooter	Scooters	Motors	Total	% Sust. Mobility
Carmerstraße NT1 - 15:52 to 16:04 - 30-04-2024	26	10	28	0	0	0	0	0	64	59.38%
Carmerstraße NT1 - 16:10 to 16:20 - 30-04-2024	18	7	21	0	0	0	1	0	47	59.57%
Carmerstraße RH1 - 18:30 to 18:40 - 30-04-2024	20	9	17	0	0	0	0	0	46	56.52%
Carmerstraße RH2 - 18:45 to 18:55 - 30-04-2024	23	10	22	0	0	0	0	0	55	58.18%
Total Carmerstraße	88	36	88	0	0	0	1	0	213	58.22%

West Berlin	Cars	Cyclists	Pedestrians	Bus	Tram	E-Scooter	Scooters	Motors	Total	% Sust. Mobility
Schillerstraße NT1 - 16:29 to 16:39 - 30-04-2024	32	20	67	0	0	1	0	0	120	73.33%
Schillerstraße NT2 - 16:44 to 16:54 - 30-04-2024	20	28	69	0	0	0	0	2	119	81.51%
Schillerstraße RH 1 - 17:53 to 18:03 - 30-04-2024	28	44	44	0	0	0	1	0	117	75.21%
Schillerstraße RH2 - 18:08 to 18:18 - 30-04-2024	26	23	44	0	0	0	1	0	94	71.28%
Total Schillerstraße	107	115	224	0	0	1	2	2	451	75.39%

Appendix G – T-test results

t-Test: Two-Sample Assuming Unequal Variances
Q1

	Variable 1	*Variable 2*
Mean	4.64516129	4.59375
Variance	0.30322581	0.31350806
Observations	31	32
Hypothesized Mean Difference	0	
df	61	
t Stat	0.3674241	
P(T<=t) one-tail	0.35728721	
t Critical one-tail	1.67021948	
P(T<=t) two-tail	0.71457441	
t Critical two-tail	1.99962358	

t-Test: Two-Sample Assuming Unequal Variances
Q4

	Variable 1	*Variable 2*
Mean	4.61290323	4.71875
Variance	0.31182796	0.33770161
Observations	31	32
Hypothesized Mean Difference	0	
df	61	
t Stat	-0.7372522	
P(T<=t) one-tail	0.23189772	
t Critical one-tail	1.67021948	
P(T<=t) two-tail	0.46379544	
t Critical two-tail	1.99962358	

t-Test: Two-Sample Assuming Unequal Variances
Q5: Schillerstraße-Klosterstraße

	Variable 1	*Variable 2*
Mean	5	3.41666667
Variance	0	0.62878788
Observations	3	12
Hypothesized Mean Difference	0	
df	11	
t Stat	6.91689045	
P(T<=t) one-tail	1.2653E-05	
t Critical one-tail	1.79588482	
P(T<=t) two-tail	2.5307E-05	
t Critical two-tail	2.20098516	

t-Test: Two-Sample Assuming Unequal Variances

Q5: Carmerstraße-Dircksenstraße

	Variable 1	*Variable 2*
Mean	4.375	3.5
Variance	0.50543478	1
Observations	24	4
Hypothesized Mean Difference	0	
df	4	
t Stat	1.68064315	
P(T<=t) one-tail	0.08406399	
t Critical one-tail	2.13184679	
P(T<=t) two-tail	0.16812797	
t Critical two-tail	2.77644511	

t-Test: Two-Sample Assuming Unequal Variances

Q5: Hardenbergstraße-Spandauer Straße

	Variable 1	*Variable 2*
Mean	4.25	3.125
Variance	0.91666667	1.05
Observations	4	16
Hypothesized Mean Difference	0	
df	5	
t Stat	2.07202467	
P(T<=t) one-tail	0.04649996	
t Critical one-tail	2.01504837	
P(T<=t) two-tail	0.09299991	
t Critical two-tail	2.57058184	

t-Test: Two-Sample Assuming Unequal Variances

	Variable 1	*Variable 2*
	4.4193548	
Mean	4	3.28125
	0.5182795	0.8538306
Variance	7	5
Observations	31	32
Hypothesized Mean Difference	0	
df	58	
	5.4630211	
t Stat	9	
P(T<=t) one-tail	5.1323E-07	
	1.6715527	
t Critical one-tail	6	
P(T<=t) two-tail	1.0265E-06	

t Critical two-tail	2.0017174 8

t-Test: Two-Sample Assuming Unequal Variances

Q6

	Variable 1	*Variable 2*
Mean	4.48387097	3.1875
Variance	0.45806452	1.31854839
Observations	31	32
Hypothesized Mean Difference	0	
df	51	
t Stat	5.47910108	
P(T<=t) one-tail	6.6292E-07	
t Critical one-tail	1.67528495	
P(T<=t) two-tail	1.3258E-06	
t Critical two-tail	2.00758377	

t-Test: Two-Sample Assuming Unequal Variances

Q7: Bike parking

	Variable 1	*Variable 2*
Mean	2.575	2.93478261
Variance	5.92828947	22.6432806
Observations	20	23
Hypothesized Mean Difference	0	
df	34	
t Stat	-0.3178936	
P(T<=t) one-tail	0.37625499	
t Critical one-tail	1.69092426	
P(T<=t) two-tail	0.75250999	
t Critical two-tail	2.03224451	

t-Test: Two-Sample Assuming Unequal Variances

Q7: Car parking

	Variable 1	*Variable 2*
Mean	6.36666667	2
Variance	12.7666667	1.38235294
Observations	15	18
Hypothesized Mean Difference	0	
df	17	
t Stat	4.5331226	
P(T<=t) one-tail	0.00014709	
t Critical one-tail	1.73960673	

P(T<=t) two-tail	0.00029417
t Critical two-tail	2.10981558

t-Test: Two-Sample Assuming Unequal Variances
Q7: Transit stop

	Variable 1	*Variable 2*
Mean	7.11538462	2.70833333
Variance	35.9661538	2.5634058
Observations	26	24
Hypothesized Mean Difference	0	
df	29	
t Stat	3.61024906	
P(T<=t) one-tail	0.00056974	
t Critical one-tail	1.69912703	
P(T<=t) two-tail	0.00113947	
t Critical two-tail	2.04522964	

Appendix H – Criteria & Descriptions affecting Walkability

Source: Rahiman & Naseer (2020), p.5-6.

Criteria	Sub-criteria	Description
***Area Characteristics**	• *Socio-economic status* • *Vehicle Ownership* • *Availability of Public Transportation* • *Demographic Factors*	
1. Built-Environment Characteristics	*1. Land-use Mix Diversity*	• Evenness of distribution of square footage of residential, commercial, and office development
	2. Household Density	• The number of households per residential area
	3. Street Connectivity	• The number of intersections per given area
2. Immediate Walking Environment	4. Maintenance of Walkways	• Upkeep of Streets/Walkways • Condition of Walkway Surface • Continuity of Walkways • Provision for drain-off during rains
	5. Walkway Characteristics	• Availability of adequate width • Separation from Vehicular Traffic • Carrying capacity in terms of volume of pedestrians • Adequate level of illumination during night • Shade provision and micro-climate
	6. Obstacles to Walking	• Presence of potholes, stagnant water and undulations in the walkway • Presence of overhead utility lines, posts or trees • Hoarding and similar barriers on the pathway • Presence of waste and dirt dumping along the way • Encroachment of walkways
3. Perceptions	7. Sense of Safety	• Vehicles' speed and pedestrians ease of manouvering • The vehicles move at a safe speed while crossing

		• On-street parking is not affecting walking ease • Protective railings along walkways • Safe, sufficient locations to cross the street • Proper illumination during night • Open drains along walkways
	8. Sense of Security	• Street activities • Buildings overlooking walkways • Long sightlines • Way-finding signages • Stray dogs & other harmful animals • Antisocial activities and robbery
	9. Comfort	• Attractive trees/ landscaping • Proper shading for pedestrians • Pollution/odour-free air • Acceptable noise on the streets • Convenience to walk without congestion
	10. Visual Interest	• Buildings of architectural interest along the walkway • Landmarks/signage as way finders • Public art/artworks for the visual experience • Billboards/Hoardings not marring visual environment
4. Urban Design Qualities	11. Imageability	Quality of a place that makes it distinct, recognizable, and memorable.
	12. Visual Enclosure	The enclosure is the degree to which streets and other public spaces are visually defined
	13. Human Scale	Corresponds to the size, texture, and articulation of physical elements that match the size and proportions of humans
	14. Transparency	The degree to which people can see or perceive human activity or what lies beyond the edge of a street or other public space
	15. Complexity	The visual richness of a place depends on the variety of the physical environment