Tactical Urbanism Approaches And The Quality Of Public Space In Sustainable Urban Development: A Case Study Of Berlin

Leonneke Elzenga
University of Groningen
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Abstract

This bachelor thesis examines the influence of Tactical Urbanism Approaches on the quality of public spaces in the context of sustainable urban development in Berlin. Using three case studies, the study measures key aspects of quality public space (Inclusiveness, Meaningful Activities, Comfort, Safety, Pleasurability) with an adapted version of Mehta's Public Space Index. Data collection took place during the first week of May 2023, encapsulating different times of day. The research indicates that repurposed streets may not inherently provide a more inclusive, comfortable, safe, and pleasurable environment. The findings highlight the significance of context-specific factors and call for deeper investigation into effective interventions reflecting community values. The study concludes by advocating for increased citizen and stakeholder engagement in the design process of TUA initiatives, potentially accelerating their transition from temporary experiments to permanent policies.

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Leonneke Elzenga
l.g.elzenga@student.rug.nl
S3122557

Supervisor: Dr. C.W. Lamker

Spatial Planning and Design
Faculty of Spatial Sciences
University of Groningen

Table of content

Ch. 1 Introduction:

Background

This research investigates urban transformations in two streets in Berlin, specifically examining the impact of Tactical Urbanism Approach (TUA) on the quality of public space. TUA encompasses low-cost and low-risk temporary projects aimed at creating long-term improvements in cities and other spaces, to explore the possibilities of a more sustainable and liveable city (M. Lydon & A. Garcia, 2015). Cities need to offer urban structures that protect the climate and promote human health to make the necessary transition towards sustainable development (United Nations, 2015a). Berlin has been recognized as a front runner in sustainable city development and has committed itself to the United Nations' 17 sustainable development goals (SDG) (United Nations, 2015a) and the Paris Agreement on Climate Change (United Nations, 2015b). In particular, the city is working towards achieving SDG 11, which aims for more inclusive, safe, resilient, and sustainable human settlements and cities (United Nations, 2022). One of its targets is to "*provide universal access to safe, inclusive and accessible, green and public spaces, in particular for women and children, older persons and persons with disabilities, by 2030.*" (DESTATIS, 2019). As part of its efforts, Berlin is striving to create more pedestrian and cyclist-friendly spaces by redistributing street space and making the city more accessible to all citizens.

While there is a global discourse taking place, where interests regarding urban sustainability often come together, there are still contrasting opinions on how to incorporate sustainable aspects in urban public spaces, especially at the local level. There remains a significant knowledge and policy gap regarding cities' ability to transform to reach a higher level of sustainability (Dodman, 2022).

Research question

The main research question is defined as followed:

> *To what extent does the implementation of Tactical Urbanism approaches in streets in Berlin contribute to the quality of public space in the context of sustainable urban development?*

In order to answer this question, this research will address the following research sub-questions:

1. *How do the repurposed streets in Berlin perform in comparison to a non-repurposed street, based on the evaluation of the quality of public space considering the aspects: inclusiveness, meaningful activities, safety, comfort, and pleasurability?*
2. *How can these insights guide future efforts to improve the quality of public space and promote sustainable urban development in Berlin?*

The findings of this research will provide valuable insights into the impacts of TUA in the streets of Berlin, highlighting the potential impact on the quality of public space and sustainable urban development in Berlin. By examining the components of quality of public space and identifying factors that contribute to differences in quality, this research aims

to contribute to the broader discussion on sustainable urban development and inform future urban planning and design strategies.

Thesis structure

Chapter 2 presents the key concepts and theories forming the framework of this study, followed by a conceptual model visualising the relations between the concepts. The research methodology, case study selection and limitations to the study are detailed in chapter 3, which provide the foundation for addressing the research questions. The findings of the study are reported and discussed in chapter 4. The thesis concludes with chapter 5. Chapter 6 and chapter 7, provide a reference list and appendices.

Ch. 2 Theoretical framework

Chapter 2 defines what *public space* means in this paper because it lacks a universally accepted definition. Hence it could complicate evaluating and comparing the results from this research. Additionally, the concepts of Sustainable Urban Development, Tactical Urbanism, Mehta's public space index and the five quality aspects will be elucidated.

Sustainable Urban Development

In 2015, the United Nations General Assembly established the 17 Sustainable Development Goals (SDG) (United Nations, 2015a) and 196 parties adopted the Paris Agreement on Climate Change (United Nations, 2015b), cities worldwide are transforming into sustainable, inclusive, safe, and resilient places. This urban transformation is essential to accommodate the ever-growing urban population, which is expected to rise to approximately 68% by 2050 according to the prognosis of the UN (2018). Sustainable urban development (SUD), refers to the process of designing and managing cities in a way that promotes economic growth, improves quality of life, and preserves the environment for future generations (UN HABITAT, 2018; United Nations, 2022). The goal is to create liveable, fair, and sustainable cities that can accommodate the rapid urban growth expected in the coming decades without placing excessive pressure on the Earth's resources. The concept of sustainable urban development is closely linked to the UN SDGs, which provide a guideline for addressing the world's most pressing challenges, including poverty, inequality, climate change, environmental degradation, and social injustice (UN HABITAT, 2018).

Public Space

Public space plays an important role in SUD (Bertolini, 2020; UN HABITAT, 2018; Wojnarowska, 2016). This research builds upon the definition of public space defined by the UN HABITAT (2018), as this definition links directly to the SDGs regarding public space, making it possible to link the collected data on quality of public space to the SDGs that Berlin adopted. Public spaces, serve as multi-purpose areas for social interaction, economic transactions, and cultural expression for diverse groups of people, and are freely accessible to all (Pacheco, 2017; UN HABITAT, 2018). It can take many forms such as parks, streets, sidewalks, footpaths, playgrounds and marketplaces, but also areas between buildings or roadsides, can be considered as public space. Public spaces serve as the venue for various activities such as cultural festivities, the trade of goods and services, mobility within a city, community life, and livelihoods for those in the informal sector. According to UN HABITAT (UN HABITAT) "*Having sufficient public space allows cities and towns to function efficiently and equitably. The network of public space not only improves quality of life but also mobility and functioning of the city.*". This research focuses on streets as a public space, which can be defined as publicly-owned and maintained vital urban road in cities and towns, offering mobility for pedestrians and vehicles and hosting a variety of social, economic, cultural, and political activities. The street-space includes elements like avenues, boulevards, squares, plazas, pavements, passages, galleries, bike paths, sidewalks, traffic islands, tramways, and roundabouts (UN HABITAT, 2018).

To make the connection between quality of space and sustainability more coherent and clearer, a definition is needed as to how quality of public spaces is relevant to contemporary cities' abilities to transform into sustainable ones. Wojnarowska (2016) notes that today meeting the needs of a larger group of users is necessary for a sustainable urban environment. This, in turn, ties into a bigger discussion on quality of urban life. Regarding the importance of quality in a sustainability context Wojnarowska states: "*Quality is recently becoming an increasingly important topic of research in various fields of urban development. One of the causes of this trend is the wide implementation of the sustainable development principle as the basis of human civilization, with improvement of the quality of life as the fundamental goal.*" (Wojnarowska, 2016, p. 82).

Tactical Urbanism Approach

Tactical Urbanism (TUA) is a cost-effective approach aimed at improving urban spaces through short-term, scalable interventions (Mike Lydon & Anthony Garcia, 2015). TUA can address environmental, social, and economic urban challenges such as car-dominance and heat island effects by fostering projects like pop-up bike lanes, parklets, and temporary pedestrian zones. Studies show that TUA promotes physical activity, supports modal shift, improves safety, enhances social interaction, and benefits local businesses (Bertolini, 2020 p. 749). Focusing on street repurposing, TUA can reclaim public spaces, making room for green spaces and expanded sidewalks (Nieuwenhuijsen & Khreis, 2016), aligning with Berlin's Sustainable Urban Development (SUD) goals. Moreover, TUA supports participatory urban planning, reflecting community values and needs (Bertolini, 2020; Pacheco, 2017; Van Hoose et al., 2022). This approach can serve as a "living lab" for testing urban improvements, reducing the risks and costs of large-scale transformations.

Mehta's Public Space Index

Vikas Mehta (2014), professor of Urbanism, designed the PSI to measure the inclusiveness of public space by rating how accessible the space is to varying individuals and groups and how well their various activities and behaviours are supported or not. He writes that it is important that the improvement of public space needs to be useful to a broad sense of people and that "*the limited public funding*" is a practical perspective that needs to be considered when planning, and that measuring *quality of space* could help with choosing what to invest in. The "*evaluation of space-index*" is a triangulation of quantitative and qualitative data and a tool that assesses aspects of public spaces of varying urban forms with a focus on public space as a social setting, but also on the design and activities. He describes five aspects as the basis for quality of space; these are *inclusiveness, meaningful activities, safety, comfort* and *pleasurability*. Each aspect is evaluated based on specific variables regarding physical design features and social diversity. The cumulative score across these variables provides a comprehensive assessment of the public space's quality and its potential to foster a vibrant and inclusive urban life. Mehta's Index is used as an inspiration for the data collection tool used in this research. He also clarifies that *quality of space* is a broad term that different researchers, architects, and designers have utilised in different ways and that they added different values to the term and what it implies. Hence, it is crucial to have a clear definition in this paper so that when the specific qualities are operationalised justly, it becomes relevant and valid within the context of research. The five quality aspects of public space that are assessed in this research are defined as follows:

Inclusiveness

This refers to the accessibility and usability of a public space by people of all ages, genders, abilities, and socio-economic backgrounds. The main objective here is that design facilitates social diversity. According to the American Institute of Certified Planners (2005), the planner's code of ethics states: "*Seek social justice by identifying and working to expand choice and opportunity for all persons, emphasizing our special responsibility to plan with those who have been marginalized or disadvantaged and to promote racial and economic equity. Urge the alteration of policies, institutions, and decisions that do not help meet their needs.*" emphasizing the importance of inclusive planning. Talen (2008) highlights the importance of prioritizing inclusion, even when it isn't very profitable. An inclusive public space does not create physical or social barriers, but rather encourages diverse groups of people to utilize and interact within the space (Amin, 2008).

Meaningful Activities

Within the framework of the public space index, Mehta (2014) mentions *meaningfulness* emphasizes that spaces gain significance when they support activities of symbolic and cultural importance, encourage casual, spontaneous interactions, and meet a variety of needs. A study by Whyte (1980) has strongly indicated that places where people can eat and drink, such as cafes, restaurants, or bars, play a crucial role in promoting sociability among individuals. In other words, these establishments not only provide food and beverages but also serve as gathering places where people can engage in social interactions, making them vital components of lively and active public spaces. They foster a sense of community, encourage human interaction, and contribute to the overall liveliness and attractiveness of urban public spaces. Designs that motivate people to spend time outside and that facilitate interactions with other people outdoors can make a substantial difference in the quality of life of city residents (Gehl, 2011). Hence, a space that promotes continuous usage of space, fosters place attachment, which is a key component of *meaningfulness* according to Jane Jacobs' observations (1961).

Safety

Safety relates to both the perceived and actual safety of a public space. It involves factors such as adequate lighting and the presence of "eyes on the street" at different times of the day (Jacobs, 1961). Santos (2022) says that street connectivity, proper access to shops and restaurants and aspects related to perceived safety (adequate lighting, crosswalks and wide sidewalks etc.) contribute to a high-quality walking environment. Moreover, Newman (1973) suggests that urban design can aid people in creating safe spaces and encourage them to spend time there. The study assesses variables such as the connection and openness to adjacent streets and spaces (Gehl & Svarre, 2013), and the presence of graffiti. Graffiti was added to the data collection tool because studies show that spaces including graffiti score significantly lower on safety than spaces without graffiti (James & O'Boyle, 2019).

Comfort

Comfort in a public space involves both physical and environmental comfort (e.g., seating, temperature, shade or shelter) (Mehta, 2014). Having plenty of sunshine and proper shelter from the wind are important contributors to social activities happening outdoors (Hass-Klau et al., 1999). However, while sunshine plays an important role in spring,

during the summer months people look up the shade (Whyte, 1980). Hence, good climatic conditions stimulate outdoor activities. Additionally, exposure to environmental stressors such as traffic noise result in a faster pedestrian walking pace (Franěk et al., 2018), which indicates a lack of comfort. In this context, *comfort* relates to the physiological comfort that a public space can provide to its users, which depends on the environmental and physical attributes of the space (Mehta, 2014).

Pleasurability

This refers to the aesthetic and sensory qualities of a space that make it enjoyable and appealing to be in. Gehl and Svarre (2013) state that "*good architecture ensures good interaction between public space and public life*.". This could involve aspects of design, architecture, natural elements, sounds, or even smells that contribute to a positive and pleasurable experience of the space (Lynch, 1964; Pallasmaa, 2012). Moreover, studies show that the presence memorable architecture or landscape features that provide sensory complexity contribute to the pleasurable experience of a place (Pallasmaa, 2012).

It is important to note, as Mehta (2014) does, that these aspects can be interpreted and prioritised differently by different stakeholders. Therefore, the operationalisation of these aspects is sensitive to the context of Berlin and the specific users of the space to ensure relevancy and validity. Additionally, the specific variables associated with these five aspects are detailed in the appendix.

Conceptual model

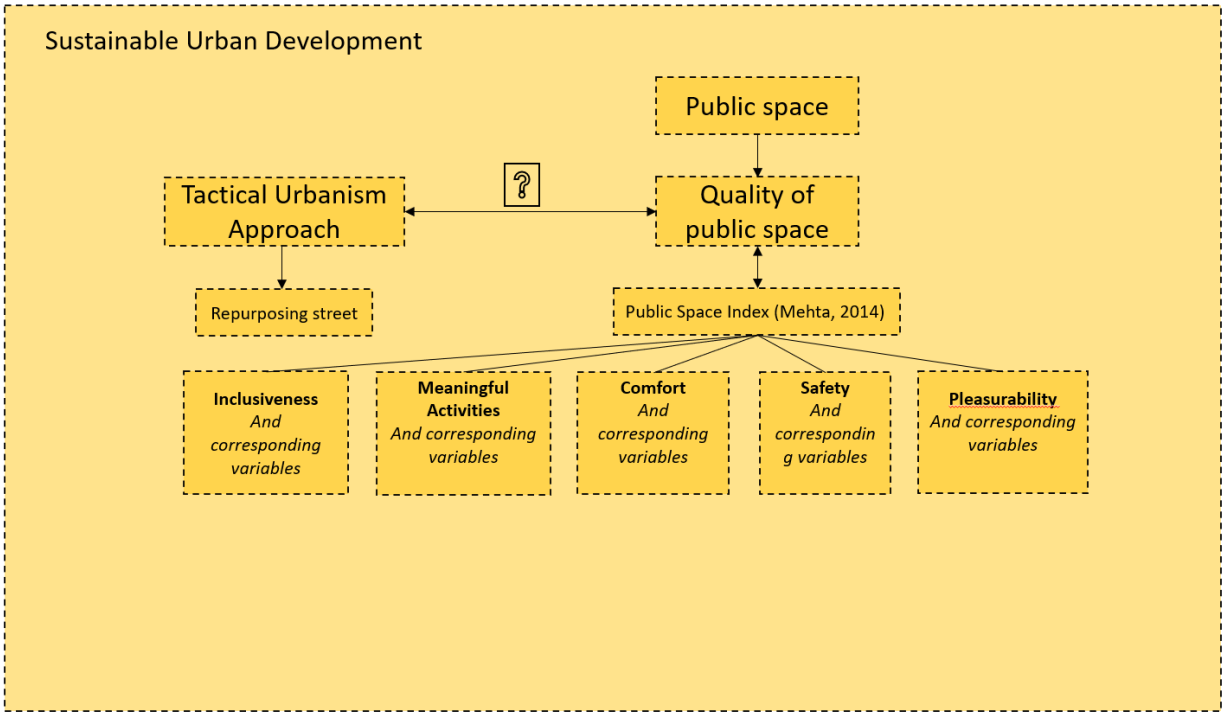

Figure 1 Conceptual model (Author, 2023)

The conceptual model, figure 1, shows how the main concepts and theories in this thesis are related.

Ch. 3 Methodology

Case selection

Through a semi-systematic approach combining desk research and on-site observations, this study selected two case areas in Berlin (figure 1) where TUAs were implemented: Friedrichstraße (figure 4) and Bergmannstraße (figure 2). Repurposed Friedrichstr. is one of the most debated TUA projects in Berlin in recent years (Berlin.de, 2018). In August 2020 a part of the street was cut-off from car traffic in favour of pedestrian use (Marcus, 2022). The changing of the function of Friedrichstraße didn't go smoothly as it contributed to heated discourses which resulted in the case going to court and the car-free street experiment being revoked until the pedestrian area was reinstated again (Goodman, 2022). Bergmannstraße, was chosen because it encompassed TUA principles with features such as a parklet, pop-up bicycle lanes, and a pedestrian zone located at the Ferdinand-Freiligrath-Schule. Both will be compared to a non-repurposed section of the Friedrichstr. between Unter den Linden and Georgenstr., to determine whether TUA have impacted the quality of public space in repurposed streets.

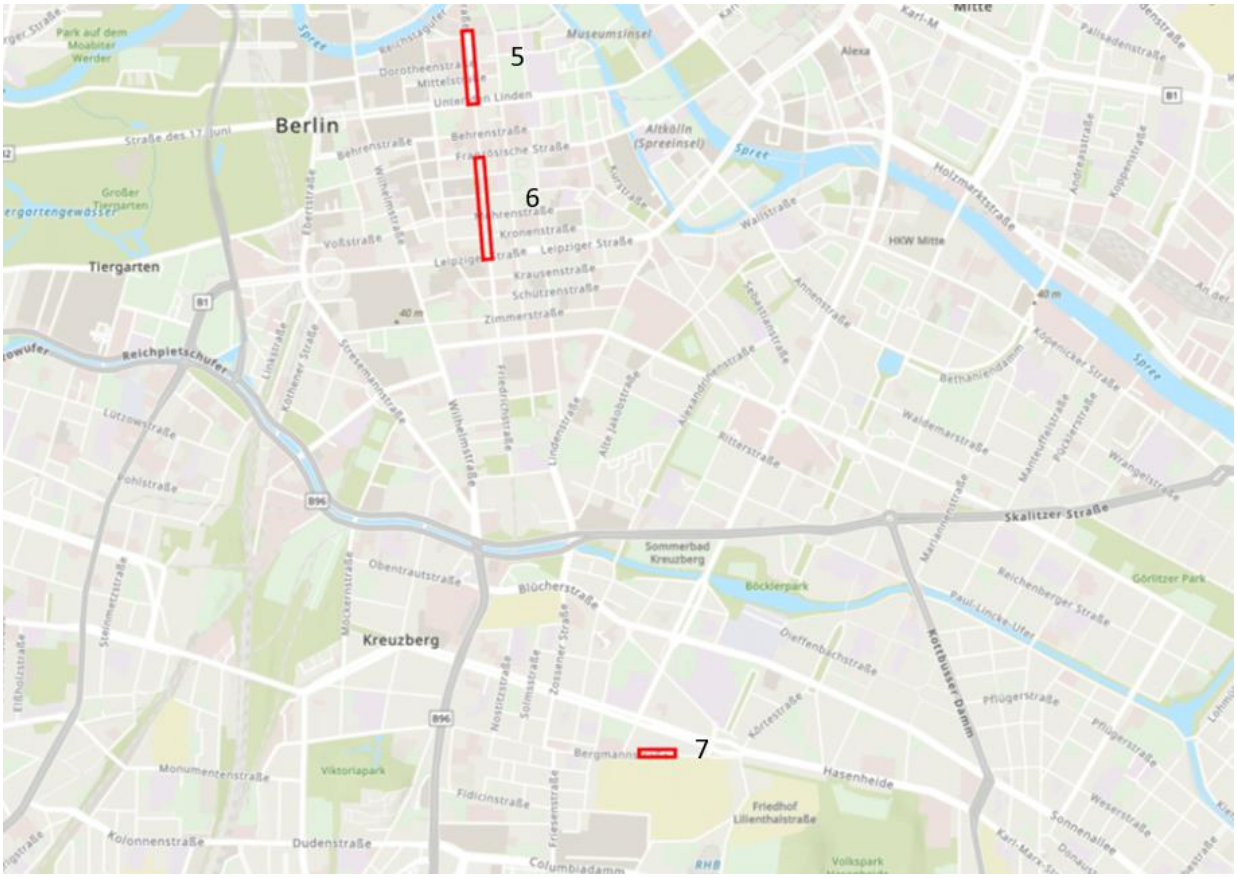

Figure 2 5 non-repurposed Friedrichstraße, 6 repurposed Friedrichstraße, 7 Bergmannstraße

Figure 3 Bergmannstraße

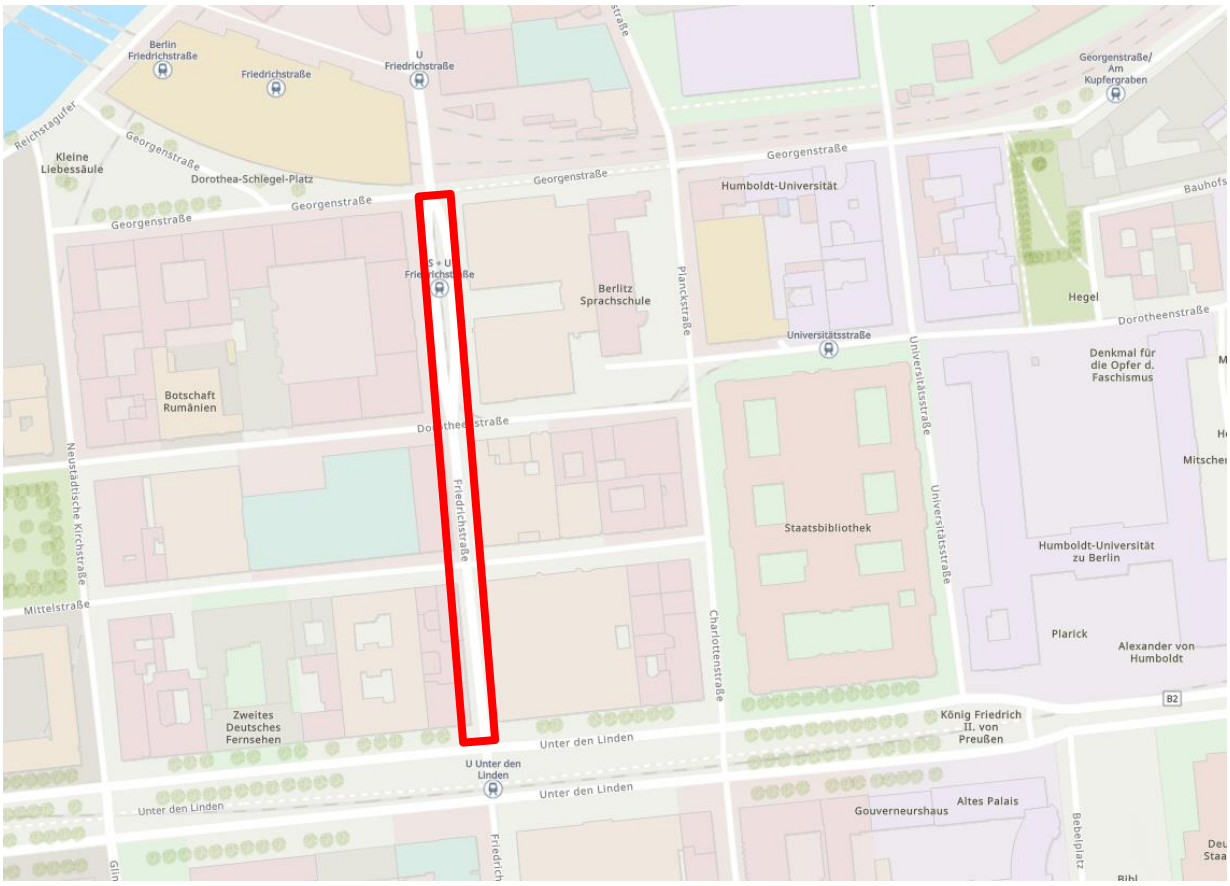

Figure 4 non-repurposed Friedrichstraße between Unter den Linden and Georgenstr.

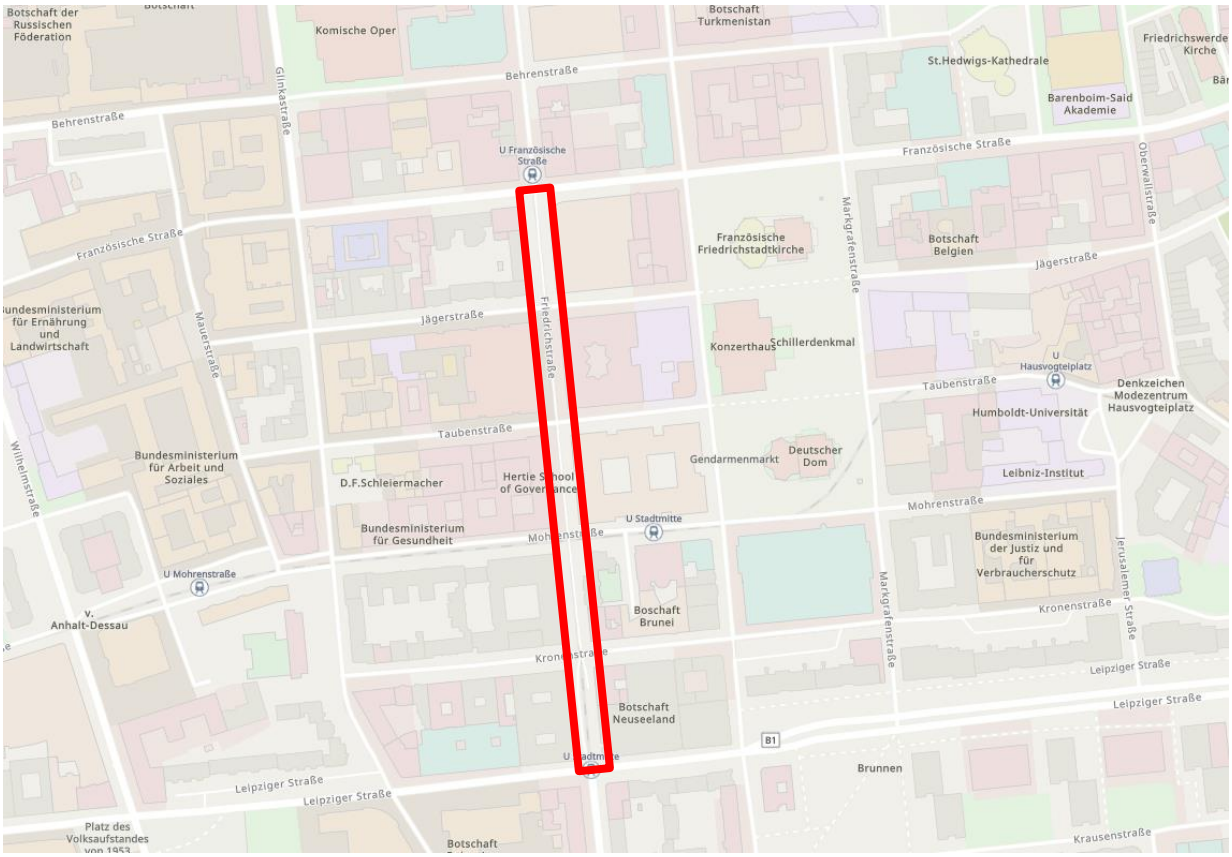

Figure 5 Repurposed Friedrichstraße between Leipzigerstr. and Französischestr.

Theory acquisition

This research uses two qualitative methods to explore "*To what extent does the implementation of Tactical Urbanism approaches in streets in Berlin contribute to the quality of public space in the context of sustainable urban development?*"

Firstly, a semi-systematic review was conducted to lay the foundation for the analysis of the collected data using key terms like "Tactical Urbanism", "Public Space", and "Street Experiments" across various academic search engines such as Scopus and SmartCat. Additionally, a 'snowballing' technique to widen the scope led to the discovery of Mehta's evaluation tool (Mehta, 2014).

Primary data collection

Second, qualitative observational methods are useful for urban studies and for understanding the dynamics of public spaces (Gehl & Svarre, 2013; Whyte, 1980). They allow researchers to capture the nuanced and context-dependent elements of public space usage and urban phenomena and offer insights that are often overlooked by quantitative methods. Moreover, direct observation of public spaces can reveal the complex social and spatial relationships that contribute to the quality of these spaces (Gehl & Svarre, 2013). The data in this research was collected by five researchers who took part in the Erasmus+ BIP program in the first week of May 2023. Variables were meticulously defined pre-data collection to ensure consistency (see appendix). The process also incorporated photographs and detailed notes, encouraging thorough understanding through team discussions and refinements. Variables were assigned values of 0-3 (table 1), reflecting its study-related significance (Mehta, 2014). Variables were evaluated in real-

time during three data collection days, with morning, afternoon, and evening observations on each street. The variable weighting, based on Mehta's PSI, was adjusted to the quantity of variables per aspect. Value definitions varied per variable, accommodating their unique characteristics. The calculation method is available in the appendix.

Aspects	Variables of Assessment
Inclusiveness	Presence of exclusionary signs, opening hours, diversity of activities, entrance controls, diversity of users in terms of age and physical abilities.
Meaningful Activities	Presence of community-gathering third places, adaptability of the space to user needs, availability of food, diversity of bordering businesses and uses.
Safety	Visual and physical connection to adjacent streets, maintenance condition, lighting quality after dark, presence of graffiti
Comfort	Free seatings, seatings provided by businesses, other furniture and artifacts, shade and shelter, design elements discouraging use of space, speed (pace) pedestrians
Pleasurability	Presence memorable architecture or landscape features, sense of enclosure, permeability of street front facades, personalisation buildings, articulation, and variety in architectural features of building facades, density and variety providing sensory complexity of sidewalk/street.

Table 1 All studied aspects and variables (Author, 2023)

Analysis

The analysis of primary data was made by calculating the weighted average scores for each aspect within each research area. These scores offered an objective measurement for comparison amongst various aspects across the different research areas. Upon identifying the specific variables that significantly contributed to these scores, it became possible to discern which factors were influential in the differences in scores between separate aspects. This methodology provided insights into why certain aspects scored differently and laid a foundation to interpret these distinctions within the context of TUA. These detailed findings from the analysis and subsequent interpretations are further discussed in Chapter 4. Through this methodology, an effective integration of empirical data with theoretical perspectives of the study was achieved, enriching the understanding of TUA's influence on the quality of public spaces.

Limitations

This study has limitations. The data collection occurred over a week, solely on weekdays, which may not fully represent the dynamics of Berlin's repurposed streets, as public space usage can change notably on weekends. Still, it provides insight into the potential impact of TUA on sustainable public spaces. The time of year at which the research was conducted could influence the results, with seasons altering e.g. comfort and pleasurability scores. Weather during the data collection might have also impacted activities and scores. Despite clear definitions, variable interpretation could be biased due to the inherently subjective nature of observations. However, it can give an insight in the potential impact TUA could have on transitioning towards more sustainable alternatives in public spaces.

This study focused on five aspects that play a crucial role in quality of space and life (Arslan et al., 2016; Gehl & Svarre, 2013; Mehta, 2014; Pacheco, 2017; Wojnarowska, 2016). However, there are many additional layers that could give interesting insights into the quality of public space in the context of TUA. Prior to the study, several variables from Mehta's PSI were intentionally omitted from the collection tool as the research focused exclusively on observational design elements. Including these factors in future studies might yield valuable insights into user experiences of TUA and the impact on public space quality.

Ch. 4 Results & discussion

Chapter 4 discusses data from the theoretical framework and qualitative observational research. It will synthesize findings from both methods to address sub-question 1 "*How do the repurposed streets in Berlin perform in comparison to a non-repurposed street, based on the evaluation of the quality of public space considering the aspects: inclusiveness, meaningful activities, safety, comfort, and pleasurability?*".

The collected data provides a view on Berlin's public space quality, based on five aspects: Inclusiveness, Meaningful Activities, Comfort, Safety, and Pleasurability, from Mehta's PSI. Analysed within the TUA framework, it offers insights into Berlin's public spaces dynamics. Table 2 shows weighted averages for each aspect on Bergmannstr. (repurposed), Friedrichstr. (non-repurposed and repurposed).

Research Area	Inclusiveness	Meaningful activities	Comfort	Safety	Pleasurability
Non-repurposed Friedrichstrasse	23,89	19,44	15,83	25	26,19
Repurposed Friedrichstrasse	18,61	22,22	15,83	25	16,19
Bergmannstrasse	19,79	19,16	20	15	18,09

Table 2 weighted average of each individual aspect for Bergmannstraße, non-repurposed Friedrichstraße and repurposed Friedrichstraße (maximum score: 30) (Author, 2023).

Non-repurposed Friedrichstraße

Inclusiveness

The high inclusiveness score of non-repurposed Friedrichstr. (23.89/30) indicates that it effectively facilitates social diversity. The data shows that for the variables "*control of entrance to public space*", *and* "*presence of people of diverse ages*", the non-repurposed Friedrichstr. scores better than the repurposed streets. The street had the highest score assigned to the variable "*presence of posted signs to exclude certain people of behaviours*" meaning that it had more signs such as *no parking for bikes (figure 6), speed limits, one-way parking, no stopping* and *one way street* signs than the two repurposed streets. The street did not have any signs excluding certain groups of people based on ages, genders, abilities and socio-economic backgrounds. However, "*The presence of people with diverse physical abilities*" scored low. This can be attributed to the presence of many thresholds on the streets that could limit the mobility of people with physical disabilities and the lack of orientation guidelines for the visually impaired. The presence of such infrastructure could have made the space more inclusive and should be included as a variable for future research. In this light, it could be argued that the design of the space did not facilitate social diversity well enough as it "did not *plan with those who have been marginalized or disadvantaged*" *(American Institute of Certified Planners, 2005)* and underlines the need for inclusive planning so that it encourages diverse groups of people to utilize and interact within the space (Amin, 2008).

Figure 6 signs excluding certain behaviour (Author, 2023)

Meaningful activities

The non-repurposed Friedrichstr. scored (19.4/30) on meaningful activities, indicating a moderate level of engagement with the space. This is mainly attributable to the lack of flexibility of the space to suit user needs as the space had many fixed design elements (figure 7). The space scored highly on "*availability of food within and at the edges of the space*" and "*variety of businesses and other uses at the edges of the space*" as there were bakeries, cafes and restaurants offering food, thus promoting sociability among individuals (Whyte, 1980), and many kinds of stores and businesses ranging from bookstores to banks. It scored highly on "*community gathering third-places*" although there was a significant score difference between times of day which had to do with the fact that the *third-places* were closed in the evening (Starbucks, book store).

Figure 7 fixed design elements (Author, 2023)

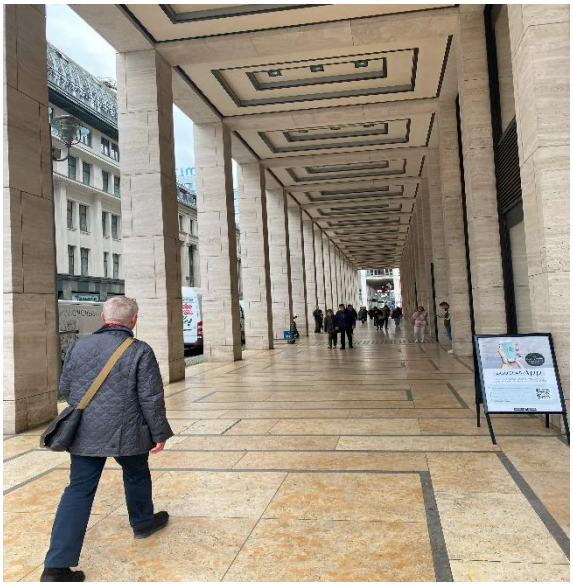

Figure 8 Arcade covering sidewalk providing climatic comfort (Author, 2023)

Comfort

The score for comfort in the non-repurposed street (15.8/30) is rather low, implying that improvements could be made to enhance the physical comfort of the area. The low score can be attributed to the low scores for "seating without paying for food or services" and "seating provided by businesses", highlighting the lack of physical comfort that it should provide its users (Mehta, 2014). The *speed of pedestrians walking* was very fast/quick-step, which could indicate that pedestrians feel more stressed in this space due to environmental stressors (Franěk et al., 2018). It scored the best out of all three spaces on "climatic comfort" which can be attributed to the presence of arcades (figure 8) and trees.

Figure 9 light on sidewalk after dark (Author, 2023)

Safety

Non-repurposed street scores comparably high on safety (25/30), suggesting that it's a secure and well-maintained area based on the evaluated variables. It scored best on "visual and physical connection to adjacent streets or spaces" (Gehl & Svarre, 2013), "lighting after dark" and "graffiti". The continuity of 'eyes on the street' throughout the day (Jacobs, 1961), and light coming from closed shops and lanterns made sure the sidewalks were well lit, which contributed to the sense of safety (figure 9).

Figure 10 Visual enclosure Friedrichstrasse train station (Author, 2023)

Pleasurability

The non-repurposed Friedrichstr. scores the highest on pleasurability (26,19/30). This can be attributed to the *"memorable architecture", "sense of enclosure", "building permeability", "density and variety of sensory complexity"* and *"personalisation of building facades"*. Sense of enclosure scored high due to the presence of arcades that covered the sidewalks (figure 8) which subsequently made the car-street look more enclosed by the tall buildings.

The Friedrichstr. train station visually cut off the northern part of the street and made the space feel more enclosed (figure 10). The arcades and mix of old and new architectural buildings increased the score on "memorable architecture". The street layout and the buildings itself provided much of the sensory complexity as there were train tracks, bus stops, car-lanes and pedestrian areas all in a confined space. There was a lot happening at the same time.

Repurposed Friedrichstraße

Inclusiveness

The lowest inclusiveness score of the repurposed Friedrichstr. (18.61) is an area of concern, as it suggests that the implementation of Tactical Urbanism initiatives might have unintentionally created barriers for certain groups. "*Presence of posted signs to exclude certain people or behaviours*" contributed to the lower inclusiveness score as there were signs observed at every intersection with a street, excluding those who primarily use private motorised vehicles (figure 11). The temporariness of the repurposed Friedrichstr. was very visible in the street infrastructure layout as it was still interpretable as a car-street. This was highlighted during the observation rounds as pedestrians in the street mostly kept to the designated footpaths and crossovers (figure 12). This behaviour could be seen as a lingering effect of the space's prior function and design, suggesting that the transformation of a space does not automatically equate to an instantaneous shift in usage patterns. Consequently, this could have contributed to the lower inclusiveness score for the repurposed Friedrichstr. It also raises questions about whether the duration of 'project Friedrichstrasse' might have been temporary for too long, resulting in more opposition (Berlin-Brandenburg, 2023; Goodman, 2022; Marcus, 2022).

Figure 11 Street sign and fence excluding private motorised vehicles (Author, 2023)

Figure 12 Pedestrians in the repurposed Friedrichstr. crossing the street at the designated crossing as if it were still a car-street (Author, 2023)

Meaningful activities

The repurposed Friedrichstr. scored comparably high on meaningful activities (22.22). This can be attributed to the high scores on "*community-gathering third places*", "availability of food", although there was a significant difference between day and night as many shops and third places were closed in the evening resulting in a lower score. Also, moderate "space flexibility" was noted, such as temporary furniture used for seating and skateboarding. Gehl (2011) and Mehta (2014) emphasise that public spaces should encourage casual, spontaneous interactions and meet a variety of needs. However, the design of the place was perceived as not inviting at all (figure 13). Its lack of character, comfort, greenery, lively atmosphere, and terraces discourages outdoor social interaction and lingering (Gehl, 2011). The high vacancy rate of shops, possibly due to street repurposing and targeting a specific consumer base, intriguingly relates to the perceived failure of the TUA. The presence of upscale stores may discourage people from lingering. It does not promote continuous usage of space, therefore it discourages place attachment (Jacobs, 1961). This also becomes evident from the recent decision to turn the repurposed street back into a car street by July 1st this year (Berlin-Brandenburg, 2023).

Figure 13 lack of character, greenery, terraces and comfort discourages people to use the space (Author, 2023)

Comfort

The score for comfort is the same as for the non-repurposed section, suggesting that the repurposing has not affected this aspect substantially. The repurposed Friedrichstr. scored (15.8/30). This can be attributed to high scores for "*seating provided by businesses*", "*free seating*", "*speed of pedestrians walking*" and "*design elements discouraging use of space*". It should be noted that there is a substantial difference between seating provided by businesses during the day and the night. At night, there were no seatings offered by businesses at all, resulting in a lower score. The use of the seating furniture was also heavily influenced by the weather. On the cold and windy day not many people used the seating area, whilst during the sunny day the seating area was very much used (figures 14 and 15), which corresponds with Whyte (1980) findings on climatic comfort in spring. However, during the summer months this will pose a problem as people will seek shading which this place does not offer enough of. This is something that planners should be aware of during the design process.

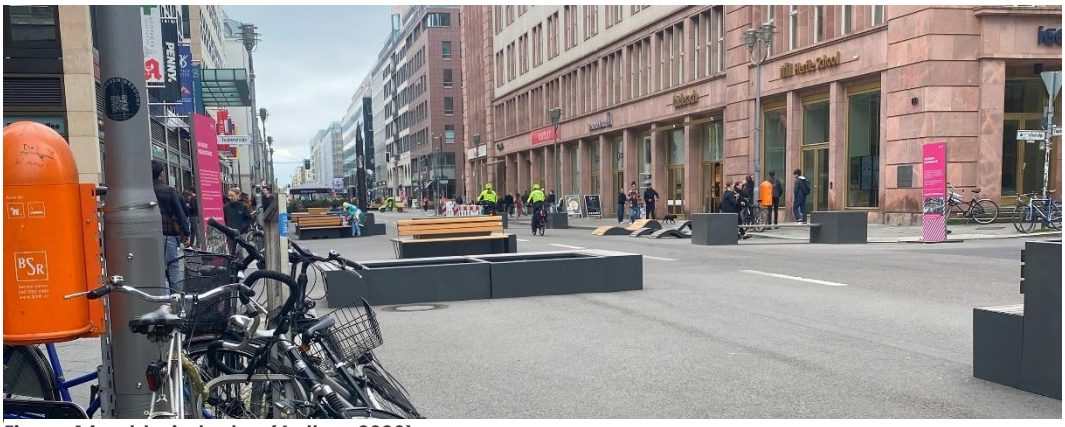

Figure 14 cold windy day (Author, 2023)

Figure 15 sunny day (Author, 2023)

Figure 16 Broken light (Author, 2023)

Safety

The repurposed Friedrichstr. (25/30) scored the same as the non-repurposed Friedrichstr., which raises questions about whether TUA interventions actually impacted safety perceptions and whether these changes are misaligned with the objectives of the SDGs. The score can be attributed to the low amount of "*Graffiti*" present (James & O'Boyle, 2019), and the very good "*physical condition and maintenance of the space*". Contrary to the day data collection, social control of 'eyes on the street' was very limited during the night, contributing to a lower sense of safety (Jacobs, 1961). The street scored relatively high on the "*lighting quality after dark*" variable, however, the measurements for this variable were taken twice during the day and once at night, which might not be considered representative. The availability of lanterns in the space was counted during the day although the quality of lighting could not be assessed. During the night assessment some lanterns did not function

properly (figure 16), resulting in a lower score. It could be questioned whether these results should be included in the safety score because of the inconsistency in interpretation during the collection rounds. However, it is interesting to note that although the infrastructure for adequate lighting is present, it does not say much about the actual quality of the lighting. Therefore, for future research it might be valuable to assess both presence and quality of lighting.

Pleasurability

Pleasurability scored comparably low in repurposed Friedrichstr. (16.19). This may suggest that the TUA interventions have affected the aesthetic appeal of the street and perhaps not fully considered the sensory qualities that contribute to a pleasurable urban experience. Lynch (1964) and Pallasmaa (2012) state that pleasurability encompasses the aesthetic and sensory qualities of a space. However, the randomly allocated furniture, the lack of memorable architecture, greenery and sense of enclosure made the space seem unattractive and chaotic (figure 17 and 18). It scored especially poor on sense of enclosure (0) due to the lack of human scale (the street seemed too open and wide in relation to the buildings) and the high level of sky exposure, therefore failing to encapsulate the pedestrian (Porta & Renne, 2005). This could have been improved by adding trees at the edges of the sidewalks.

Figure 17 poor sense of enclosure (Author, 2023)

Figure 18 no greenery (Author, 2023)

Bergmannstraße

Figure 17 signs excluding certain behaviour or people (Author, 2023)

Inclusiveness

Inclusiveness scored moderately (19.79/30). The "*presence of people of diverse ages*" varied at different times of the day and was comparably low to the other streets. A higher score implies a more diverse crowd age-wise. "*Presence of people with diverse physical abilities*" scored very limited, suggesting limited diversity in physical abilities among the observed people. "*Control of entrance to public space*" and "*range (variety) of activities and behaviours*" scored medium. There were fences at each side of the repurposed section that were supposed to keep car traffic out, although, this was not always the case, as some cars drove past the fence. The variety of activities seen on Bergmannstraße could change significantly. It was used as a gathering space for a dance group, school pupils hung around during their school breaks and many cyclists passed through the area. This suggests that the space encourages diverse groups of people to use the space (Amin, 2008). "*The presence of posted signs to exclude certain people or behaviours*" (figure 19) scored moderately, due to the presence of signs excluding motorised vehicles.

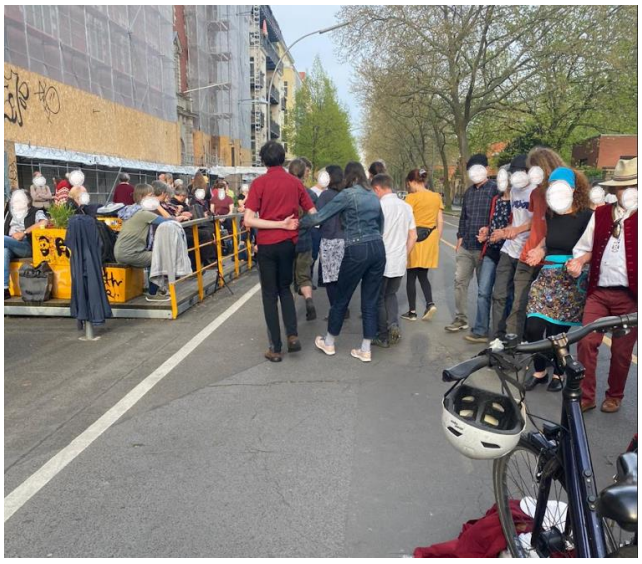

Figure 18 Parklet used by a dancing group during the evening (Author, 2023)

Meaningful activities

Meaningful activities scored moderately (19.16/30). The place scored high on "*space flexibility to suit user needs*". The street had almost no fixed design elements which made modification of the space more possible to suit user needs (figure 20). The parklet motivated people to spend time outside and facilitated interactions with other people outdoors which can make a substantial difference in the quality of life of city residents (Gehl, 2011). The street also had two restaurants/cafés at the edges of the street which is why it scored relatively high on the "*availability of food*" variable during the day. During the evening measurement,

both places were closed resulting in a low score, meaning the time of day influenced the score. Variety of businesses scored the lowest out of all streets as there were only a school, two restaurants and a graveyard in the repurposed street section.

Figure 19 Trees offering shade for pedestrians (Author, 2023)

Comfort

Bergmannstr. high score (20/30) in comfort implies that the TUA initiatives might have effectively introduced elements that contribute to the sense of comfort, such as designated seatings without paying for goods and the parklet. Trees and buildings offered climatic comfort in some parts of the space (figure 21). These environmental and physical aspects influence the psychological and physical wellbeing of the city's inhabitants (Mehta, 2014). However, the space scored very low on seating provided by businesses as there weren't any businesses located in the repurposed street section. The speed of pedestrians walking during the day was moderate, however, during the evening measurements it was very fast, indicating that time of day and a lack of "eyes on the street" might have played a role in the comfortable feeling of the space.

Figure 20 Graffiti (Author, 2023)

Safety

The comparably low "*safety*" score in Bergmannstr. (15) was a result of the very low score it got for the "graffiti" variable, as there was a lot of graffiti of the buildings and street furniture (figure 22). However, the overall experience was rather pleasant. Moreover, at night the street was mostly well-lit and the researcher who collected the data noted that they felt safe regardless of the lack of "*eyes on the street*" and the high amount of graffiti present, contradicting what Jacobs (1961) and Newman (1973) emphasise say about the importance of good visibility, adequate lighting, and "eyes on the street". This contradicts

the overall score for "*safety*" and raises questions about whether the variables that were chosen to assess this aspect were sufficient to determine the impacts of Tactical Urbanism interventions on safety perceptions.

Figure 21 Architectural features (Author,2023)

Pleasurability

Pleasurability scored moderately (18.10/30), suggesting mixed perceptions of the aesthetic changes. It scored very good on "*presence of memorable architectural and landscape features*" and "*sense of enclosure*", however it scored very low on the "*permeability and personalisation of building facades*" because large parts of the school were in scaffolding, making it impossible to see through the windows. The "*density and variety of elements offering sensory complexity*" and "*Articulation and variety in architectural features of building facades*" scored very high during the day and very low during the night measurements, suggesting that the time of day played a large role in the pleasurable experience of the space. The area had many natural elements such as trees and bushes, and classical buildings (figure 23) which contributed to a positive and pleasurable experience of the space (Lynch, 1964; Pallasmaa, 2012).

Ch. 5 Conclusion

The results of the three sites in Berlin provide an interesting insight into the effects of Tactical Urbanism initiatives on the quality of public spaces. TUA aims to create quick and affordable changes to urban spaces to foster inclusivity and cater to citizen's needs, aligning with the SDGs' objectives of fostering inclusive, safe, resilient, and sustainable cities. However, the research findings suggest a more nuanced relationship between these theoretical concepts and the realities of the studied spaces. The repurposed Friedrichstr. has been a 'temporary street experiment' for some time. It could be argued that the duration of the temporary redesign of the street might have taken too long to find political and societal acceptance to push it towards permanent policy implementation. Since the repurposed Friedrichstr. will be transformed back to a car street on July 1st 2023, one might say that the experiment has failed. Nonetheless, the repurposing of the street did start an important discourse about moving towards more sustainable mobility alternatives and a fairer distribution of public space. Based on the results of this research, both repurposed Friedrichstr. and Bergmannstr. did not necessarily facilitate a more inclusive, comfortable, safe and pleasurable environment. This could be an indication that while TUA aims to foster those aspects, the implementation may unintentionally create new barriers. The lack of character, climatic comfort, greenery, terraces and redesign of the car-street layout in repurposed Friedrichstrasse did not encourage pedestrians to use the space to its full potential of becoming the place of stay/*pedestrian-zone* that the municipality was aiming for. Repurposing alone may not necessarily improve the comfort level of a street, and other factors, such as existing amenities, location and the specific interventions implemented, play a crucial role. While TUA initiatives can introduce new aesthetic elements, they may also disrupt existing sensory qualities, thereby affecting the overall pleasurability of the space. Moreover, not all interventions will have the same effect across different sites, and it's crucial to consider the unique characteristics and potentials of each area. The results underscore the need for further research into what kinds of interventions are most effective in reflecting community values and needs. Mehta's PSI could be a valuable tool as it emphasises user experiences. Researchers could gain deeper insights into the impact of various interventions, ultimately leading to more effective and community-oriented urban designs. Additionally, inclusiveness can be encouraged by making citizen and stakeholder engagement an integral part of the design process of TUA initiatives. In doing so, Berlin's planners and designers could potentially accelerate the process of gaining political and societal acceptance for TUAs, fostering a speedier transition from temporary to permanent policies to reach a higher level of sustainability.

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Ch. 7 Appendix

7.1 Data Collection Instrument Google Form

Date:

Date

dd-mm-jjjj

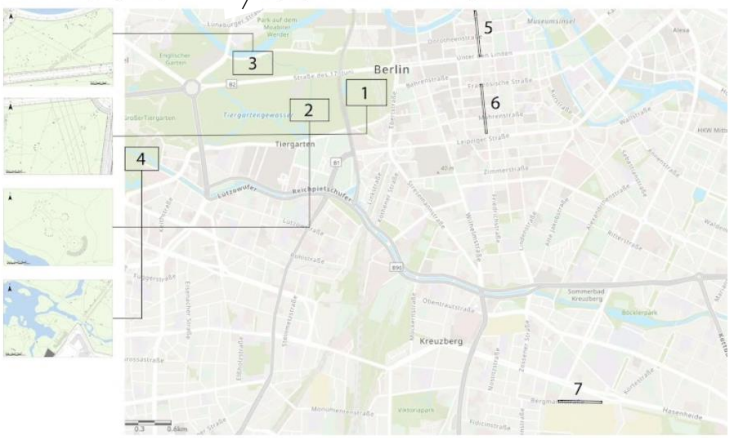
Time

Time

: AM

Research area:

1 - Tiergarten entrance
2 - Venusbassin (Tiergarten)
3 - Middle North (Tiergarten)
4 - Neuer See (Tiergarten)
6 - Pedestrianised section of street Friedrichstraße between französischestraße and Leipzigerstraße.
5 - Non-pedestrianised Friedrichstraße at the north-side.
7 - Repurposed street section at Bergmannstraße 60



- 1 - Tiergarten
- 2 - Tiergarten
- 3 - Tiergarten
- 4 - Tiergarten
- 5 - non-pedestrianised Friedrichstraße
- 6 - pedestrianised Friedrichstraße
- 7 - Bergmannstraße

Inclusiveness:

Presence of people of diverse ages:

- ◯ 0 - very limited
- ◯ 1 - low
- ◯ 2 - medium
- ◯ 3 - high

Presence of people with diverse physical abilities:

- ◯ 0 - very limited
- ◯ 1 - low
- ◯ 2 - medium
- ◯ 3 - high

Control of entrance to public space: presence of lockable gates, fences, etc:

- ◯ 3 - none
- ◯ 2 - low
- ◯ 1 - medium
- ◯ 0 - high

Range (variety) of activities and behaviours:

- ◯ 3 - very limited
- ◯ 2 - low
- ◯ 1 - medium
- ◯ 0 - high

Opening hours of public space:

- ◯ 0 - very limited < 10 hours
- ◯ 1 - open at least 10 hours
- ◯ 2 - open most hours
- ◯ 3 - no restrictions

Presence of posted signs to exclude certain people or behaviours:

- ◯ 3 - none
- ◯ 2 - somewhat
- ◯ 1 - moderately
- ◯ 0 - very much

Meaningful activities:

Presence of community-gathering third places:

- ◯ 0 - none
- ◯ 1 - one
- ◯ 2 - two
- ◯ 3 - few

Space flexibility to suit user needs:

- ◯ 0 - none
- ◯ 1 - somewhat flexible
- ◯ 2 - moderately flexible
- ◯ 3 - very flexible

Availability of food within or at the edges of the space:

- ◯ 0 - none
- ◯ 1 - one
- ◯ 2 - two
- ◯ 3 - several

Variety of businesses and other uses at the edges of the space:

- ◯ 0 - none
- ◯ 1 - very little
- ◯ 2 - moderate
- ◯ 3 - high

Comfort:

Designated seatings without paying for goods and services

- ◯ 0 - none
- ◯ 1 - few
- ◯ 2 - several in some parts of space
- ◯ 3 - several in many parts of space

Seating provided by businesses

- ◯ 0 - none
- ◯ 1 - few
- ◯ 2 - several in some parts of space
- ◯ 3 - several in many parts of space

Other furniture and artifacts in the space

- ◯ 0 - none
- ◯ 1 - few
- ◯ 2 - several in some parts of space
- ◯ 3 - several in many parts of space

Climatic comfort of the space - shade and shelter

- ◯ 0 - not comfortable
- ◯ 1 - somewhat comfortable in some parts of space
- ◯ 2 - comfortable in some parts of space
- ◯ 3 - comfortable in most of the space

Design elements discouraging use of space

- ◯ 3 - none
- ◯ 2 - one or two
- ◯ 1 - few (3-6)
- ◯ 0 - several (7+)

Speed (pace) of pedestrians walking

- ◯ 0 - very fast
- ◯ 1 - quick step
- ◯ 2 - moderate
- ◯ 3 - slow

Safety:

Visual and physical connection and openness to adjacent street/s or spaces:

- ◯ 0 - almost none
- ◯ 1 - somewhat tentative
- ◯ 2 - moderately well connected
- ◯ 3 - very well connected

Physical condition and maintenance appropriate for the space:

- ◯ 0 - not at all
- ◯ 1 - somewhat
- ◯ 2 - mostly
- ◯ 3 - very much

Lighting quality in space after dark:

- ◯ 0 - very poor
- ◯ 1 - many parts not well lit
- ◯ 2 - mostly well lit
- ◯ 3 - very well lit

Graffiti;

- ◯ 0 - none
- ◯ 1 - few
- ◯ 2 - moderate
- ◯ 3 - several

Pleasurability for street:

Presence of memorable architectural or landscape features (imageability):

- ◯ 0 - none
- ◯ 1 - very few
- ◯ 2 - moderate
- ◯ 3 - several

Sense of enclosure:

- ◯ 0 - very poor
- ◯ 1 - moderately well
- ◯ 2 - good
- ◯ 3 - very good

Permeability of building facades on the streetfront:

- ◯ 0 - not at all
- ◯ 1 - some parts somewhat permeable
- ◯ 2 - moderate permeability
- ◯ 3 - very permeable all along

Personalization of the buildings on the streetfront

- ◯ 0 - not at all
- ◯ 1 - some parts somewhat personalized
- ◯ 2 - moderate personalization
- ◯ 3 - very personalized all along

Articulation and variety in architectural features of building facades on the streetfront:

- ◯ 0 - poor articulation and variety
- ◯ 1 - somewhat articulated
- ◯ 2 - moderate articulation
- ◯ 3 - very well articulated

Density of elements on sidewalk/street providing sensory complexity:

- ◯ 0 - none or very few
- ◯ 1 - few
- ◯ 2 - moderate
- ◯ 3 - high

Variety of elements on sidewalk/street providing sensory complexity:

- ◯ 0 - none
- ◯ 1 - very little
- ◯ 2 - moderate
- ◯ 3 - high

7.2 Dataset different times of day

Date	Time	Time of the day	Area	Inclusiveness	Meaningful activities	Comfort	Safety	Pleasurability
2-5-2023	11:50:00 AM	morning	5 - Friedrichstraße	24,16666667	25	15	20	25,71428571
2-5-2023	12:40:00 PM	afternoon	6 - Friedrichstraße	20,83333333	28,33333333	16,25	20	11,42857143
2-5-2023	4:50:00 PM	afternoon	7 - Bergmannstraße	19,58333333	16,66666667	20	10	20
3-5-2023	10:36:00 AM	morning	7 - Bergmannstraße	20	21,66666667	20	10	22,85714286
3-5-2023	11:13:00 AM	morning	6 - Friedrichstraße	13,75	26,66666667	16,25	20	11,42857143
3-5-2023	5:12:00 PM	afternoon	5 - Friedrichstraße	24,16666667	25	16,25	20	28,57142857
4-5-2023	9:47:00 PM	evening	5 - Friedrichstraße	23,33333333	8,333333333	16,25	17,5	24,28571429
4-5-2023	9:53:00 PM	evening	6 - Friedrichstraße	21,25	11,66666667	15	15	11,42857143
4-5-2023	11:45:00 PM	evening	7 - Bergmannstraße	17,5	6,666666667	12,5	10	11,42857143

7.3 Public Space Index: Variable definitions

This study employs a method that is not all-encompassing. It does not account for every possible public space where people interact or socialize. However, by having a clear structure or set of standards for looking at public spaces, this approach can still provide valuable insights. It allows us to examine and assess important areas where people gather, interact, and engage in public life. Even though it is not covering every aspect of life in public spaces, the research can still offer important information about the parts of the public spaces that it does cover.

Inclusiveness

(1) *Presence of people of diverse ages* - can be measured by classification in four categories: children, young adults, middle-aged adults and elderly people, and assigning a value (0 - very limited, 1- low, 2 - medium, 3 - high) based on counts.

(2) *Presence of people with diverse physical abilities* - can be measured by counting people with limited physical abilities (e.g. people using wheel chairs), and assigning a value (0-3) based on counts. (0 - very limited, 1- low, 2 - medium, 3 - high)

(3) *Control of entrance to public space: presence of lockable gates, fences, etc*. - can be measured by looking for elements that control the entrance to the space, and assigning a value (3 - none, 2 - low, 1 - medium, 0 - high).

(4) *Range of activities and behaviours* – can be measured by looking at the diversity of activities, behaviours and postures of people. (e.g.: walking, sitting, standing still, shopping, playing music, eating, etc.). Rate how well the place supports various activities and behaviours or not, and assign a value of: 0 – very limited; 1 – low; 2 – medium; 3 – high.

(5) *Opening hours of public space* - can be measured by looking for signs stating the opening times of the space and assigning a value: 0 - very limited < 10 hours, 1 - open at least 10 hours, 2 - open most hours, 3 - no restrictions.

(6) *Presence of posted signs to exclude certain people or behaviours* - can be measured by looking at (and counting) signs, their location, size and wording, and assigning a value (3 - none, 2 - somewhat, 1 - moderately, 0 - very much).

Meaningful Activities

(7) Presence of community gathering third places: Definition in Oldenburg (1999) states that community gathering third places are places that have little or no financial barriers to entry. Conversation is primary. (e.g. Starbucks, Coffee shops, French cafés) Has a home-like, cosy feeling and is a place where people can spend time between home and work. Assign a value: (0 – none; 1 – one; 2 – two; 3 – few.)

(8) Space flexibility to suit user needs: Determined by observing the possibility of modifying the space to suit user needs. Look at fixed design elements and flexible design elements (poles, benches, streets, street thresholds, urban infrastructure, etc). Assign value: (0 - none, 1 – somewhat flexible, 2 – moderately flexible, 3 - very flexible)

(9) Availability of food within or at the edges of the space: Determined by observing cafés, restaurants, food stands, kiosks etc. at the edges or within the space. (0 – none; 1 – one; 2 – two; 3 – several.)

(10) Variety of businesses and other uses at the edges of the space: Determined by observing using counts. (0 – none; 1 – very little; 2 – moderate; 3 – high)

Comfort

(11) Designated seatings without paying for goods and services: Determined by observation using counts. Assign value: (0 – none; 1 – few; 2 – several in some parts of space; 3 – several in many parts of space)

(12) Seating provided by businesses: determined by observation using counts. Think of terraces and benches provided by restaurants and cafés (0 – none; 1 – few; 2 – several in some parts of space; 3 – several in many parts of space)

(13) Other furniture and artifacts in the space: determined by observation using counts. Think of ornaments, poles and pillars, plant pots, bus stops etc. (0 – none; 1 – few; 2 – several in some parts of space; 3 – several in many parts of space).

(14) Climatic comfort of the space - shade and shelter: Determined by observations. Shade and shelter can be provided by arcades, trees, parasols, buildings to protect people from temperature, sunlight, rain and wind, etc. (0 – not comfortable; 1 – somewhat comfortable in some parts of the space; 2 – comfortable in some parts of the space; 3 - comfortable in most parts of the space)

(15) Design elements discouraging use of space: Determined by observation. Design elements such as poles or fences separating car and pedestrian street, spikes in windowsills preventing people to sit etc. (3 – none; 2 – one or two; 1 – few(3-6); 0 – several(7+)).

(16) Speed (pace) of pedestrians walking: determined by observation. Speed of pedestrians says something about how comfortable they feel in a space (slow speed = safe and comfortable feel, maybe leisure; fast pace = not comfortable, in a hurry, commuter, unsafe) (0 – very fast; 1 - quick step; 2 – moderate; 3 – slow)

Safety

(17) Visual and physical connection and openness to adjacent streets or spaces: lets people change streets and turn corners - can be measured by looking at and counting streets/spaces that are connected and assigning a value: 0 = almost none or very poor, 1 = somewhat tentative, 2 = moderately well connected, 3 = very well connected

(18) Physical condition and maintenance appropriate for the space: can be measured by observation, can be measured by assigning a value: 0 = not at all, 1 = somewhat, 2 = mostly, 3 = very much

(19) Lightning quality in space after dark: can be measured by looking at how well lit the place is, (are there many lanterns, are there any broken ones that darken a space) and assigning a value 0 = very poor, 1 = many part not well lit, 2 = mostly well lit, 3 = very well lit

(20) Graffiti: studies show that spaces including graffiti score significantly lower on safety than spaces without graffiti (James & O'Boyle, 2019). (3 – none; 2 – one or two; 1 – few(3-6); 0 – several(7+)).

Pleasurability

Pleasurability: Lynch (1964) definition of imageability - "quality in a physical object which gives it a high probability of evoking a strong image in any given observer"; mental image of physical attributes of a space (shape, colour, environment arrangement)

(21) *Presence of memorable architectural or landscape features (imageability)* - Lynch mental image; refers to the spatial configuration and layout of the street in a sense of perceived pleasurability based on the physical attributes; can be measured by looking at (and counting) the major specific features that create a mental image (e.g. buildings, monuments, flower gardens, etc.) and assigning a value (0 - none, 1 - very few, 2 - moderate, 3 - several).

(22) *Sense of enclosure – "Sky exposure is the amount of sky visible in each photograph, where trees are considered as opaque, the same as buildings or other permanent man-made objects. This measurement seeks to understand the urban environments' ability to encapsulate the pedestrian. The designer can relate this information to the person's sense of intimacy through enclosure"* (Porta & Renne, 2005). It also refers to the vertical dimension (height - width proportion) of the space (buildings, trees, walls), the ratio theory justified by the pedestrian perspective (mostly applied to streets, standards of spatial enclosure 1:1) ; can be measured by looking at (and assessing) the fit between the perceived height and width of the space relative to the human scale and assigning a value (0 - very poor, 1 - moderately well, 2 - good, 3 - very good); n.b: some of the best public space examples do *not* comply with the ratio theory.

(23) *Permeability of building facades on the streetfront* - can be determined by looking at how much of the activity beyond the facades on the streetfront can be seen (Mehta, 2014), and assigning a value 0 = not at all, 1 = some parts are somewhat permeable, 2 = moderate permeability, 3 = very permeable all along.

(24) Personalisation of the buildings on the streetfront - can be determined by looking at personalized shop, windows, signs, trees, and density and variety of form, texture and color of shrubs and plants (Mehta, 2014), and assigning a value 0 = not at all, 1 = some parts somewhat personalized, 2 = moderately personalized, 3 = very personalized all along

(25) Articulation and variety in architectural features of building facades on the streetfront - can be determined by looking at "colors, shapes, patterns, textures, forms, coherence, order of buildings," (Metha, 2014) and assign a value 0 = poor articulation and variety, 1 = somewhat articulated, 2 = moderate articulation, 3 = very well-articulated

(26) Density of elements on sidewalk/street providing sensory complexity - variety and novelty, order and coherence, activities of people, building features that heighten interest (Metha, 2014) determined by observations using counts, and assigning a value of 0 = none or very few, 1 = few, 2 = moderate, 3 = high

(27) Variety of elements on sidewalk/street providing sensory complexity - determined by observation using counts by looking at order and coherence, activities of people, building features that heighten interest (Metha, 2014), and adding a value of 0 = none, 1 = very little, 2 = moderate, 3 = high

7.4 Calculation weighted values for each variable

The data was gathered in an Excel sheet.

Weighted variables score based on the ratio and calculation of Mehta (2014).

1. Each aspect should have a total of 10 (according to Mehta's calculations (2014), therefore: x (a+b+c+…) = 10, x = 10 / (a+b+c+..)
x = weighted factor
a, b, c, … = original variable scores
2. Multiplying all the variables by the corresponding weighted factor x, for each aspect.