Master's thesis

NTNU
Norwegian University of Science and Technology
Faculty of Architecture and Design
Department of Architecture and Planning

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Walkability and Inclusive Spaces

A study on Walkability and Inclusiveness in Small Norwegian cities

Master's thesis in Urban Ecological Planning
Supervisor: Tanu Priya Uteng
July 2023

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Abstract

This thesis explores walkability, inclusive mobility, and urban spaces in small Norwegian cities, aiming to understand how walkability can create inclusive spaces and promote sustainable transportation. It focuses on the importance of walkability in designing inclusive spaces, the role of different population groups in shaping inclusive mobility, the varying needs for walking among sociodemographic groups, areas for improvement in walkability planning in small cities, and applicable methodologies.

The literature review emphasizes the significance of walkability in urban planning and explores the concept of the 15-minute city and the intersectionality of walkability with other urban planning concepts.

Grounded in Social Practice Theory and the right to the city, the theoretical framework emphasizes understanding the social and material aspects influencing walking practices and promoting equitable access to urban resources. The research methodology combines qualitative and quantitative methods to analyze walkability and its relationship with different population groups.

Findings highlight the importance of walkability in designing inclusive spaces, promoting active mobility, and equitable access to services. The findings indicated that the needs regarding walking vary among sociodemographic groups, considering factors like infrastructure, amenities, and attractiveness. Furthermore, the quantitative analyses exhibited that gender, age, and the time one has lived in a city, affected the inhabitants' perception of the city center's walkability. Moreover, gender, age, education level, and holding a driver's license had significant effects on the population's walking behavior during different seasons. Areas for improvement include goal-setting, stakeholder engagement, and alignment with urban sustainability objectives.

Implications include the need for comprehensive assessment frameworks, considering demographic shifts and population needs in sustainable transportation planning, and integrating qualitative and quantitative methods. The research contributes to the discussion on walkability and provides recommendations for creating walkable and inclusive cities.

Keywords: Walkability, Inclusive mobility, Small Norwegian cities, Social Practice Theory, Right to the city, 15-minute city.

Sammendrag

Denne masteroppgaven utforsker gangvennlighet, inkluderende mobilitet og byrom i mindre norske byer med et mål om å forstå hvordan gangvennlighet kan skape inkluderende rom og fremme bærekraftig transport. Fokuset ligger på viktigheten av gangvennlighet i utformingen av inkluderende rom, rollen til ulike befolkningsgrupper i utformingen av inkluderende mobilitet, hvordan ulike befolkningsgrupper påvirker utformingen av inkluderende mobilitet, de ulike behovene for å gå i forskjellige sosiodemografiske grupper, forbedringspunkter i planleggingen av gangvennlighet i mindre byer og anvendelige metoder.

Litteraturstudiet tydeliggjør betydningen av gangvennlighet i byplanlegging og utforsker konseptet 15-minuttersbyer og skjæringspunktet mellom gangvennlighet og andre aspekter innen byplanlegging.

Med grunnlag i sosial praksisteori og retten til byen legger det teoretiske rammeverket vekt på å forstå de sosiale og fysiske aspektene som påvirker våre gåvaner og fremme rettferdig tilgang til urbane ressurser. Forskningsmetodikken kombinerer kvalitative og kvantitative metoder for å analysere gangvennlighet og dens forskjeller i ulike befolkningsgrupper.

Funnene fremhever viktigheten av gangvennlighet når man designer inkluderende rom, fremmer aktiv mobilitet og rettferdig tilgang til tjenester. De indikerer at kravene for å kunne gå varierer blant de sosiodemografiske gruppene med tanke på faktorer som infrastruktur, fasiliteter og attraktivitet. De kvantitative analysene viste at kjønn, alder og hvor lenge man har bodd i byen påvirker innbyggernes oppfatning av gangvennligheten i sentrum. I tillegg påvirket kjønn, alder, utdanningsnivå og førerkort befolkningens gåvaner i de ulike årstidene betydelig. Forbedringspunkter inkluderer tydelige målsetninger, interessentengasjement og tilpasning til urbane bærekraftsmål.

Resultatene impliserer behovet for utfyllende vurderingsrammer som tar hensyn til demografiske endringer og befolkningsbehov i bærekraftig transportplanlegging samt integrering av kvalitative og kvantitative metoder. Forskningen bidrar til diskusjonen om gangvennlighet og gir anbefalinger for å skape gangbare og inkluderende byer.

Nøkkelord: Gangvennlighet, inkluderende mobilitet, små norske byer, sosial praksisteori, retten til byen, 15-minuttersbyer.

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Table of Contents

List of Figures

List of Tables

Chapter 1

Introduction

Walkability, as well as inclusive mobility and urban spaces, have gained significant attention in the urban planning discourse as essential factors in transitions toward more sustainable and lively cities. Walkable environments facilitate pedestrian-friendly infrastructure, promote active modes of transportation, and contribute to improved public health and well-being. Additionally, inclusive mobility and design ensure accessibility for all individuals, including those with diverse mobility needs. These topics have been broadly explored in various global contexts. Similarly, projects and opportunities regarding walkability in major Norwegian cities such as Oslo and Trondheim have been largely focused on. However, smaller Norwegian cities have gained less attention in that matter. Therefore it is crucial to examine walkability, mobility, inclusive urban spaces, and their specific implications and challenges within small Norwegian cities.

Norway, where environmental sustainability, high-quality urban design, and social equality commitments and goals have extensively been on the national policy-making agenda, provides an interesting case study for exploring the intersection of walkability, inclusive mobility, and urban spaces. The country's unique geographical features, urban structure, and transportation policies create opportunities and challenges for creating pedestrian-friendly cities. Understanding the factors influencing walkability, inclusive mobility, and urban spaces in Norway can contribute to developing adequate strategies and interventions to enhance the pedestrian experience, promote sustainable and inclusive transportation, and improve urban livability. This contribution is far more crucial in the case of

smaller Norwegian urban areas where car dependency is dominant.

This introduction aims to provide an overview of this thesis regarding the background, gaps, topic, and questions. First, the existing research and policies regarding walkability and the relevant accomplishments in Norway will be discussed to find the gaps and shortcomings. Accordingly, the research topic and the focus of the study will be introduced concerning the identified gaps. Finally, the main research question based on the research focus will be initiated and divided into sub-research questions.

1.1 Background and research gap

In this section, the aim is to review what has already been done regarding walkability in Norway. It includes an overview of policies, frameworks, and methods generated to promote walkability in Norway. In addition, this part explores studies on Norwegian cases that address related shortcomings related to the walkability notion.

Norway considers active mobility an essential component of its transport policy, contributing to its goals of reducing greenhouse gas emissions, promoting public health, and developing livable and sustainable cities [94]. Active mobility reduces congestion, improves air quality, and encourages physical activity, which can benefit public health. However, the country faces various challenges in promoting walking and cycling, including unfavorable weather conditions, topography, and limited infrastructure. The government recommends several policy measures, such as investing in cycling infrastructure, promoting road safety for pedestrians and cyclists, and providing incentives for active mobility. Norway has implemented various initiatives, including the ”National Cycle Routes” and ”School Road” programs, which aim to create a network of safe and attractive cycle routes and encourage children to walk or cycle to school. Civil society, the private sector, and research institutions also contribute to promoting walking and cycling through public awareness campaigns, corporate social responsibility programs, and research on active mobility. The government in Norway calls for greater collaboration among the government, civil society, and the private sector to promote active mobility and achieve sustainable development goals [94].

As the context of the study in this thesis, Norway prepares a national transport plan every four years. The Norwegian government produces the agenda as a white paper and presents it as a proposal to the parliament for approval [95]. The 2022-2023 national transport plan introduces five objectives to achieve by 2050, as shown in Figure 1.1. The report's only mention of inclusive mobility is in the fifth objective, which addresses ease of travel and increased competition. The aims of the national transport plan regarding this issue address the inclusiveness of the transport system regardless of age and functional ability under the universal design of travel chains and exclusive attention to children and the young population. Concerning walkability, other than the focus on the population groups, the plan pays attention to factors such as safety and infrastructure maintenance. A pivotal strategy focused on cycling (and walking) is the initiation of grants and support for the development of such travel modes in smaller urban areas [95].

Figure 1.1: Policy objectives for the Norwegian transport sector, [95].

The Norwegian public roads administration has provided a national-level walking strategy to be implemented by the municipalities. The plans direct the details and decisions to local municipalities. The reason is that municipal governments hold a holistic insight into the stakeholders' needs and have authority over interventions [144]. Figure 1.2 illustrates the hierarchy and planning system for the national walking strategy.

Figure 1.2: The planning system with regards to the walking strategy, [144].

The national walking strategy, established in 2012 as a part of the 2014-2023 national transportation plan, had two central goals. First, walking should be attractive to everyone, meaning that all population groups notice the motivational arrangements regarding this goal and notice walking as an interesting routine practice. The second goal is to increase the number of people and walking trips, which indicates that walking should be the mode of transport for a noticeable number of the population's total trips, and all population groups should walk more daily [145]. To achieve the goals, the Norwegian public roads administration composed six objectives to direct the municipalities and other actors in the planning process, shown in Table 1.1.

Table 1.1: Local walking strategies for Norwegian municipalities, [144].

Local Walking Strategy	Description
Land-use and densification	Providing services and mixed functions over shorter distances makes walking more attractive to citizens. For example, walking trips can be established as connection trips between different modes of travel. Additionally, pedestrian networks and public transport should be the priority in all urban development plans. Protecting green spaces must be regarded during these efforts.
Attractive environment	For the urban environments to be attractive, the mixture of functions, the quality of the buildings, and meaningful places are necessary. The municipalities can inspire developers and building owners to deliver better quality. The city should also contribute by creating better public meeting places and developing green areas.
Coherent pedestrian networks	Municipalities should undertake pedestrian behavior mapping and run needs assessments using various methods. Creating shortcuts in pedestrian networks' missing links, and providing safety and accessibility, especially for schools, are among the guidelines.
Maintenance	Regarding the adequate function and maintenance of the pedestrian infrastructure, municipalities are advised to follow the Norwegian public roads administration's handbook *111 standards*. Setting up routines and following up on the procedures, especially during the winter, helps maintain the quality of such facilities. Cooperation and agreements with building owners and private houses are a practical support system for ensuring safety and functionality.
Traffic interaction	Pedestrians should be the priority in designing traffic facilities by lowering the speed limits. To assess and address their needs in such designs, surveys, mapping, and citizen engagement are essential to forming a foundation for future safety and universal design measures. Another significant action is to provide enough space for cycling lanes and to divide them from pedestrian paths.
Development of active walking culture	This goal is attainable through two strategies of information handouts and participation. Suggestions include campaigns to encourage environment-friendly transport modes, especially campaigns focused on walking, and those advertising walking among children, youth, and the elderly. Other recommendations are cooperation with local organizations for walking encouragement, micro-mobility schemes, and local ambassadors.

Concerning sustainable development, Norway has initiated national-level and inter-municipal collaborations regarding urban development and transportation. Urban Growth Agreements (Byvekstavtaler) and Reward Agreements (Belønningsavtaler) are schemes that aim to reduce car-based transportation and promote walking, cycling, and public transit

as alternatives in Norway [108]. They are implemented in major urban areas and are financed through toll fees and contributions from the government and local authorities. Urban Growth Agreements replaced previous agreements, Urban Environment Agreements (Bymiljøavtaler) and Urban Growth Agreements (Byutviklingsavtaler), which focused on coordinating land-use and transportation policies. The initiative for Urban Growth Agreements is to achieve zero growth in car traffic by reducing greenhouse gas emissions, congestion, air pollution, and noise. The government plays a significant role by providing financial support for major public transit projects and increasing its contribution to these projects. City Assessments (Byutredninger), which are collaborative studies conducted by government agencies and local authorities, provide various strategies to achieve the zero-growth goal, being road tolls, urban densification, increased parking fees, improved public transit, pedestrian and cycling infrastructure, and reducing road capacity for cars. Reward Agreements, however, are incentive arrangements designed to improve mobility and environmental conditions in major urban areas by reducing car usage and increasing public transit ridership. These agreements are funded by the government and administered by local authorities responsible for public transit. Additionally, a new funding scheme has been introduced for smaller urban areas to support investments in pedestrian and cycling infrastructure as well as local public transit [108].

The guidelines are laid out for municipalities nationwide, and the funds and extensive projects concentrate on major cities such as Trondheim [83] and Oslo [47]. Additionally, few municipalities have focused on groups other than children and the young. Differentiating age groups, especially elderly groups, is a fundamental requirement in needs assessment regarding walking [67].

A critical review of the discussed national walking strategy by Brechan, from the Institute of Transport Economics (TØI) [12] presents assessments and recommendations on the goals set for Norway's pedestrian strategy. The report notes that the strategy's objectives are predominantly aligned with other national and global strategies, promoting sustainable urban transportation. It also indicates that the strategy's focus on enhancing pedestrian infrastructure and safety is well-founded and reflects a grasp of the advantages of active transport. However, the document delivers several critical standpoints on the strategy's objectives. For instance, the author states that the goals lack specificity and

are not always measurable, making progress assessment difficult and potential improvement recognition challenging. The report also argues that some of the strategy's goals may be overly ambitious or unobtainable within the designated time frame. To address the concerns, the report provides several suggestions for improving the national walking strategy's goals. These include establishing specific targets for each goal, incorporating feedback from stakeholders and users, and aligning the goals with broader urban sustainability objectives. The review also emphasizes the requirement for continuous monitoring and evaluation to ensure that Norway's national walking strategy effectively elevates walking as a mode of transportation [12].

A Knowledge Foundation for Walking Strategies is another report by TØI, prepared as a constitution for Oslo's establishing walking strategy [48]. The study identifies strategies and methods for promoting walking at the city, neighborhood, and infrastructure levels, as demonstrated in Table 1.2. The document highlights the importance of initiating supportive environments that make walking a safe, convenient, and enjoyable alternative for all users [48].

Table 1.2: Suggestions for walking strategy foundation, [48].

Urban Level	Suggestion
City (Macro)	• Implementing car-free zones in city centers • Creating walkable environments with mixed-use developments, compact and connected street networks, and well-designed public spaces
Neighborhood (Meso)	• Local retail and services within walking distance of residential areas • High-quality and attractive walking routes, including safe and accessible crossings and street furniture • Addressing safety concerns through traffic-calming measures and speed limit reduction • Local community involvement in the design and planning process
Infrastructure (Micro)	• Continuous and well-maintained sidewalks and pedestrian crossings • Ensuring adequate street lighting and visibility • Introducing pedestrian-only zones or shared spaces with low vehicle speeds • Public transport and active transport infrastructure investments to enable multimodal trips

Sweco [156] provides urban development and policy suggestions regarding transporta-

tion and mobility for a network of 18 small and medium-sized Nordic towns [1]. As a part of the study for the green transition and competitiveness in the Nordic urban region project, Firstly, the report suggests a set of indicators to measure transport sustainability, such as greenhouse gas emissions, travel time, and accessibility. It also underscores the importance of active modes of mobility, walking and cycling, and public transport in downsizing private car usage and promoting sustainable mobility. Additionally, the document presents a toolbox for promoting sustainable transport and mobility in the target regions. The toolbox incorporates measures including public transport improvements, cycling infrastructure, parking management, and travel planning. The document also suggests promoting electric vehicles and car-sharing to decrease the environmental impact of private cars. Finally, the study emphasizes the significance of integrated land use and transport planning to sustainable mobility. The methods related to this planning approach include generating compact and mixed-use urban areas with adequate access to public transport, cycling, and walking infrastructure. It also indicates that citizen and stakeholder involvement in planning processes is necessary to guarantee that the solutions are tailored to the local demands and preferences [156].

Exploring the crucial aspect of walking distances to public transport in both smaller and larger cities in Norway, Tennøy et al. explore the primary dimension of walking distances to public transport in both smaller and larger cities in Norway. The study aims to shed light on the disparities in access to public transportation infrastructure and how it affects the residents' daily lives [157]. Through an extensive analysis of data and mapping techniques, the researchers uncover notable differences in walking distances between the two types of cities. While larger cities tend to have more developed public transportation systems with shorter walking distances to stops and stations, smaller cities face challenges in providing comparable accessibility due to limited resources and lower population densities. The findings emphasize the importance of considering the spatial distribution of public transport services and the need for tailored strategies to improve accessibility in smaller cities. The article also highlights the significance of promoting active transportation modes, such as walking and cycling, as viable alternatives to public transport, particularly in smaller cities where distances may be more manageable. Altogether, this

[1] For the majority of public projects and policies, the Norwegian government employs consulting agencies and research institutes for assessment studies.

research provides a practical perspective into the complexities of public transportation accessibility in Norwegian cities, paving the way for informed policy decisions and urban planning initiatives aimed at mobility enhancement and sustainable transport options for all residents [157].

Nonetheless, the challenges and opportunities of implementing climate-friendly transport solutions in Norwegian rural areas, including the prevalent issue of car dependency, maintain. Tønnesen et al. uncover the deep-rooted challenges that rural communities face regarding transportation and its environmental implications. The article paints a vivid picture of the prevailing car-centric culture that permeates these regions, where sprawling landscapes and limited public transport options have led to an overreliance on private vehicles for daily commuting and access to essential services [161]. Through a comprehensive analysis of data and case studies, the authors highlight the negative consequences of this car dependency, ranging from increased carbon emissions and traffic congestion to social isolation and reduced quality of life. They convey the struggles faced by the residents who lack viable alternatives to car travel, often enduring long distances and limited connectivity to meet their daily needs. The authors also shed light on the intricate interaction between land-use patterns and transportation choices, emphasizing the importance of integrated planning approaches that foster compact, walkable communities and prioritize sustainable modes of transport. By revealing the extent of car dependency in rural areas, this article sparks a crucial conversation about the need for innovative solutions that promote climate-friendly transportation and enhance the well-being of rural inhabitants [161].

Among the planning projects in Norway that are funded by both the public and the private sector are the *Områdeløft* programs. *Områdeløft* or *area upliftment* is an urban planning method that undertakes physical and social measures to contribute to the holistic, lasting, and locally rooted development in less developed or marginalized urban areas [11]. The area upliftment method has been used in well-funded projects in a few Norwegian cities, including Oslo [99] and Trondheim [113]. In these projects, the focus areas undergo different area analyses to identify the challenges and to determine the strategies to resolve them [11][110][120]. In the proposal for the områdeløft projects, one of the primary methods is a collaboration among local stakeholders, with an emphasis on the involvement of

the residents in the decision-making process and giving them a voice in the development of the neighborhood [99][113]. Another fundamental method used is the physical environment upgrade that focuses on enhancing public spaces, such as streets, squares, and parks, and advancing universal access. In addition, the projects take measures to improve housing conditions and the overall urban landscape to enhance the quality of life for residents [99].

Områdeløft emphasizes the extent of socioeconomic development. It includes plans for local business development, employment opportunities, and education programs to improve the economic situation of the neighborhood [99]. The proposals also highlight the importance of strengthening the neighborhood's social fabric by facilitating community involvement and creating opportunities for social interaction [113].

Even though the urban upliftment and enhancement projects have comparatively taken social dimensions of planning into account, within the social and transportation planning discourse in Norway, gender and social background are demographic characteristics that, to some extent, have been undermined. Priya Uteng [171] brings attention to the issue of urban mobility and social exclusion focusing on immigrant non-western women in Norway. The study first elaborates on the background of gender and mobility intersection in the non-western context and its relationship with cultural norms. The research manifests that in Norway, a car-based lifestyle, which might be getting encouragement through mobility and transportation policies, led to the social exclusion of non-western immigrant women. However, other factors, such as geographical location and access to different kinds of spaces add up to the issue.

To support the discussion on the significance of demographic characteristics in planning for urban mobility in Norway, Sovacool et al. [136] is an example of research highlighting the importance of considering such factors in designing and implementing policies to promote sustainable transportation in the Nordic region. It examines the influence of demographic factors, including gender, education, occupation, age, and household size, on the preferences for electric mobility in the Nordic region. The authors utilize empirical data to analyze the relationship between these demographic factors and electric mobility preferences. The findings suggest that demographic factors play a significant role in shaping preferences for electric mobility and that policy interventions that address these

factors can promote sustainable transport solutions' adaptation [136]. This study also shows the significance and necessity of considering different population groups when developing mobility options.

To further explore the facilitation of choice and alternative, the assessment for developing mobility options by Leva Urban Design can be a fitting example. The study comprehensively reviews the advantages and challenges associated with active mobility in urban areas in the "NTNU Veien Videre" working document [70]. The authors analyze the challenges associated with promoting active mobility in urban areas, including inadequate infrastructure, safety concerns, and social and cultural barriers that discourage individuals from choosing active modes of transportation. The report identifies several potential solutions to address these challenges, such as enhancing cycling and pedestrian infrastructure, reducing speed limits in urban areas, and promoting cultural changes that value active mobility. The document emphasizes the importance of collaborative efforts among city planners, policymakers, and the public to achieve these solutions. The authors note that successful implementation of active mobility solutions requires a holistic approach that considers the needs and preferences of all stakeholders [70]. Other than being aligned with the UN transportation and mobility policy suggestions, these recommendations provide a framework for working with those suggestions on a meso level. However, despite the findings and suggestions in this working document and other related studies, the problems in the case study area still need to be solved [4]. This issue might indicate the challenges such as uncertainties, lack of communication between sectors, and the need for attention to assessment inputs when the plans turn into action.

One issue that affects almost every dimension of urban planning and design in Norway, especially those related to the infrastructure, is the climate. The dominantly cold and damp weather makes maintenance challenging and impacts users' mobility and behavior. Fossum et al. [34] explore the spatial conditions of pedestrian routes and how they affect walking behavior. The study concludes that individuals' choice of walking, as a type of mobility, depends very much on the energy consumption of the path and the distance. This finding provides an opportunity to reflect on the issue of energy consumption through the lens of walking, thus putting forth a fresh and unexamined lens on the Norwegian national policy of zero-growth goal or "Nullvekstmålet" and the overall ambition of the UN 2030

Agenda.

By studying the issues of inclusive mobility and walkability in Norway, it is evident that though walkability is gaining a lot of attention and focus, it is limited to big cities. The walking share in small Norwegian urban areas is still relatively low, and they still need to be given equal importance [45]. Another research gap here is that the focus on population groups in Norwegian studies is commonly limited to age. Accordingly, this research aims to focus on different sociodemographic groups.

1.2 Research topic

This research focuses on walkability in small Norwegian cities and explores strategies and methods to incorporate walkability into creating inclusive spaces. The thesis aims to contribute to the walkability discussion in Norway by investigating the existing decision-making and planning structures and processes in small Norwegian cities regarding walkability. This aim is not possible to accomplish without the consideration of the overlap between the spatial development of cities and transportation planning. Walking as a green mobility choice with substantial health benefits should be considered a pre-requisite for the right to the city as and when it is made available in a safe and secure form to all groups. The planning system in Norway can accomplish this by stratifying walking and supplying the foundations for behavioral shifts toward active and green mobility choices.

Although Norway has implemented various initiatives, namely the ”National Cycle Routes” and ”School Road” programs, which aim to create a network of safe and attractive cycle routes and encourage walking or cycling to school in children, there is a deficiency of focus on population groups other than age groups including children and older adults. The Norwegian public roads administration provided a national-level walking strategy to be enforced by municipalities. Still, the roadmap is merely suggestive, and the funds and extensive projects concentrate on major cities such as Trondheim and Oslo. Consequently, there is a requirement for research and initiatives to focus on different age groups, particularly senior citizens and small urban areas. Additionally, the critical review of the national walking strategy by TØI [12] suggests that the strategy’s goals may lack specificity, mak-

ing progress assessment difficult, and the goals may be overly ambitious or unobtainable within the designated time frame. To address these concerns, it is necessary to establish specific targets for each goal, incorporate feedback from stakeholders and users, and align the objectives with broader urban sustainability objectives. Ultimately, there is a need for continuous monitoring and evaluation to ensure that Norway's national walking strategy effectively elevates walking as a mode of transportation.

1.3 Research Questions

This research primarily strives to answer the question: *How can walkability be utilized to provide inclusive mobility and spaces in small Norwegian cities?*

Furthermore, the study seeks to explore the following sub-research questions:

SRQ1: How important is walkability in designing inclusive spaces?

SRQ2: What is the importance of sociodemographic groups in designing inclusive mobility and spaces?

SRQ3: What are the different needs for walking in different sociodemographic groups?

SRQ4: Which areas of the planning process in Norwegian municipalities require improvement to optimize the plans regarding walkability in small cities?

SRQ5: Which methodologies can be applied to study and improve walkability for different sociodemographic groups? How can these methodologies be structured to be readily adopted by the (Norwegian) municipalities?

Chapter 2

Literature Review

The following is a review of the mobility and transportation literature conducted as an exploration of walking as an active mobility choice and its related conceptions. The literature review starts with investigating the walkability concept and the indicators for a walkable place. The section is followed by the study on the idea of the 15-minute city and how it connects to active mobility facilitation. Additionally, the review looks into walking and its linkage to inclusive mobility and how the initiative furnishes the imperative for sustainable development goals (SDGs). The SDGs are further explored by pointing out the transport and mobility policy suggestions by the United Nations. The final part of the chapter includes experiences regarding transport and mobility policy and planning in the Scandinavian context.

Other than facilitating the identification of research gaps and linkage establishment within previous research, the literature review research method prevents duplication and enables validation and a solid theoretical foundation for the study [135]. This thesis employed two key search engines for academic literature to conduct the literature review. Oria, the search engine for available literature in Norwegian resources [131], was the primary tool used to find relevant research publications. The reason for deciding on this search engine as the central reference source was that it was developed by and for Norwegian resources, so it has finer accuracy for the Norwegian vocabulary, which is beneficial for this research in the Norwegian context. The complimentary search engine for this study was Google Scholar, a practical tool for research in English academic literature.

As the presented search engines were less applicable for document reviews, and since most of the detailed government reports and policy regulations in Norway are in Norwegian, searching the respecting Norwegian keywords in Google Search was the available option.

As this thesis is part of the WALKMORE project by TØI, some of the reports and publications were acquired from the institute's publication library, which is publicly accessible for downloads.

2.1 Walkability and walkable places

As terminology often eases the understanding of concepts by scaling down the domain in which they have situated the exploration of the term, *walkability* can start within the vocabulary. Searching *walkability* or *walkable* in Merriam Webster's dictionary [82], no results occur. However, in the Oxford Dictionary [149], *walkable* is defined as "(of an area or route) suitable or safe for walking: *a walkable neighborhood*" and "*(of a destination) close enough to be reached by walking.*" In addition, *walkability* is mentioned as a derivative noun of the *walkable* adjective. In the Supplementary Dictionary of Transport Studies [114], walkability does not have a dedicated entry. Although there is a definition for *neighborhood walkability*:

> *A term used to describe the effect of the walking environment on people's willingness to walk in a designated area; for example, their local community. Neighborhood walkability is measured by studying user perspectives of the quality of the physical and social environments that affect walking behavior. The key attributes of the quality of the environment include pedestrian perceptions that reflect its sense of comfort, safety, and visual interest, access to services, connectivity, land-use pattern, cleanliness, and pedestrian crossings. Those who live in walkable neighborhoods tend to live longer and are healthier, both physically and mentally, than those from car-dependent sprawling neighborhoods [114].*

However, in the urban planning discourse, the focus on attributes mentioned in the last

definition varies in different discussions. In an essay on the interpretation of walkable places, Forsyth [33] sorts several discussion focuses regarding walkability in three groups and demonstrates the relationship between them (Figure 2.1). The first collection of definitions focuses on *means to create walkability* related to the community environment's qualities, which include traversable environments, compact places, and physically enticing environments. The second group is definitions related to the *outcomes* of walking, being lively and sociable environments, sustainable transportation options, and exercise-inducing environments. The last set of discussions concentrates on walkability as a *proxy for better design*. The author mentions that this set implies a mixture of expansive claims on outcomes and dimensions that are not entirely agreeable but included among the discussions of walkability because they are used generally as definitions of the term.

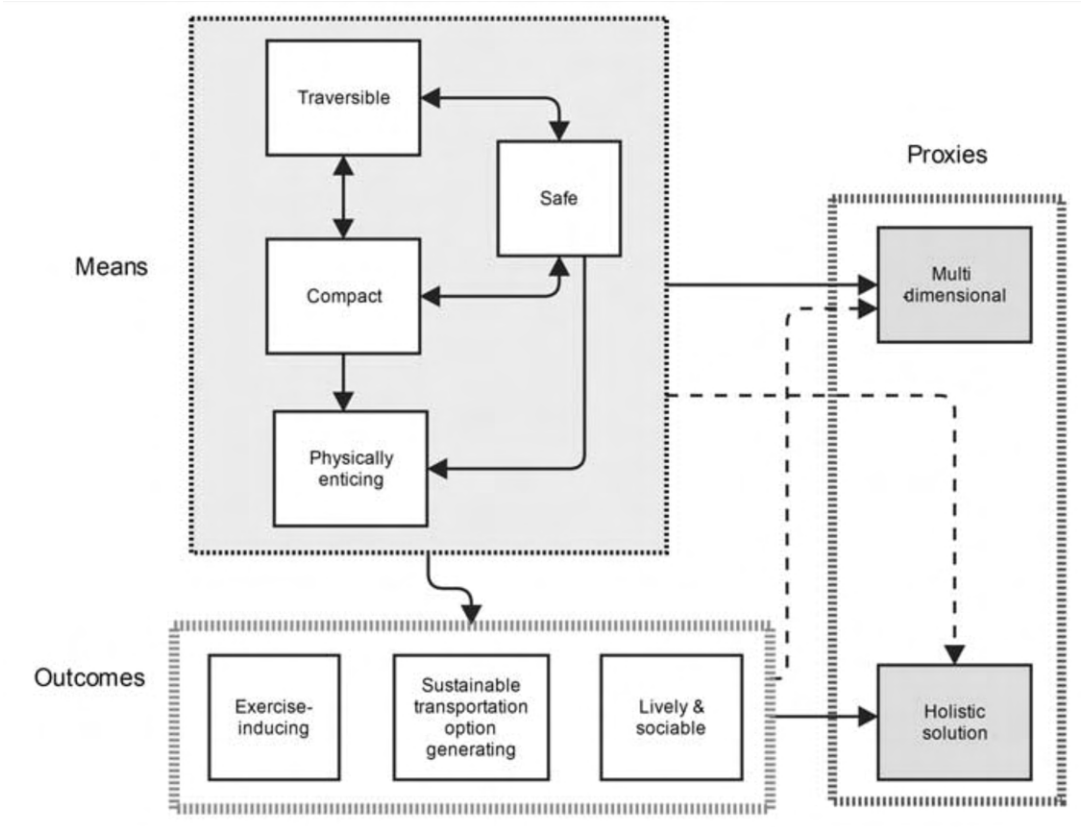

Figure 2.1: Framework displaying the linkage between definitions of walkability and walkable places, [33].

Definitions of walkability that belong to this group, in some cases, perceive walkability as *multidimensional in terms of means* considering the dimensions as *measurable*. In other cases, walkability is seen as an expression of premium environments and *a holistic*

solution to urban area improvement [33].

To translate these definitions of walkable places into urban planning and design strategies and quantifiable results, one can refer to Figure 2.4, which illustrates different themes regarding walkability and examples of related interventions.

Furthermore, Knapskog et al. delve into the walkability assessment topic in urban environments [58]. The authors critically examine existing methods and propose innovative approaches to measure the walkability of neighborhoods and cities. The study highlights the multidimensional nature of walkability through an extensive literature review and empirical analysis. It emphasizes the need for comprehensive assessment frameworks that consider various factors influencing walkability, such as street design, connectivity, land use mix, safety, and aesthetics (see Figure 2.2). The authors argue that traditional measures, which often focus solely on pedestrian infrastructure, are insufficient in capturing the complex interplay between built environment characteristics and human behavior. Instead, they advocate for quantitative data integration, qualitative assessments, and participatory approaches to provide a more holistic understanding of walkability. The findings of this study contribute to the ongoing discourse on urban design and planning by providing insights into the nuanced aspects of walkability and offering practical recommendations for policymakers, urban designers, and researchers to develop more walkable and people-centric cities [58].

Concerning urban morphology, the urban DMA is another way of defining walkability. Evolved from Jacobs's fundamentals for cities' functionality, concentration, mixed primary use, and small blocks [56], this definition of walkability consists of density (people and buildings), functional and attraction mix, and network access among them [26]. Density here means an assemblage of relations and linkages among its diverse definitions [25]. Density is central to walkability since it contains people and places at a walkable range. It is also immensely intertwined with the functional mix as the latter shortens the walking distance [26].

Factors	*Attributes*	*Highly walkable*	*Walkable*	*Somewhat walkable*	*Not walkable*
		◄			►
Infrastructure and traffic	Street or road character	Streets			Roads
	Pedestrian infrastructure	Sidewalks			No sidewalks
	Crossings	Defined crossings at same level			Barriers and detours for pedestrians
	Traffic volumes	Low			High
	Speed levels	Low			High
	Pollution and noise	Low			High
	Traffic safety	High			Low
	Universal design	High accessibility			Low accessibility
	Public transport connectedness	Walking routes connected to public transport stops			Walking routes not connected to public transport stops
Descriptive conclusion					
Urbanity	Density	High			Low
	Proximity	Short distances			Long distances
	Connectedness	Connected to the city structure			Its own structure
	Scale	Pedestrian			Vehicle-oriented
	Orientation of buildings	Buildings oriented along the street			Buildings receded from the street/road
		Building head-to-head to the sidewalk			Parking in front of buildings
	Block sizes	Small blocks			Long/large blocks
	Permeability	High Permeability			Non-permeable
	Pedestrian network	Coherent pedestrian network, short cuts			Infrastructure as barriers for pedestrians
	Urban structure	Grid			Cul de sacs
	Parking lots	Few			Many, making barriers
	Urban spaces and parks	Many			Few/none
	Green	Street trees, parks etc			No greenery
	Street furniture	Many			Few
Descriptive conclusion					
Surroundings and activities	Destinations	Multiple			Few or no one
	Activities	Multiple			Few or no one
	People walking or staying	Many			Few or no one
	Facades	Active			Closed
	Mix of functions	High			Low
	Vibrancy	High			Low
	Maintenance	High			Low
	Experienced safety	Feels safe			Feels non-safe
	Wayfinding	Easy			Not easy
Descriptive conclusion					

Figure 2.2: Factors and attributes for measuring walkability, [58].

The function mix is about a live/work/visit triangle (Figure 2.3) focused on interconnections between the functions [26][172]. The other way of looking at this concept is from

the urban mix stand. Formal and social mix are two categories of this perspective. The formal mix is about the produced plot sizes in the urban areas (by different building sizes and styles), and the social mix applies to how a good city connects people of different ”ages, abilities, ethnicities and social classes” [26].

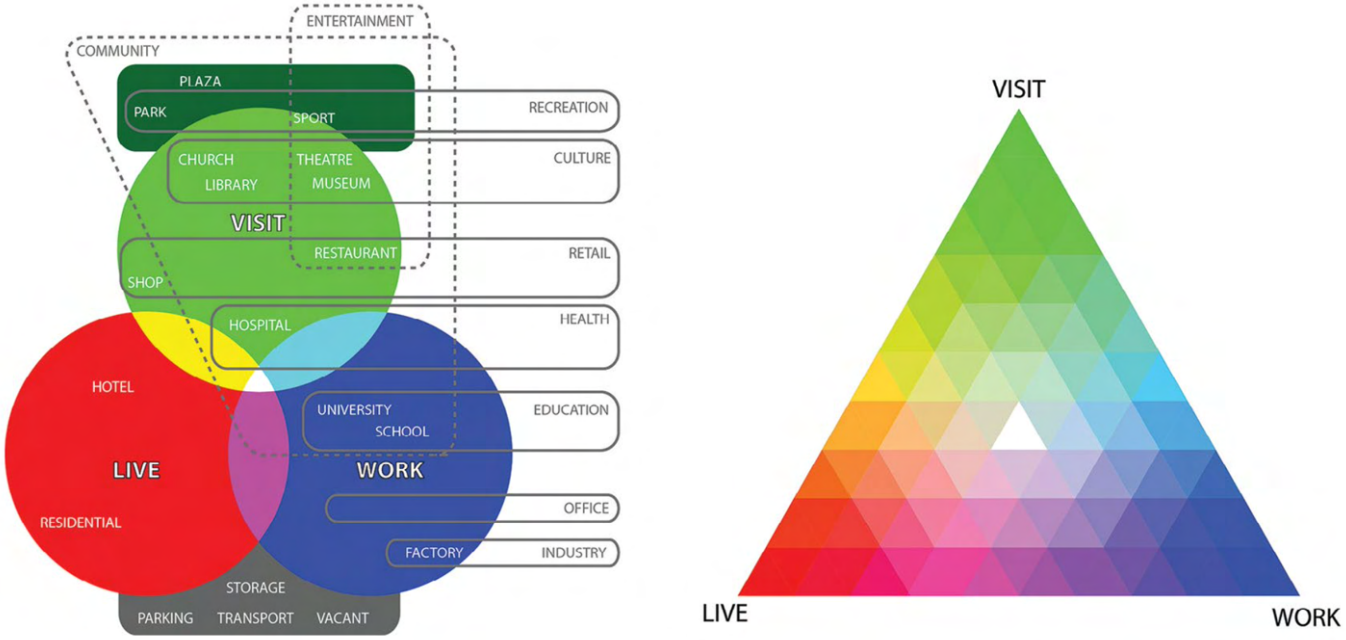

Figure 2.3: Functions that overlap (left) and the Live/Work/Visit Triangle (right), [26].

Access, the urban DMA’s final component of Density, Functional Mix, and Access Networks, constructs the networks and connections between the other two factors (density and mix) and arbitrates the traffic flow. The effect of access on walkability is about boosting the flow and reducing distances [26].

Although the mentioned elements and definitions for walkable places include some social dimensions, others argue that these dimensions have far more weight in people’s tendency to walk. For example, Forsyth and Guan [41], in a study on the city of Chengdu, China, argue that the social environment, the built environment, and the neighborhoods are influential factors in choosing active mobility. However, the extent varies in significance based on the context. They conclude that researchers who look for conceptual frameworks should consider the physical and cultural contexts, especially when the case studies are a thin pool. In narrowing down the focus on socioeconomic status, Adkins and others [2] contend that the effect of enticing built environment is inadequate on socioeconomically disadvantaged groups’ walking and physical activity and almost double in the

opposite groups. The authors state that the reason is that even though supportive environments have a more dominant influence, disadvantaged groups do most of the walking in unsupportive environments.

Interventions (across) *Themes (down);*	*Infrastructure provision*	*Infrastructure design/quality*	*Pedestrian network*	*Distances*	*Activities supported*	*Programming/policy examples*	*Measures* *Example measures*
Environmental conditions							
Traversable	Paths that are relatively level, even	Basic level	Relatively complete	[a]	Being able to get around at all on foot	[a]	Path presence; basic condition
Compact/ close (destinations, density, layout)	As above	Basic level	Connected, direct paths	Close destinations	Getting to important destinations	High density planning	Distances to destinations; block size
Safe	Separated paths, safe crossings, traffic calming	Pedestrian-scaled lighting, clear sight lines	Safe links/crossings, no movement predictors	[a]	Getting around on food without fear of violence or accidents	Community policing, design for safety, speed limits, limits to pedestrian unfriendly uses (for example abandoned properties)	Safety features (crossings, lighting, good sight lines), perceived and actual crime figures
Physically-enticing	Many paths, street furnishings, landscaping treatments, human scaled building	Many aesthetically pleasing elements	Relatively complete	[a]	Both walking to destinations and recreational walking; excitement	Maintenance/ cleaning; design guidelines, streetscape improvements, public art	Presence of infrastructure elements
Outcomes							
Lively and sociable	Provided	Pedestrian scaled	Relatively complete	Close to substantial residential densities and/or highly accessible by transit /car	Shopping, cultural activities, recreational walking	Activities that bring people out and about	Numbers of people outdoors; people in groups, mapping, traces, interviews
Sustainable transportation option creating	Provided	Basic level	Complete	Close destinations	Walking to destinations; alternative to car	Parking pricing, affordable housing near jobs	Transportation mode split; energy use, transit access by population,
Exercise-inducing	Provided	At least to a basic level	Complete	Close enough (though not too close!)	Both walking to destinations and recreational walking	Social supports, exercise campaigns	Distance walked; total physical activity
Proxies							
Multidimensional	Sidewalks, lighting, street trees and so on	Measurable	Complete, connected	Close destinations	Both walking to destinations and recreational walking	All above.	Multidimensional indicators
Holistic solution	Provided	Many aesthetically pleasing elements	Complete	Close destinations	Both walking to destinations and recreational walking	Pedestrian overlay districts, redevelopment agencies, healthy city programs	Happiness (surveys), redevelopment investment, population increase

[a]Dimension less important in this theme.

Figure 2.4: Walkability themes and related interventions, [33].

2.2 The 15-Minute city

The concept of 15-minute cities has recently gained attention in urban planning as a tool to reach more sustainable, livable, and equitable urban habitats. The notion suggests that all essential services and amenities, including retail, healthcare, educational, and recreational establishments, should be accessible within a 15-minute walk or bike ride from the residential zones. This section provides a concise overview of the current state of research on the 15-minute city vision, emphasizing its potential benefits and challenges from an urban planning standpoint.

The 15-minute city concept was proposed as a solution to make cities more livable and sustainable [86]. The 15-minute city model highlights the initiative of locating the essential services and amenities, such as housing, jobs, healthcare, education, culture, and leisure, within a 15-minute walk or bike ride from the residential areas. This polycentric, multi-use, multi-service city model strives to downsize commute duration and improve the quality of life for the citizens by supplying access to services within a short distance and lowering carbon emissions [6]. The concept underlines that the 15-minute city model can result in ecological, social, and economic sustainability, elaborated in Figure 2.5 [57]. In his article, Moreno [86] investigates different case studies that have enforced the 15-minute city model, including Paris, Melbourne, and Barcelona, and emphasizes the importance of an integrated and collaborative approach between planners, policymakers, and citizens to develop a city that prioritizes the well-being of its residents.

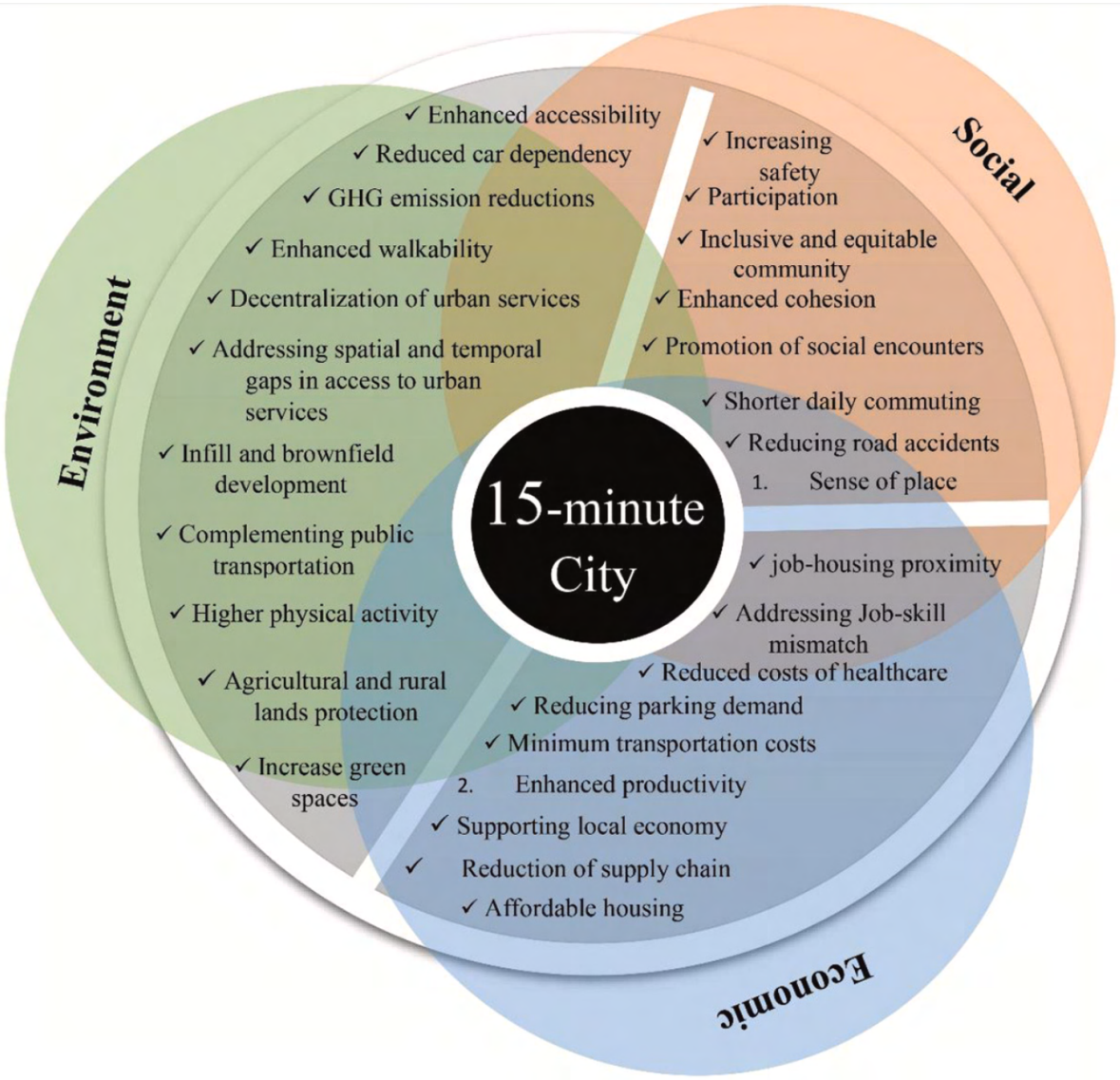

Figure 2.5: Sustainability contributions in the 15-minute city concept, [57].

The 15-Minute City concept, established on ”chrono-urbanism,” suggests that the quality of urban life is influenced by the time spent on transportation, especially by car [87]. This notion aims to enhance residents' quality of life by enabling them to conveniently fulfill six essential urban social functions: living, working, commerce, healthcare, education, and entertainment. By prioritizing these functions, the goal is to create a more tightly-knit urban social fabric, fostering increased interaction and participation among residents. This, in turn, strengthens social bonds and participation, builds trust, and contributes to the development of healthier urban environments [87].

These six functions can link to the Live, Visit, Work triangle model of the Urban DMA,

mentioned in Figure 2.1. The two visions of the 15-minute city and the Urban DMA highlight the significance of the social fabric of the cities, especially when it comes to facilitating social interactions through the urban formation.

The close linkage between the 15-minute neighborhoods, walkability, and inclusiveness has been highlighted by Weng et al. Though the authors discuss the issue from a health point of view, the findings emphasize that the 15-minute city idea should incorporate sociodemographic attributes, including age and economic status [174]. For instance, they argue that senior or adult-centered communities are inclined to have higher walkability. In contrast, those with their basic amenities focused on children tend to have lower walkability [174].

Addressing the studies similar to Weng et al., a modified 15-minute city concept was introduced. Moreno et al. provided a framework for the 15-minute city with four essential components portrayed in Figure 2.6.

Figure 2.6: The modified 15-minute city framework, [87].

As the first character of the built environment, density refers to the people per kilometer square [87]. The framework suggests that in a sustainable planning practice within the given area, the principal is for the optimal number of people to sustain comfortably concerning access to urban services and resources. The initiative accentuates the maximum density facilitating sustainable purposes within the social, economic, and environmental dimensions [87].

One of the characteristics of a place being walkable indicated in Figure 2.1 under the 'means' category is being 'compact,' which relates to the density element of the 15-minute city.

The second element of the modified 15-minute city concept is proximity in both temporal and spatial senses [87]. Residents in a neighborhood should have convenient access to essential services within a 15-minute radius. This aspect is crucial for reducing commuting time in cities and mitigating the environmental and economic effects associated with transportation [87].

Furthermore, proximity plays a significant role in determining social indicators that influence urban residents, particularly in fostering social interactions, as advocated by urban theorists like Jane Jacobs [56].

Diversity is another component of the framework that is centered around two dimensions:

- The growing recognition regarding the importance of mixed-use neighborhoods that incorporate a balanced combination of residential, commercial, and entertainment elements
- Promotion of diversity in terms of culture and people

Mixed-use neighborhoods are paramount in supporting economically thriving urban environments, ensuring adequate housing for all residents, promoting inclusively, and fostering sustainable practices [87]. In pursuing the 15-Minute City model, adapting mixed-use neighborhoods is vital to achieving optimal density and proximity for essential amenities while facilitating the development of walkable streets and bicycle lanes. This approach helps preserve and uphold the quality of existing public spaces and, when possible, creates opportunities to create new public areas. Furthermore, diversity contributes to the

neighborhood's livability enhancement, property value maintenance, and community participation motivation and interaction [87].

Adopting diversity within a neighborhood enables the focus on enhancing service delivery to residents for local governments. Moreover, the mixed-use strategy contributes to livability, helps maintain property values, and fosters increased community participation and interaction [13].

The city's multicultural aspect positively affects the economy, allowing locals to access a diverse range of products, including cultural products and heritage [87]. This diversity also contributes to an appealing urban environment for visitors, thereby promoting tourism and related businesses. These factors are crucial for generating new economic ventures, fostering vibrancy, and creating more employment opportunities [115]. To fully capitalize on these advantages, it is necessary to implement this multicultural dimension at different scales within the city, not only on a broader urban scale within a 15-minute radius but also at smaller scales, such as within individual buildings [87]. Diversity can also be related to liveliness and sociability, which are segments of the outcome category in the walkability indicators illustrated in Figure 2.1.

The COVID pandemic revealed the new digital potentials of the cities, especially in the 15-minute city concept. Moreno et al. introduced Digitalization as an additional component of the 15-minute city concept [87]. The initiative behind this element argues that this dimension is in sync with the Smart City notion, where the inspiration for the 15-minute city idea is rooted. An instance of this alignment is the Smart City concept supporting the cross-platform, including digital platforms, inclusiveness, resident participation, and real-time delivery. Achieving these ambitions is attainable through sufficient utilization of technology, which can provide extensive results in the 15-minute city model. Experience enhancement, urban resilience, mixed energy use strategies, optimal consumption, emission decline, safety, and security are instances of the mentioned results. Digitalization is perceived as cross-disciplinary. Therefore it is assumed to play a significant role in assuring the other components of the 15-minute city concept being applied [87].

In the Norwegian context, the idea of a 10-minute town (also known as a nearby town) is specifically mentioned in a national report, indicating that this principle is expected to be

implemented in all cities throughout Norway [109]. In the nearby town, all the essential elements of daily life, such as housing, schools, kindergartens, businesses, jobs, leisure activities, public spaces, and green spaces, are conveniently reachable within a 10-minute walk [24]. An established example among the larger cities is Oslo.

In Oslo, the compact city is often associated with the 10-minute town concept [24]. Compact city centers are perceived as concentrated public developments that can positively affect public life. Proximity plays a significant role in Oslo, with the emphasis being on having a diversity of public space types within one kilometer, equivalent to about a 10-minute walk. However, when it comes to the workplace, there are limited tools and available examples to fully integrate it into the daily perspective of the 10-minute city [24].

Oslo's principle of sustainable mobility prioritizes pedestrians and cyclists, followed by public transport, with vehicles having the lowest priority [109]. The goal is to establish connections between regional and municipal structures, such as public transport, bike paths, lakes/river courses, green areas, and recreational spaces. Public space networks planning in Oslo is driven by the idea that everyday activities should be easily accessible by walking or biking. These public spaces are designed to accommodate various purposes and activities required by residents and society while also promoting local identity [109].

In the 10-minute city concept of Oslo, traditional workplaces are mentioned within the larger network of urban functions without significant emphasis [24]. The city recognizes New Working Spaces (NWS) within the three innovation districts: Oslo Sentrum, Hovinbyen, and the districts of Gaustad, Blindern, Marienlyst, and Majorstuen in the northeastern and northwestern parts of the city. The municipal strategies aim to make these areas more multifunctional and attractive to actors, businesses, and citizens, but also to managers and users of NWS. Developing new local cultural and recreational services, housing, and vibrant streets is a priority. Libraries are also considered important meeting places for local communities, fostering networks among residents and facilitating the dissemination of research and knowledge [24].

The Shortcomings

Like any other concept, the 15-minute city, while holding great potential, is not without its risks, concerns, challenges, and uncertainties. These factors have sparked extensive discussions and debates surrounding the framework.

There is a concern that the timing of the real estate market could impact the development of the 15-minute city concept [180]. During an economic downturn, where real estate values decline, and investments become deficient, the focus on implementing the 15-minute city may diminish. The argument from the real estate point of view is that as long as the benefits of the concept are evident in terms of real estate retrievals, social diversity, and environmental sustainability, investors will remain interested. Meanwhile, on the urban studies side, there are concerns about who will own the real estate and share the values of the 15-minute city. The preference is to involve small businesses and small-scale property owners to generate a more diverse neighborhood. This difference in perspective highlights the potential risks and contradictions surrounding the concept. Another risk is the possibility of creating imbalance and injustice by implementing the 15-minute city in some neighborhoods while neglecting others. One suggestion is that municipalities may need to prioritize certain neighborhoods. However, this could lead to gentrification and social segregation. Furthermore, there is a larger-scale issue of regional connectivity. While the emphasis is often placed on individual neighborhood development, neglecting the interconnectivity between neighborhoods could result in a lack of regional accessibility, restricting the effectiveness and inclusively of the 15-minute city concept. Therefore, the 15-minute city implementation must be coordinated across the entire city and even at the county level to ensure comprehensive and equitable outcomes [180].

The modified 15-minute city model highlighted these shortcomings in the Smart City concept. The argument is that the notion of Smart City, while aiming to address various urban challenges, has been inhibited by its focus on profit-driven ICT technology providers. Rather than prioritizing inclusivity and social equality, these providers are motivated by economic agendas, leading to the current issues' aggravation instead of resolving them [87]. An example is Pandey, who highlights how smart cities marketed as technologically advanced often come with a high cost of living, making them unaffordable for many residents [101]. This emphasis on technology overlooks the social and

economic aspects that should be addressed, deviating from the Sustainable Development Goals, particularly SDG 11 (sustainable cities and communities). Similarly, the Smart City concept has contributed to growing inequality in the housing sector, as the real estate market expands disproportionately to residents' income growth. These issues further reinforce the problem of inaccessibility in cities, as it aligns with grid planning systems [87]. Scholars like Gurstein and Hutton argue that urban planning concepts must be reevaluated to promote sustainable and equitable urban development [43]. The discussion of the proposed 15-Minute City concept is that the model could be suitable for achieving this goal by integrating environmental and equitable approaches [87].

Another significant risk identified is the potential for creating imbalances and patterns of segregation within the city. From an urban study perspective, the emphasis is on the need for careful consideration when planning and implementing 15-minute neighborhoods to avoid unjust disparities where some districts enjoy the benefits while others are left behind [180]. The abrupt implementation of the entire 15-minute city is financially and logistically challenging, leading cities to adopt a phased approach, focusing on select neighborhoods. However, this selective approach could also lead to further injustices as certain areas receive more attention and investment, potentially exacerbating gentrification and displacing those who cannot afford the rising property prices [180].

Moreover, there are concerns about the potential for the 15-minute city to create isolated islands, promoting segregation instead of fostering social interaction and integration [40]. This issue highlights the importance of enabling socialization and collaboration between residents from different parts of the city to break segregation patterns and provide opportunities for all [180].

Regarding this resident collaboration concept, in the participatory planning processes withhin the Norwegian context, citizen participation has been highlighted in the Planning and building act [63]. However, the challenges become noticeable concerning the practice and implementation of these regulations in the planning process.

To elaborate, the obstacles to citizen participation in Norway's planning processes may regard the planning structure. The Norwegian Planning and Building Act of 1985 introduced public participation measures, such as early announcements and public hearings, to

gather views early on and avoid delays caused by late submissions of crucial perspectives [30]. However, these measures lack formal requirements, leaving room for challenges. The act also allowed private zoning plans, initially intended as a bottom-up approach for local communities to present alternative plans. However, in a neoliberal planning practice, private developers seized this opportunity, resulting in a shift of power and a stronger influence of market actors in urban planning. This new division of labor between private developers and public planning authorities has raised concerns regarding democratic principles. The early negotiation phase, dominated by closed negotiations between market actors and planning authorities, frames the planning process but excludes the public and ordinary politicians from participating. This lack of transparency and formal roles for citizens and politicians poses democratic problems, especially when preliminary agreements heavily influence the decision-making phase. Formal participation rights in the later stages of the zoning plan process, such as consultation rounds and public hearings, are time-limited and often reduced to the opposition, as crucial aspects have already been agreed upon. The final political decision-making stage allows for direct lobbying, which can bypass formal planning stages and sideline civil society involvement. The implications of this neoliberal trend in Norwegian urban planning raise questions about the extent to which these practices uphold democratic norms and values [30]. Therefore the 15-minute city enactment in a Norwegian context requires either alternative methods to be utilized by planners or a larger-scale modification in the governance system [30].

The 15-minute city concept faces several uncertainties as well. One of the main weaknesses from an urbanism standpoint is the lack of a clear and universally accepted definition. Different actors interpret the concept differently, leading to ambiguity and confusion. While some emphasize walking and cycling, others neglect the role of public transport, which is crucial for job accessibility [180]. Additionally, the concept's trendy nature raises concerns about its long-term viability, as past ideas like remote office parks have fallen out of favor over time. Another concern is the limited evidence supporting the concept's effectiveness. It relies heavily on the impressions and decisions of Carlos Moreno, the concept's originator, rather than solid scientific research. The definition of urban amenities and the specific destinations to be included in the 15-minute city also lack consensus, with broad terms like "entertainment" posing challenges. The absence of a common understanding regarding the inclusion criteria poses implementation risks, as

each actor interprets and applies the concept differently. While the idea holds great appeal, there is a need for further research and clarification to determine its key components and ensure its successful realization as a sustainable, digitized, and walkable city [180].

Implementation Framework Examples

The URBACT European collaboration provides valuable insights and methods in the framework suggestions for the Walk'n Roll Cities project, where a cluster of strategies are integrated with the 15-minute for increasing walkability in cities. The recommendations offer a comprehensive approach to transforming urban spaces into vibrant, pedestrian-friendly environments [162]. The emphasis is on the importance of promoting active mobility, particularly walking and cycling, as sustainable and inclusive modes of transportation. It recognizes that creating walkable cities is not merely about improving infrastructure but also addressing various interconnected factors, including urban design, land use planning, transportation policies, and social considerations. The guidebook outlines a range of practical methods and strategies to enhance walkability. These include:

- Urban Design and Streetscape: The guidebook advocates for designing streets prioritizing pedestrians and cyclists by creating safe and attractive walking environments. It emphasizes the need for pedestrian-friendly features such as wide sidewalks, well-maintained pathways, adequate lighting, seating areas, and green spaces. The public art integration, street furniture, and landscaping can also contribute to a more enjoyable walking experience.

- Connectivity and Accessibility: Improving connectivity within cities is essential for promoting walking. The guidebook suggests enhancing the accessibility of neighborhoods by reducing barriers such as physical obstacles, busy roads, and fragmented urban spaces. Creating well-connected networks of pedestrian and cycling infrastructure, including dedicated paths and crossings, helps ensure safe and convenient pedestrian trips.

- Mixed Land Use and Compact Development: Encouraging mixed land use and compact urban development plays a significant role in increasing walkability. The guidebook emphasizes the importance of locating amenities such as schools, shops, and parks within walking distance of residential areas. This approach reduces the

need for car-dependent travel and enhances the viability of walking as a mode of transportation.

- Stakeholder Engagement and Participation: The guidebook underscores the significance of involving various stakeholders, including local communities, in the decision-making process. Engaging residents, businesses, and organizations help ensure that their needs and perspectives are considered in the planning and implementation of walkability initiatives. Participatory approaches, such as community workshops and consultations, foster a sense of ownership and collective responsibility for creating walkable cities.

- Policy and Governance: The guidebook highlights the importance of supportive policies and governance structures prioritizing walkability. It advocates for integrated transportation planning, zoning regulations promoting mixed land use, and allocating adequate resources for infrastructure development. Collaborative partnerships between different levels of government, urban planners, and community organizations are essential for effective implementation.

The Guidebook indicates that by following the outlined methods and recommendations, cities can create vibrant and inclusive urban environments that prioritize walking and cycling as primary modes of transportation. This transformation can lead to numerous benefits, including improved public health, reduced congestion and pollution, and enhanced community cohesion [162].

Another instance of engaging the 15-minute city concept is an exploration of functional reconfiguration. The study employs the sustainability contributors of the 15-minute city [10] to evaluate the case cities of Paris, Milan, and Melbourne regarding their strategies to achieve the urban model. This research concludes that transformative placemaking as a module in three levels of the city, destination, and place, illustrated in Figure 2.7, can be adapted as a strategy towards the proximity city objective. In Figure 2.8, the study provides a framework to elaborate the placemaking strategy under different urban planning dimensions [10].

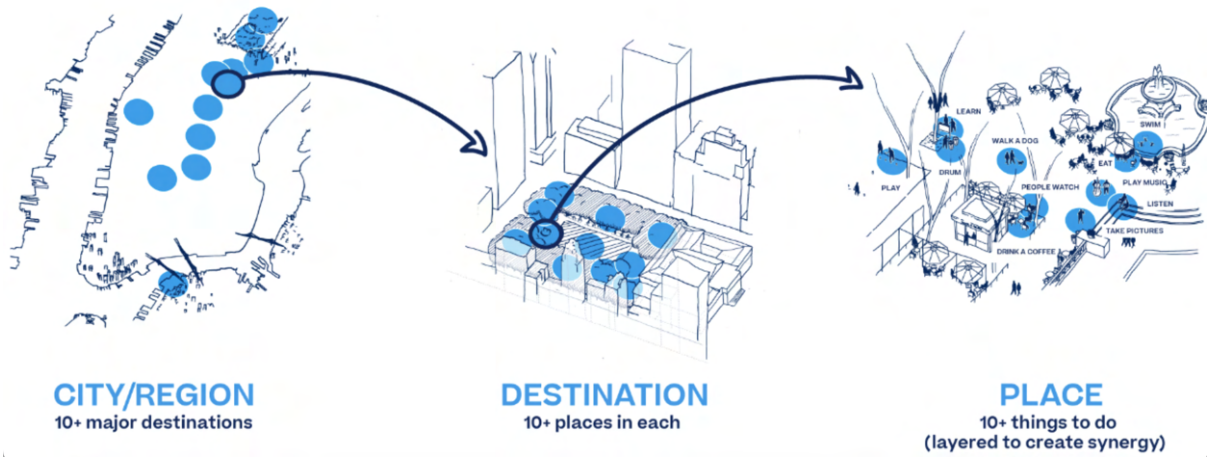

Figure 2.7: Urban transformation through placemaking, [10].

Trasformative placemaking aims to			
Economic ecosystem	**Built environment**	**Civic structures**	**Cohesive social environment**
Regionally connected	Accessible	Locally organized	Vibrant
Locally empowering	Flexible	Inclusive	Cohesive
Innovative	Healthy and sustainable	Networked	Reflective

Figure 2.8: The framework for transformative placemaking, [10].

From a circular economy point of view, the reuse of abandoned urban spaces and buildings can be an approach to the approximate city initiative [9]. By focusing on the concept of public city and the Caligari city in Italy as the case study, the study regards the potential of these spaces to address the social and environmental challenges of cities, highlighting the need for community engagement and participatory processes in their transformation [9].

2.3 Inclusive mobility

Equipping citizens with the chance of social participation, inclusive mobility, and transport is essential in facilitating access to socioeconomic opportunities for them [173]. Every citizen has the right to access urban commodities such as housing, basic service, resources, or transportation. However, this right has not been acquired by all [8]. In addition to contributing to the country's gross domestic product (GDP), transport provides

access and mobility for people and the movement of goods and services [3]. The requirement for mobility, a vital factor in urbanization and development, is to be safe, affordable, accessible, and environment-friendly [96][3]. Inclusive mobility refers to the possibility for all individuals to access and use transportation systems, regardless of their physical abilities, economic status, and social backgrounds. This section aims to conduct a brief review of the discussed concepts' association with the idea of inclusive mobility.

As the concluded research gaps in Chapter 1 indicated, the discussion of mobility in smaller urban settlements in Norway has not been given attention in contrast with larger cities. If mobility and transportation planning aims to be inclusive for all citizens, these cases must be focused on a similar extent, or more, given the level of car dependency as the large urban areas [161].

Poltimäe et al. [103] aim to explore mobility challenges for citizens in rural areas. The article also focuses on investigating the need for sustainable and inclusive solutions to address them. The authors discuss the importance of considering the distinctive characteristics of rural areas, such as low population density and limited public transportation options, when developing mobility solutions and options. Additionally, the paper delivers examples of sustainable and inclusive mobility solutions, such as car-sharing, bike-sharing, and community-based transportation services, that can be carried out in rural areas to enhance mobility and accessibility for all.

In an exploration of the concept of inclusive transport and its importance in achieving sustainable development goals, Velas-Suarin [173] argues that inclusiveness in transportation is a critical component of a sustainable transportation system and is vital in enabling social and economic development, promoting equality, and diminishing the negative environmental impacts of transportation. The author examines various extents of inclusive transport, including accessibility, affordability, safety, and convenience, and how they contribute to achieving sustainable development objectives (SDGs). The article also provides instances of inclusive transport initiatives in the Philippines, such as the Universal Access to Quality Tertiary Education Act, which provides free transportation to students enrolled in state universities and colleges, and the Pantawid Pasada Program, which provides fuel subsidies to public utility vehicle operators. The paper also highlights the requirement for policies and agendas that elevate inclusive transport, notably the adoption of

low-emission vehicles, the enhancement of pedestrian and cycling infrastructure, and the provision of public transit services that address the needs of marginalized communities.

An in-depth analysis [136] focused on the Nordic region aimed to understand how social, economic, and cultural factors shape the preferences of individuals to adopt electric vehicles as mobility choices, which are critical to the decarbonization of transport and the decline of greenhouse gas emissions. The authors used a survey to collect data from individuals in Denmark, Finland, Norway, and Sweden to analyze the impact of gender, education, occupation, age, and household size on electric mobility preferences. The findings indicated that males and those with higher education levels and income were likelier to choose electric vehicles, while older age groups and individuals with larger households were less likely to prefer them. Another finding was that occupation had a minimal impact on electric mobility preferences. In addition, the article argues the policy implications of these results and proposes that policymakers consider demographic factors when planning and enforcing electric mobility agendas and initiatives. For instance, policies targeting individuals with higher academic degrees and earnings might be more effective in promoting electric vehicle adoption. Likewise, policies that address the barriers faced by the older age groups and those with larger households, for example equipping residential areas with charging infrastructure, facilitate the increase of electric mobility adoption rates among these groups. The study underlines the significance of comprehending demographic factors in promoting sustainable transportation [136].

2.4 Policy Recommendations Regarding SDGs

Transport plays a significant role in advancing various Sustainable Development Goals (SDGs). It contributes significantly to SDGs related to economic development, industry, small and medium-sized enterprises (SMEs), trade, investment, employment, well-being, and reducing inequalities and exclusion [28]. Additionally, the importance of transport extends to attaining SDG 11, focused specifically on sustainable cities and communities, while other goals and targets of the 2030 Agenda indirectly emphasize the need for sustainable, accessible, inclusive, and efficient urban and territorial transportation [166].

Key objectives in pursuing sustainable transport include universal access, improved safety, reduced environmental and climate impact, enhanced resilience, and greater efficiency [46]. Fulfilling these objectives presents challenges such as addressing climate and environmental concerns, enhancing transport systems and traffic safety, and managing job-related issues and decent work [28].

The policy recommendations document from the United Nations [168] regarding sustainable mobility and transport suggests several actions governments can take to promote sustainable mobility. These include [168]:

- Developing and implementing integrated transport policies that prioritize sustainable modes of transport such as walking, cycling, and public transport.
- Investing in sustainable transport infrastructure and services, such as bike lanes, sidewalks, and public transport systems, to ensure that they are safe, reliable, and accessible to all.
- Promoting the use of low-emission vehicles and fuels, such as electric cars and renewable energy sources, to reduce the environmental impact of transport.
- Encouraging the use of alternative transport modes, such as carpooling and shared mobility services, to reduce the number of private vehicles on the road.
- Improving road safety through measures such as speed limits, seatbelt laws, and enforcement of traffic regulations.
- Engaging with stakeholders, including civil society and the private sector, to develop and implement sustainable transport solutions that meet the needs of all users.

Overall, the document emphasizes the importance of a holistic and integrated approach to sustainable mobility that minds social, environmental, and economic considerations [168].

2.5 Walkabilty in Scandinavian contexts

Although they have differences, the Scandinavian countries share many similarities regarding geography, demographics, and government models. Therefore, exploring their pedestrian strategies can outline what works in the Norwegian context. The following sections are reviews of the planning measures taken in Sweden and Denmark.

The climate, as a significant similarity between the countries in the region, calls for extensive measures regarding walkability. As mentioned in Section 1.1, the weather influences the mobility infrastructure surface and user behavior. However, with climate change and global warming occurring, infrastructure development and walkability plans should be prepared accordingly.

Regarding the walkability challenges in the Scandinavian and Nordic regions, specifically in Finland, Norway, and Sweden, in the context of climate change impacts, the importance of understanding future driving and walking conditions in these regions is emphasized [35]. Climate change can have significant implications for walkability as changing weather patterns, such as increased precipitation and extreme events, can affect the safety and accessibility of pedestrian infrastructure. Moreover, changing climate conditions can also influence the attractiveness and comfort of walking environments. These challenges can discourage walking as a mode of transportation and contribute to increased car usage, which in turn has negative implications for environmental sustainability and public health. It is essential to undertake further research and planning efforts to address these challenges and ensure that walking remains a viable and desirable mode of transportation in the face of climate change impacts [35].

Sweden

On the national level, the goal of the Swedish government in terms of transportation and mobility policy is that “a socially and economically effective and long-term sustainable transport supply for the citizens and the trade and industry” is guaranteed [80]. The goal is defined under six secondary objectives [107]:

- Access
- High quality
- Traffic safety
- Environmental compatibility (nature, culture, and resources)
- Support of an effective and just development
- Gender equality

These strategies appear to be an overall objective for mobility and transport, and the focus on strategies for walking as a mode of transport is more on a municipal level. For example, as a part of the national mobility strategy, Stockholm municipality generated a pedestrian plan that concludes ten action plans to promote and facilitate walking in urban areas. The action plans are as follows [151]:

- Network improvement through the increase of strategic corridors
- Recreational thoroughfare improvement
- Mending local pedestrian issues through a public campaign
- Development of a navigation (way-finding) system
- Development of a pedestrian analysis toolbox
- Temporary measures (tactical urbanism)
- Safety and equality through street management and maintenance
- Development of footway congestion assessment methods customized to Stockholm
- Applying "Living Stockholm" (alternative and temporary use of urban spaces)

However, even though the focus on walking is expanding in the Swedish planning system, the policy results, whether on the national or the municipality level, seem to be inconsistent as a result of instrumental rationality, and the means do not include a focus on walking in this planning concept [74]. On the national level policy, Sweden's ambition to reach its 2040 climate policy is not aligned with the existing urban development and transportation planning policies [100]. For instance, attempts like congestion task introduction were inefficient in reducing car dependency in the country [112].

Some would suggest that a more successful approach involves a gradual institutionalization process rather than radical policy and fast implementation [54]. The recommendation

entails building internal support within city administrations and gaining public acceptance for potentially controversial measures restraining car usage and normalizing them as regular transportation planning practices [54].

On the whole, regarding the intersection between walkability and inclusive mobility in Sweden, the planning system appears to be making spatial changes according to the 15-minute city concept [44], which can lead to positive outcomes conducive to social equality and just spaces. However, this achievement relies on the measures implemented in socio-economically vulnerable areas with preventative considerations regarding gentrification-caused resident displacement [44].

Denmark

Regarding walkability, national-level policies in Denmark do not directly refer to walking [163]. However, in the plans by the Ministry of Transport for a green transport system, improvements to public transport and infrastructure has been addressed [164]. Similar to the case of Sweden, the most noticeable strategic plan for walking is for Copenhagen, the capital. This strategic plan is focused on the four areas shown in Table 2.1.

Denmark's long-term measures and strategies regarding sustainable mobility in Copenhagen appear efficient to some level. As a result of the introduction of cars to the city, Copenhagen experienced a paradigm shift, recognizing the significance of sustainable transportation modes and modal integration [37]. The city's morphological evolution was influenced by public transportation, with the "Finger Plan" focusing on rail stations and metro lines for growth and development. The pedestrianization of the "Stroget" area in 1960, followed by other open spaces, increased activities in the city center and contributed to its compactness and 15- to 20-minute walkable distances [37].

The mentioned modifications have also led to lower energy consumption. As a result of mixed-use and dense urban development approaches in Denmark, the country's energy consumption is 40% lower than in Finland, which has a lower urban density [179].

However, with the population's trip statistics, Denmark still has remaining issues regarding dependency on private cars. The share of trips on the national level is 59% by car, 15% by bike, and 7% by public transport. Additionally, despite the endorsements regard-

ing Copenhagen being a bike-centric city [18], the city's trip shares are 30% by car, 28% by bike, 21% by public transport, and 21% by foot [59], demonstrating the need for more efficiency in policy and planning.

Table 2.1: Strategies under the main walking objective for Copenhagen, [60].

Strategy	Means
Walking culture	• Citizen participation and feedback • Increase of daily walking through social campaigns • New experiences added to walking • Utilization of technological tools such as GPS
Pedestrian networks and meeting spots	• Coherent networks • Greener routes and new shortcuts • Increase in the number of meeting spots • Attractive and enticing routes • Suitable lighting and maintenance
Strøggader[1]	• Pedestrian and cyclist prioritization • Low speed limits • Green boulevards • Pullback and collaboration from the shops along the street • Open and aesthetic shop windows • Access to maps and information • High maintenance standards
Traffic nodes	• Improved access and visual transparency for traffic junctions and the shops and services located within them • Connection between pedestrian networks and other transport modes' network • Easier ticket access • Spatial improvement

[1] Straight streets, local shopping streets for Copenhagen's neighborhoods. In the 2009 municipal plan for the city, 12 of these straight narrow streets were dedicated to neighborhoods' shopping streets to provide more lively urban spaces.

Furthermore, population groups require more in-depth attention in the planning processes in Denmark. For instance, there are arguments about mobility planners assuming that users fit into the mere category of everybody and focusing on equality, not equity [104]. This practice of 'cultural black boxing' leads the planners tending to avoid addressing gender inequality. They primarily respond to visible and established groups and empha-

size narratives of existing equality rather than acknowledging ongoing inequality. Consequently, cultural black boxing transpires in the mobility planners being influenced by their national identity and eventually in their planning processes [104].

The contribution of sustainable transportation to improved health and increased quality of life is evident. Investing in cyclist and pedestrian-friendly cities also helps reduce greenhouse gas emissions, and increases the population's health index, given the significant contribution of transportation to global emissions [37]. Additionally, the quality of life has been associated with transportation, particularly public transport [55].

There have been studies that introduced alternatives for Denmark's areas with smaller population sizes to reduce the dependency on private cars. For instance, it has been argued that implementing demand-responsive transport (DRT) in Danish rural areas as a public transport option can lead to improved accessibility and increased transportation options for residents, particularly those with limited mobility or without access to private vehicles [27]. This type of transport was found effective in bridging the transportation gap in rural areas and connecting people to essential services, such as healthcare facilities, schools, and shopping centers. Moreover, discussions highlight the potential cost savings associated with DRT implementation. By optimizing the routing and scheduling of vehicles based on passenger demand, DRT can lead to more efficient resource utilization and reduced operational costs compared to traditional fixed-route systems. Additionally, the model can contribute to reduced traffic congestion and environmental benefits by promoting shared rides and reducing the number of private vehicles on the road. Furthermore, the importance of effective planning and coordination in implementing DRT systems in rural areas while considering factors such as population density, service coverage, and user preferences has been emphasized [27].

Based on the 15-minute city concept, the cities can adapt these alternative solutions to improve walkability by filling the gaps in the public transportation networks. However, for the DRT model's successful implementation, several factors should be considered. Understanding the unique characteristics of the target population and their travel needs is crucial [22]. Tailoring DRT services to address specific demand patterns and user preferences can increase the likelihood of success. Additionally, effective marketing and communication strategies play a significant role in creating awareness and encouraging ridership. Col-

laborative partnerships between public transit agencies, private operators, and community stakeholders are also important for the sustainable development and operation of DRT systems. Integration with existing transportation networks and infrastructure, as well as engaging emerging technologies, such as mobile applications for booking and real-time tracking, can enhance the user experience and improve efficiency. Furthermore, the continuous monitoring and evaluation of DRT services to identify areas for improvement and adapt to changing demands are essential [22].

2.6 Literature Review Conclusion

In conclusion, this literature review chapter sought a comprehensive examination of the walkability concept, its multidimensional nature, and its significance in urban planning and design. The discussions highlighted the need for comprehensive assessment frameworks that capture the complex interplay between the built environment and human behavior. The literature emphasized the significance of considering factors such as street design, connectivity, land use mix, safety, and aesthetics in assessing walkability. It advocated for integrating quantitative data, qualitative assessments, and participatory approaches to gain a holistic understanding.

The chapter also explored the 15-minute city concept, which promotes the idea that essential services and amenities should be accessible within a short distance, aiming to create more sustainable, livable, and equitable urban environments. The reviewed literature underscored the key components of the 15-minute city, including density, proximity, diversity, and digitalization, while acknowledging the challenges and risks associated with its implementation. Moreover, the importance of careful planning, coordination, and citizen participation in addressing these challenges was emphasized in the studies.

Furthermore, the discussions indicated the intersectionality of walkability with other urban planning concepts and initiatives, such as transformative placemaking, network-based evaluation frameworks, and inclusive mobility. It highlighted the significance of considering demographic shifts, policy overlaps, and different populations' specific needs and challenges in sustainable transportation planning.

The examples from Scandinavian countries, Sweden and Denmark, shed light on the efforts to promote walkability and inclusive mobility in these regions. While progress has been made in implementing pedestrian-friendly measures and sustainable transport systems, there is still room for improvement in policy implementation, addressing challenges related to car dependency, and ensuring gender equality in planning processes.

In conclusion, this literature review chapter provides urban design and planning by providing insights into the nuanced aspects of walkability, the potential of the 15-minute city concept, and practical recommendations for creating more walkable and people-centric cities. The literature accentuated the importance of promoting active mobility, engaging stakeholders, and implementing supportive policies and governance. By adopting a comprehensive approach to sustainable mobility, governments and planners can contribute to achieving sustainable development goals while creating more inclusive and sustainable urban environments.

Chapter 3

Context

This chapter first introduces the WALKMORE project to which this thesis belongs, the institutions involved, and the ambition of the research project. Then, the case study city of this thesis, Kongsvinger, will be presented regarding its history, geography, and demography. At the end of the chapter, there is a brief review of the city's current status concerning mobility and transport.

3.1 WALKMORE

This thesis is an attachment to the WALKMORE research project by the Institute of Transport Economics, Norwegian Centre for Transport Research (TØI). The project's ambition is to build on the knowledge regarding [159]:

- Planning and decision processes and practices
- Methods and tools for mapping and evaluating walking and walkability
- Walking behaviors and how people perceive their urban built environments.

The WALKMORE project investigates means to increase walking among inhabitants of small Norwegian cities (pop. 10-15.000) [158]. Small Norwegian cities have a significant local walking potential as they deliver short distances within and to the city center [158]. However, the dominance of private cars in daily trips of the small city residents is the

issue. Addressing this problem is possible through land use and development planning, yet the knowledge gap and restricted resources in small municipalities limit such possibility. The WALKMORE project's main research question is *How can small cities be planned and developed to make people walk more?* [159]. The project is a collaboration between several public actors and research institutes. The Norwegian municipalities and their respective counties as partners and case cities are Narvik and Nordland, Steinkjer and Trøndelag, and Kongsvinger and Innlandet. Other partners include the National Public Roads Administration and the Norwegian University of Life Sciences (NMBU), with TØI as the leading institute [159].

The Institute of Transport Economics is a national research center in the field of transport and mobility established in 1964 and turned into an independent private institute in 1984. TØI's initiative is to conduct research while ensuring that the center uses the full potential of the resources, facilitates collaboration between the institute and other partners, and that the results benefit Norwegian society and businesses. The research council of Norway supplies most of the institute's funding [160].

3.2 Kongsvinger

Situated between Oslo and the Swedish border, Kongsvinger is a prominent connection point in terms of history, culture, mobility, and trade. The city has been involved in many historical events, such as war and mass immigration. The total number of inhabitants in Kongsvinger municipality was 17,966 in 2022. The population projections, however, are 18,262 in 30 years and 18,429 in 50 years [140].

The Kongsvinger municipality is the center of the Kongsvinger region, which is a part of the Innlandet county [66]. The Kongsvinger city's location within the different government division levels is illustrated in Figure 3.1.

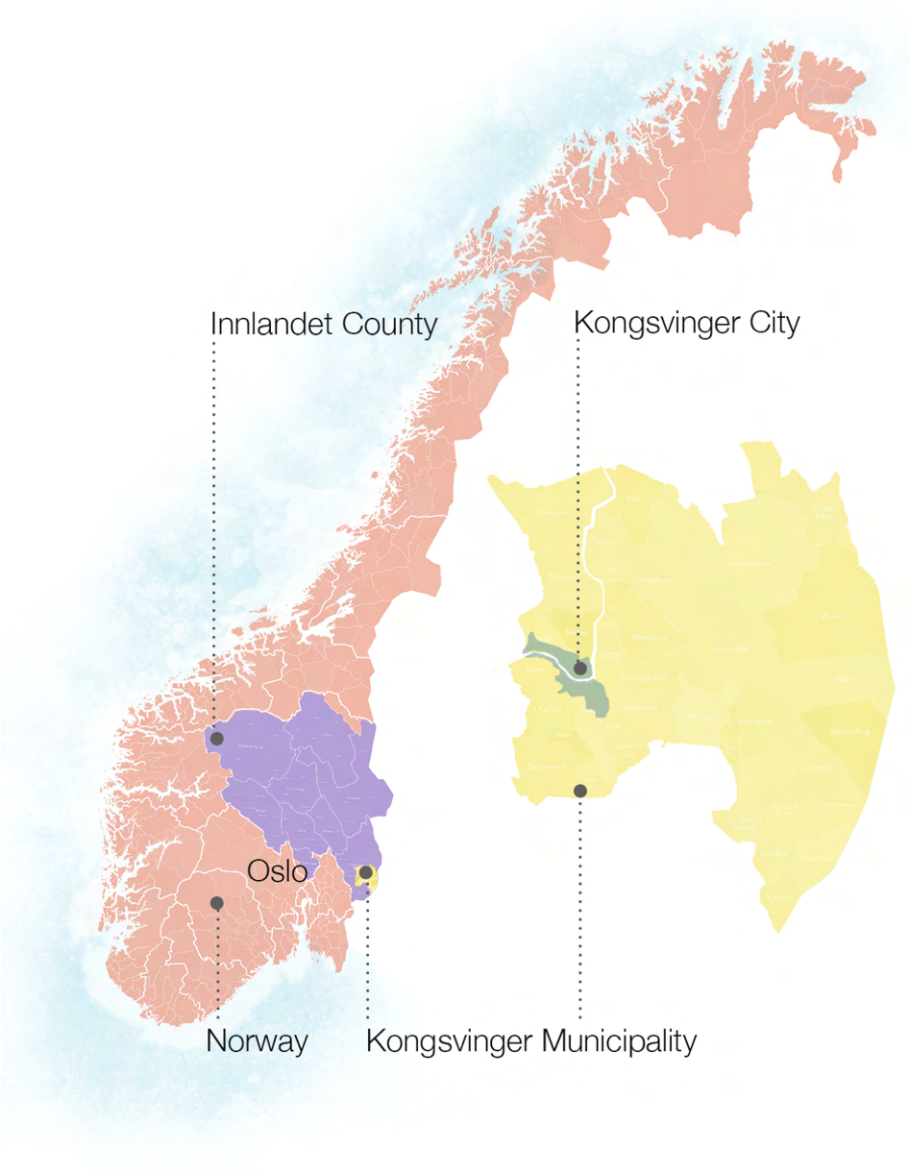

Figure 3.1: Kongsvinger's position on the country, county, municipality, and city level, author.

3.2.1 Geography Land use and Production

With Norway's longest river, Glomma, running through the municipality region, Kongsvinger City is divided into a Northern and a Southern faction [66]. In addition, with 827.36 km² of forest areas [140], the Kongsvinger municipality is Norway's largest forested municipality. The area's topography has a gentle elevation fluctuation that reaches 523 meters above sea level at the highest point. The river bed and the soil of the surrounding river area consist of well-grained sand and are suitable for grain and potato farming [153]. The second largest land-use area in Kongsvinger, other than fresh water, is cultivated land with

Fritidsbebyggelse	1.47
Bebygd område for landbruk og fiske	3.44
Næring, offentlig og privat tjenesteyting	2.39
Undervisning og barnehage	0.2
Helse- og sosialinstitusjoner	0.16
Kultur og religiøse aktiviteter	0.1
Transport, telekommunikasjon og teknisk infrastruktur	16.13
Beredskapstjenester og Forsvaret	0.13
Grønne områder, idretts- og sportsområder	1.55
Uklassifisert bebyggelse og anlegg	1.29

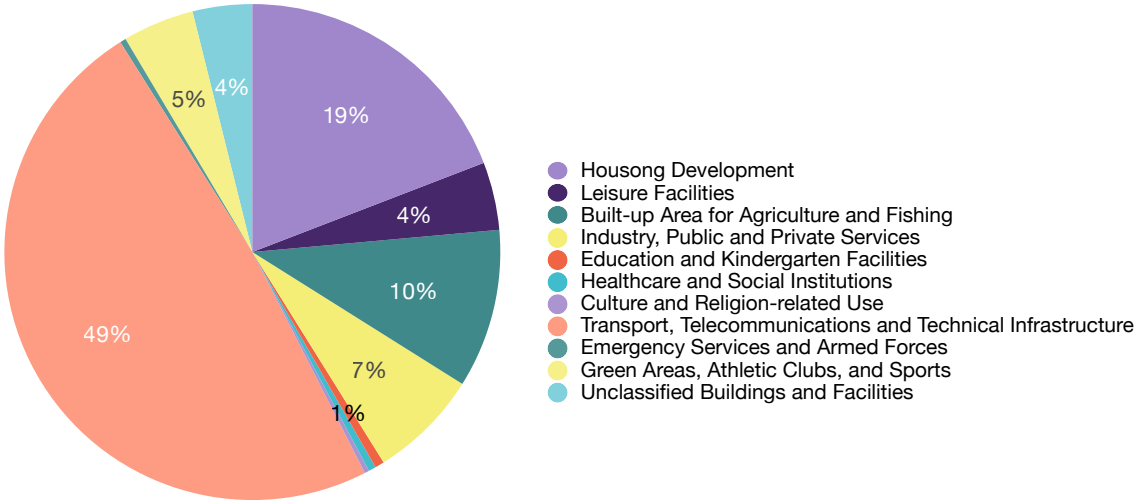

Figure 3.2: Land-use in Kongsvinger's built areas, [140].

1

Since 1965, Kongsvinger went through years of noticeable industry development [153]. The municipality provided real estate options for notable businesses and industries that moved their bases partially or fully to the area. The main reasons were the access to the labor forces and the proximity to Oslo, where most of the headquarters were located. Also, with five power plants, Kongsvinger is among the power-producing municipalities in Norway, even though its production is relatively small [153].

3.2.2 History

By looking at the online and offline available information about the city's history, it is evident that a focal point in Kongsvinger City's formation and development is the Kongsvinger Fortress. The fortress is located on the Eskoleia ancient route, an important connection between Sweden and Norway [73]. Later in the medieval era, the path became a pilgrims' route, extending from southern Norway and Europe to Nidaros (Current Trondheim), St. Olav's shrine's location [152]. The Kongsvinger fortress was mainly built as a defense reinforcement structure in the 17th century. The aim was to secure

Kongsvinger as a crucial connection point [64]. Later, Johan Caspar von Cicignon, an architect from Luxemburg who was also in charge of Trondheim city's plan after the 1681 fire [165], laid out the grid plan for the blocks in the neighboring areas of the fortress [75]. Until 1854, when declared as a Kjøpstad, the name Kongsvinger only belonged to the fortress, and the city was called Vinger [50]. Kjøpstad was a term used for places for trade and material export [1]. This declaration resulted in an increase in the city's physical development, investments, and the number of inhabitants.

3.2.3 Demography

Since the death rates are outnumbering birth rates by around 45%, the population growth projections do not show an apparent increase in the total population in 2030 and 2050 [140]. Despite the 24.5% growth in the 1970s, the city of Kongsvinger has had a relatively stable population of a little over 17,000 and a 1.8% population growth in the ten years between 2013 and 2022 [153]. If the trends and external factors stay the same, half of the city's population in 20 years will be elderly age groups. Around 11% of the Kongsvinger residents work in Oslo.

Around 45% of the population in Kongsvinger is employed [142]. This employment rate is distributed almost evenly between male and female residents between 17 and 74 years old. The dominant fields regarding employment in the city are health and social service, with about 78% female employees, and merchandise and motor vehicle repair, with around 60% majority of male employees [142].

Among the inhabitants in Kongsvinger, nearly 40% have high school-level education degrees. 24% of the population in the city has gone through academic education, and only 5% of them have participated in long-period university programs [138].

3.2.4 Mobility in Kongsvinger

Kongsvinger is situated on the North Eastern side of Oslo within a 93 km distance. The travel time from Oslo to Kongsvinger is about an hour and 15 minutes by car and one hour and 18 minutes by train. The railway transport providers, SJ and Vy, provide the five train

routes connected to Kongsvinger [79]. However, public transport's frequency and convenience significantly decrease in trips to and from nearer areas and within Kongsvinger city. For example, by a brief look at Google Maps, it is evident that in two of the most central public transport stations, Kongsvinger central station and the Rådhus Station, the frequency of the city bus lines are minima of 30 minutes during rush hours (morning and afternoon), and the most used train line, R14 [85], is scheduled every hour.

Planning trips with active mobility choices is a challenge in Kongsvinger. The city is formed on the sides of the river, creating a V-shaped profile and a very steep topography. Other challenges regarding active mobility in Kongsvinger are the intermittent route network and the undivided paths for pedestrians and cyclists. Figure 3.3 illustrates the current active mobility networks in the city. In addition, Figure 3.4 shows the city's height profile.

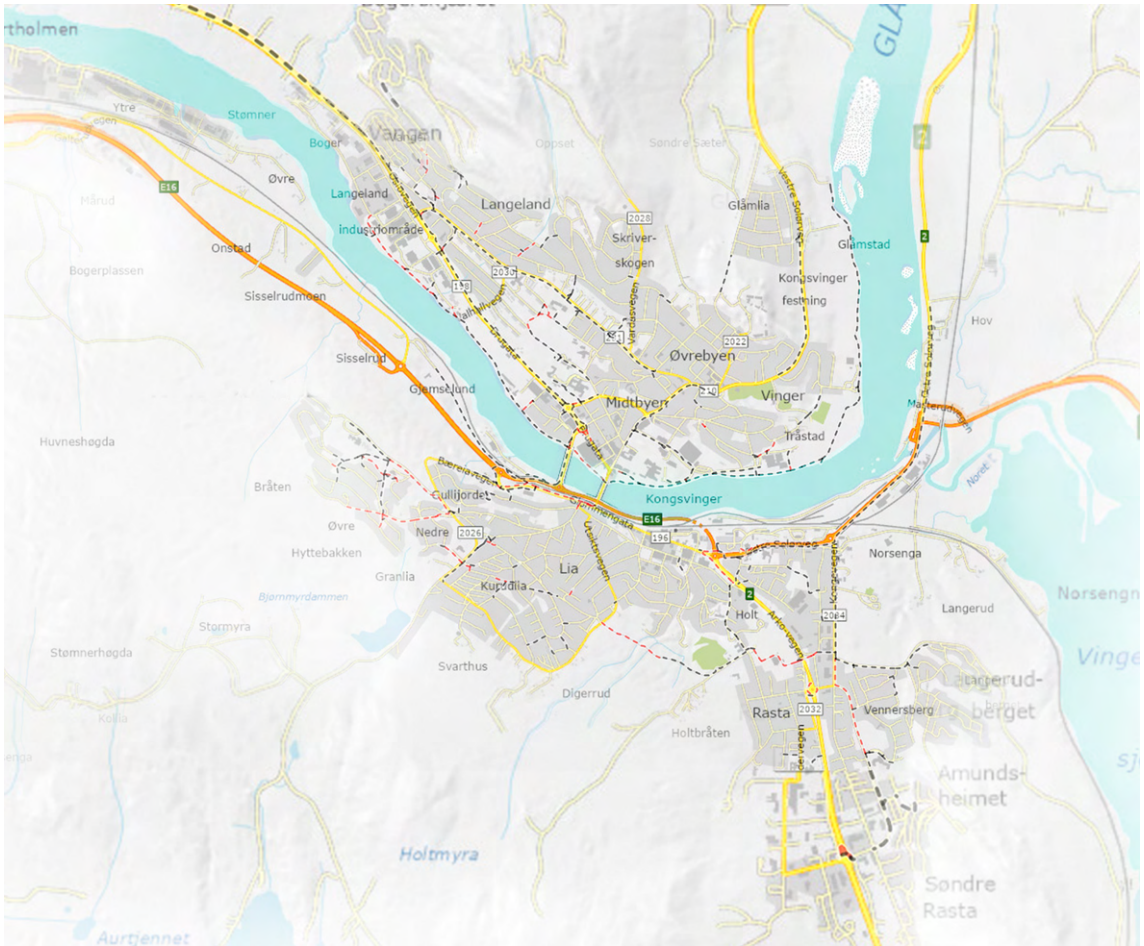

Figure 3.3: Active mobility networks in Kongsvinger showing the incomplete coverage and the lack of division between pedestrian and cycling paths, [143].

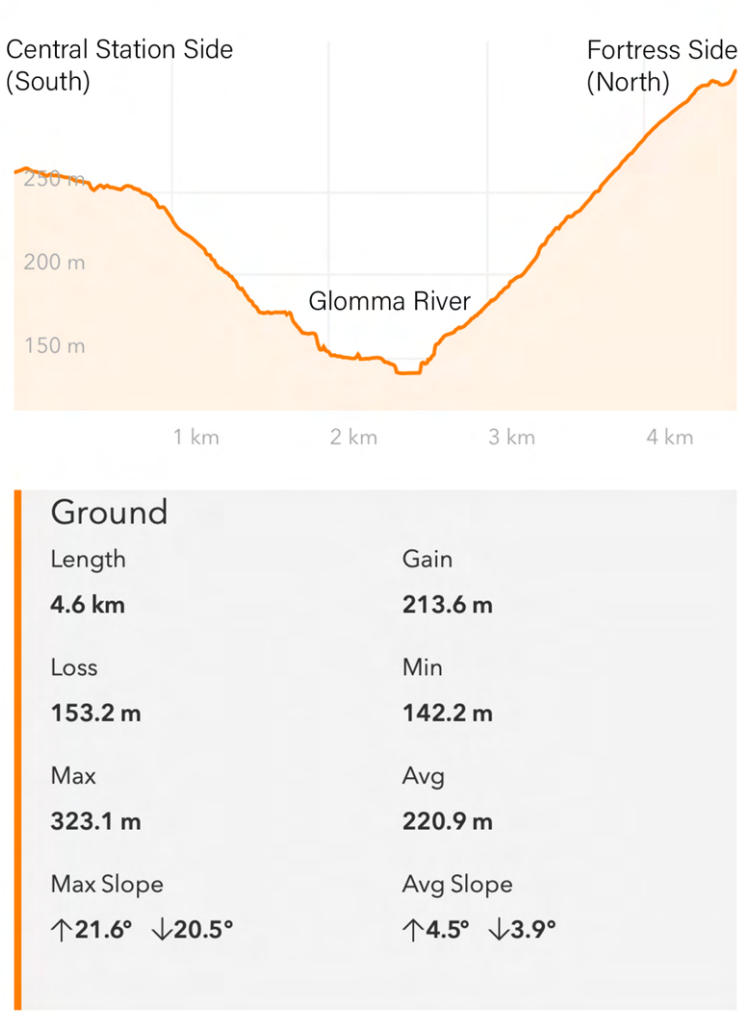

Figure 3.4: Kongsvinger city's height profile showing the challenging topography of the city for transportation infrastructure, [65].

During the fieldwork in Kongsvinger for this research, a limited number of younger age groups (teens and 20s) who used E-scooters were noticeable. However, when one refers to the E-mobility rental service providers, there are no options available in Kongsvinger. This lack of services also applies to shared mobility choices.

E-mobility might come to mind as a sustainable mobility option, but with E-car charging stations (see Figure 3.5) being the only E-mobility option in Kongsvinger, it might encourage car dependency among citizens even more. Another facilitator for using private cars in the city is the abundance of parking spaces in the city (see Figure 3.6).

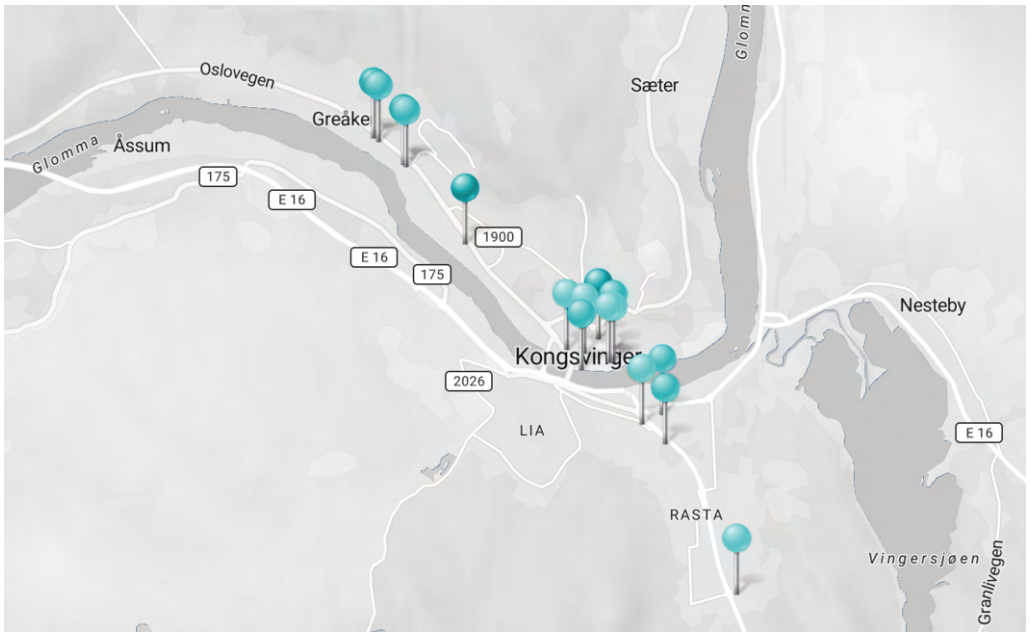

Figure 3.5: Car charging stations in Kongsvinger, [15].

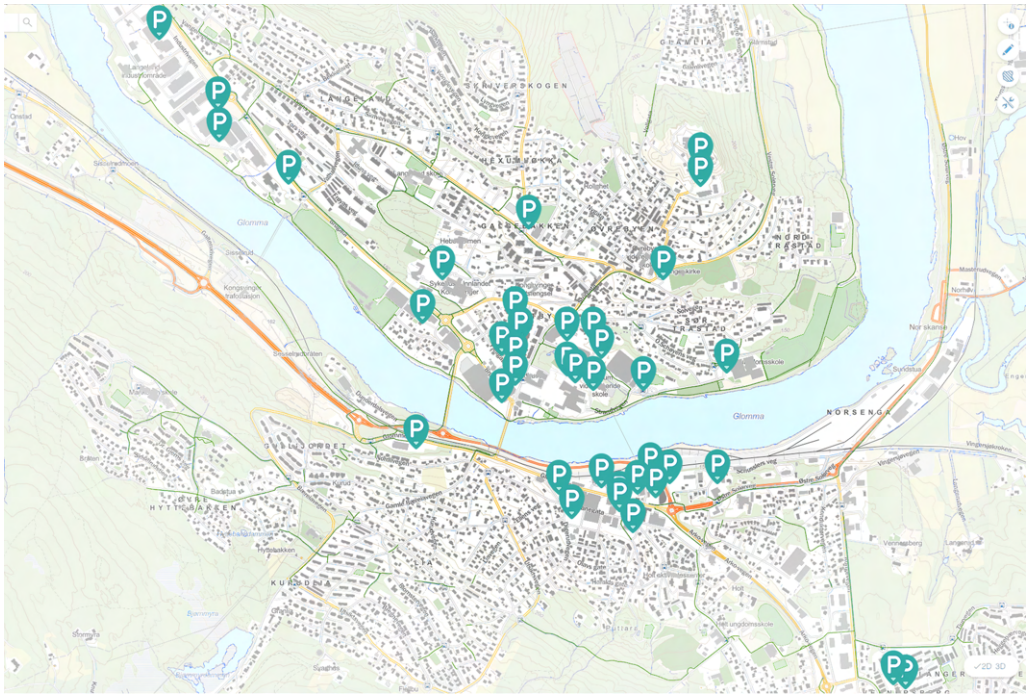

Figure 3.6: The number of public parking facilities in Kongsvinger and their distribution, author.

Additionally, being 30 minutes away from Charlottenberg, Kongsvinger is one of the ideal connection points for those Norwegians that take their shopping trips to Sweden by their private cars [17].

Chapter 4

Theoretical Framework

The following section provides an overview of the theories through which the study perceives the concept of walkability. First, a critical review of *the Theory of Planned Behavior*, as a contrasting concept to *the Social Practice Theory* is delivered. The discussion will be accommodating in understanding the importance of social background in inclusive mobility provision. Next, the focus will be on *the Social Practice Theory* as the suitable alternative and the pivotal theoretical framework of this thesis. Lastly, a brief review of *the Right to The City* and how it translates into the right to mobility is presented.

4.1 Theory of Planned Behavior

The Theory of Planned Behavior (TPB) has been used to comprehend and anticipate human behavior in similar research within the mobility and transport domain [98][147].

The Theory of Planned Behavior, proposed by Ajzen et al., provides a social psychology framework for understanding and predicting human behavior. The authors stated that TPB provides a comprehensive framework for understanding behavior and its antecedents. They suggested that the three components of TPB, attitudes, subjective norms, and perceived behavioral control are sufficient to explain behavior across different disciplines. Additionally, the writers accentuated the importance of action control, which refers to the process through which intention translates into action [5]. Altogether, the

theory posits that behavior is determined by an individual's intention to engage in that behavior, which, in turn, is influenced by three main factors: attitudes, subjective norms, and perceived behavioral control [32].

Based on this theory, attitudes refer to the individual's evaluation of specific behavior, considering its advantages and disadvantages. These evaluations can be influenced by various beliefs, values, and past experiences related to the behavior [5].

Furthermore, subjective norms involve social influences and the perceived expectations of significant others, such as family, friends, or cultural norms. These norms can shape an individual's perception of whether engaging in a particular behavior is socially acceptable or desirable [32].

Moreover, perceived behavioral control refers to an individual's belief in their ability to perform the behavior successfully. It takes into account factors such as personal skills, resources, and external barriers that may affect one's confidence in executing the behavior [5].

According to the Theory of Planned Behavior, these three factors — attitudes, subjective norms, and perceived behavioral control — interact to shape an individual's intention to perform a specific behavior. Additionally, the theory proposes that intentions are the best predictors of actual behavior, with stronger intentions typically leading to a higher likelihood of engaging in the behavior [32].

Overall, advocates of the Theory of Planned Behavior claim that this theory provides a comprehensive understanding of the cognitive and social factors that influence human behavior, emphasizing the importance of attitudes, subjective norms, and perceived behavioral control in determining behavioral intentions and subsequent actions.

However, the Theory of Planned Behavior has been extensively criticized. Additionally, the theory's validity and practicality have been widely doubted.

There are remaining limitations in utilizing the Theory of Planned Behavior (TPB) in explaining physical activity behavior [134]. Researchers who sought to investigate the influences on physical activity behavior among older adults employed a representative cohort of community-dwelling individuals. They examined psychological factors such

as attitudes, subjective norms, and perceived behavioral control, alongside demographic characteristics, health-related variables, social factors, and environmental factors that may affect physical activity engagement. The findings revealed that while the constructs of the TPB (attitudes, subjective norms, and perceived behavioral control) were associated with physical activity behavior to some extent, their influence was relatively weak compared to other factors. The researchers found that demographic characteristics (such as age and gender), health-related variables (such as self-rated health and functional limitations), social factors (such as social support and social engagement), and environmental factors (such as neighborhood characteristics and access to facilities) played more substantial roles in determining physical activity levels among older adults. These results suggest that the TPB alone may not adequately explain physical activity behavior in the context of older adults. Other factors beyond the psychological constructs proposed by the TPB, including demographic, health-related, social, and environmental factors, need to be considered to gain a comprehensive understanding of physical activity engagement in this population [134].

The article by Orbell and Sheeran examined another potential shortcoming of the Theory of Planned Behavior (TPB) in predicting health-related behavior. The authors introduce the concept of Inclined Abstainers, individuals who possess favorable attitudes and intentions toward a particular health-related behavior but fail to engage in that behavior [97]. The authors conducted three experiments to explore this phenomenon. The findings suggest that the TPB, which emphasizes the role of attitudes, subjective norms, and perceived behavioral control in predicting behavior, may not fully account for the complexities and inconsistencies observed in health-related behavior. Specifically, some individuals who expressed positive attitudes and intentions toward a behavior still did not engage in that behavior due to various psychological and situational factors. The article highlights the significance of considering additional factors beyond the constructs of the TPB to gain a more comprehensive understanding of health-related behavior. The indication is that factors such as past behavior, self-identity, and conflicting goals or priorities may influence behavior independently of the TPB constructs [97].

Furthermore, the Theory of Planned Behavior is argued to have varied effectiveness across different behavior domains [81]. The TPB was found to be more effective in predicting

behaviors that were under voluntary control and involved conscious decision-making processes. However, its predictive power was found weaker for behaviors that were habitual, automatic, or influenced by external factors beyond individual control. Additionally, factors that influenced the strength of the TPB's predictive ability have been found. The TPB has been described as more effective in cases of closer temporal proximity between the measurement of TPB variables (e.g., attitudes, subjective norms, perceived behavioral control) and the actual behavior. Furthermore, the TPB's predictive power was enhanced when the measurement of TPB variables was behavior-specific rather than assessing generic beliefs [81].

Some studies challenge the validity and utility of the TPB. The argument is that the TPB's assumptions and limited scope interfere with its effectiveness in explaining and facilitating behavior change and do not capture the complexities of human behavior [133].

One key concern is the conflict between the mediation assumptions in the TPB and empirical evidence. One argument is that beliefs often predict behavior over and above intentions, indicating that the TPB's mediation assumptions may not hold [7][21]. Additionally, evidence suggests that external influences such as age, socioeconomic status, physical health, mental health, and environmental factors predict behavior independently of TPB predictors. These results challenge the TPB's bold sufficiency hypothesis, which assumes that all external influences on behavior are mediated through the TPB [133]. The opponents criticize the TPB's explicit, fully specified, and statistically testable model, arguing that this approach is misleading [36]. Alternatives, including those focusing on habit strength, motivational measures, self-regulatory measures, and nudging techniques, are among the suggested approaches [133]. The TPB's limited predictive power among diverse populations and when predicting self-reported behavior over a short term is also argued [81][134].

Moreover, the critics question the utility of the TPB in practical applications and intervention development [133]. They argue that the TPB no longer provides helpful explanations for human behavior and fails to offer meaningful hypotheses that differentiate it from other theories [155]. The TPB is criticized for lacking effective experimental test facilitation and not accurately communicating accumulated empirical evidence [53][62][92][111][124]. The suggestions indicate that researchers have already moved

on from the TPB by using extended versions of the theory or incorporating additional behavior change strategies, implying a lack of confidence in the TPB as it stands [133].

While TPB has been argued to be applicable and influential in predicting and changing behavior by its advocates [148], its effectiveness in different contexts and domains remains debated. The theory of planned behavior diverts the entirety of the behavior caused to the user and ignores the effect of the environment and space on user actions. The arguments for the theory's insufficiency suggest incorporating additional factors and accounting for contextual and cultural elements as complementary considerations.

4.2 Social Practice Theory

The theoretical foundation of this research will be grounded in the Social Practice Theory. The importance of social analysis on unconscious symbolic structures is that they affect human behavior [106]. Walking as a choice of mobility, human behavior, and a routine practice [177] fits Reckwiz's definition of practice: "forms of bodily activities, forms of mental activities and 'things' and their use, a background knowledge in the form of understanding, know-how, states of emotion and motivational knowledge." [106]. The Social Practice Theory argues that the overall trend in different practices of a society is set by the material framework, meanings, and skillset produced from previous practices [117]. Therefore, studying the interlocking mechanisms of material, meanings, and skills of different techniques for different demographic groups remains an imperative task to shift daily mobility towards walking-based mobility.

Walking, a habitual and essential mode of mobility for individuals, is a means to travel short distances, improve their health, and reduce their environmental impact. That being the case, it is essential to explore the social and material factors that shape the practice of walking and understand how to promote it as a viable and sustainable mobility option.

Social Practice Theory provides a practical framework for analyzing the social and material arrangements that produce and reproduce walking as a social practice. Social practices are not just individual actions but also include the extensive social and material arrangements that make those actions possible [106].

Practice theory views practices as enduring and recognizable entities formed through the coordination and interdependence of activities [123]. The argument is that practices enacted by individuals contribute to the social structures and institutions formation [117]. The framework identifies three main elements of practices: material, meaning, and competence (see Figure 4.1) [128]. These elements represent the equipment, images, and skills involved in carrying out practices [117]. Everyday life consists of various practices, such as cooking, sleeping, and working, which are interwoven and connected to the use of resources [128]; [117].

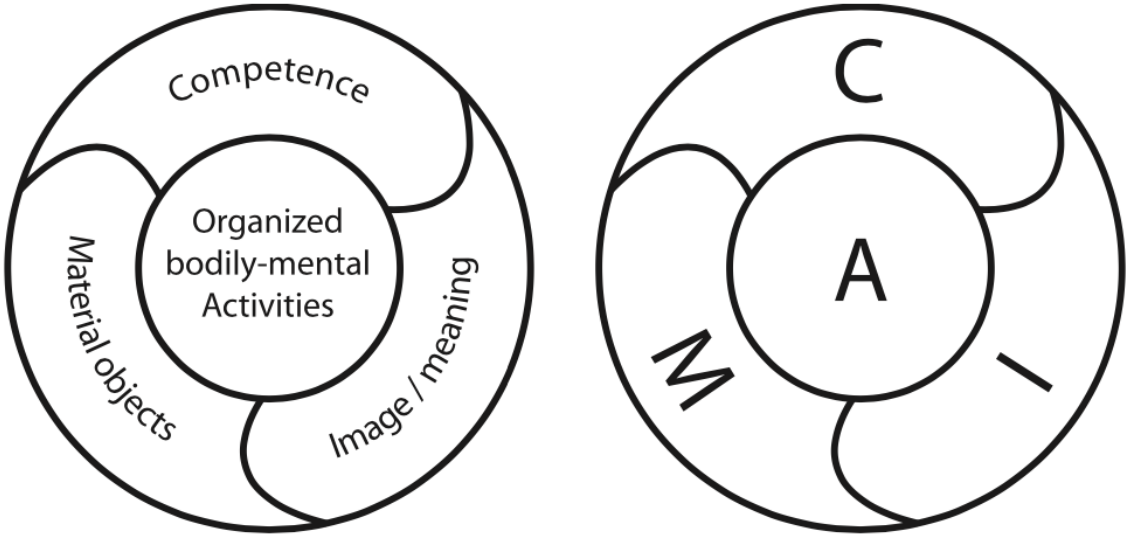

Figure 4.1: The Social Practice Theory's three central elements, [117].

The proponents emphasize that the combination of practices in everyday life determines the environmental impacts. As seen in Figure 4.2, the social and material framework established by previous practices influences the trends and constraints in combining practices [117]. People also establish a private framework influenced by social norms and individual choices, which further shapes the practice combinations [175]. Projects emerge from these frameworks, representing a complex of practices necessary to fulfill specific intentions [105]. Moreover, practices can contribute to multiple projects, and their meanings are attached to the projects they serve (see Figure 4.3) [117].

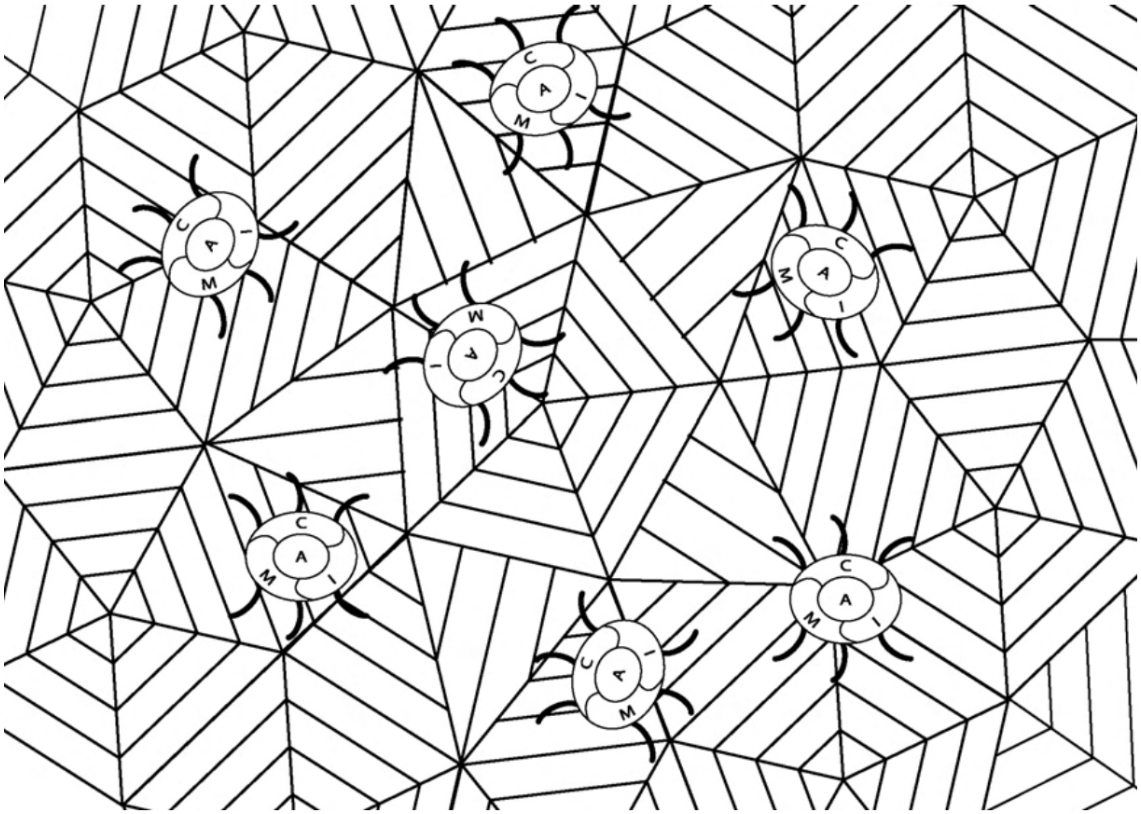

Figure 4.2: The interaction between practices and the social and material framework, [117].

Time and space play significant roles in everyday life. People follow paths in time and space while carrying out practices, and coordination is essential to manage participation in practices within the limitations set by time, space, and social frameworks [105][49]. Relations of power and dominance are present, reflecting unequal access to benefits and influence over projects [117]. Routines are relied upon to cope with the complexity of everyday life, but tensions arise when time demands and coordination needs from practices conflict [175].

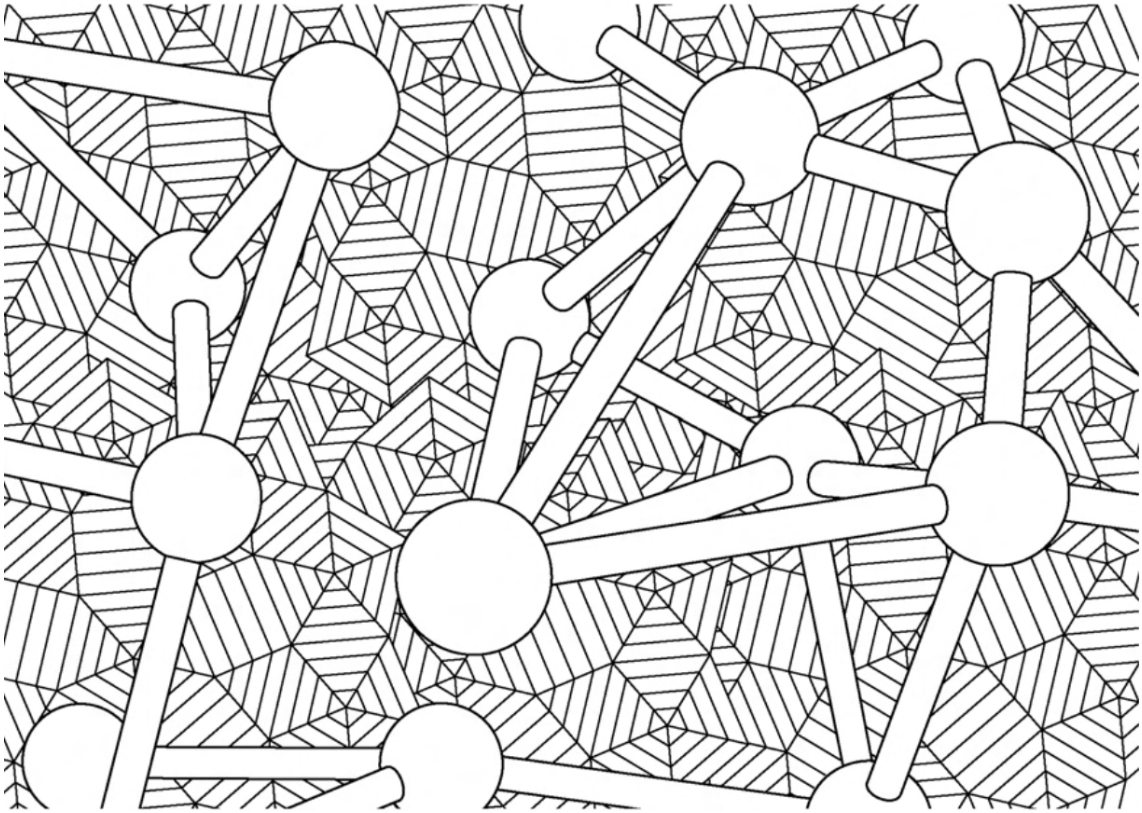

Figure 4.3: The Practices contributing to projects, [117].

The Social Practice Theory as a theoretical framework can be applied to diverse domains, ranging from households and leisure to work-life balance, business, and the public and political spheres [117]. By employing the concept of everyday life as an analytical tool, we gain insights into the lived experiences across these sectors. Active mobility choices, such as walking, can be seen as an example of practice within this framework. The practice of walking, as an active mobility choice, encompasses meaning, material, and skill. It involves the utilization of resources, where infrastructure becomes a crucial material aspect. The meaning would be the social and individual background, and the skill would refer to the physical ability. The intensity of this practice in everyday life is influenced by various factors, such as the specific characteristics of the walking practices themselves, how they are combined, the constraints imposed by time, and the spatial coverage they encompass. Over time, these factors continuously evolve and transform, shaped by societal practices, innovations, and the dynamic interplay between social and material contexts.

Walking as an everyday practice can be divided into two forms: integrative practices and dispersed practices [52]. Integrative practices refer to walks with specific goals, such as

hiking, where walking itself is seen as an achievement. On the other hand, dispersed practices involve walking as a supportive activity for other primary goals, such as traveling or socializing, where walking goes unnoticed and is not considered a significant part of the accomplishment. However, some factors affect the meaning and structure of walking as a practice. For instance, Harris et al. indicate that step measurement through an app had a transformative effect on participants' perception of walking. The visualizations provided by the app made participants more aware of the incidental walking embedded within their everyday practices. This newfound awareness led them to value and increase their walking. Subsequently, participants started incorporating walking into activities like shopping or socializing, recognizing the associated health benefits. The measurement of walking also changed participants' understanding of distance, making them realize that they could walk instead of using other forms of transportation for shorter trips. The app's feedback influenced the organization of performed practices and also altered participants' understandings and motivations. In some cases, walking became a primary goal within existing practices, such as shopping trips, where the emphasis shifted from the specific purpose to being active and getting out. This shift in teleoaffective structures allowed participants to view walking as a valuable exercise practice integrated into their daily routines. The study acknowledges that these changes to practice performances do not necessarily imply changes to the practices as social entities. However, the app's feedback had the power to reconfigure individuals' perceptions and behaviors, creating new subjectivities and desires related to walking. It is worth noting that the changes introduced by the app could be temporary, as daily life is influenced by fixed schedules and the participation of others, making it challenging to prioritize health-focused practices consistently [52].

Nevertheless, the reorientation of everyday practices towards health considerations comes with certain risks. By emphasizing self-measurement and instrumental behavior change, there is a potential to stigmatize individuals not engaging in health-oriented practices or those with lower step counts, eventually leading them to feel failure and self-judgment [77][52]. Moreover, focusing on walking as the primary aspect of practice may overshadow other elements contributing to overall well-being, such as mindfulness or connection with nature [119][52].

Yet, Social Practice Theory has its limitations. It tends to overlook spatial differentiation

and structure, focusing more on temporal aspects. Additionally, it can downplay broader systemic forces and the importance of systems change. Critics also argue that the theory disconnects practices from individual actors, potentially diminishing the role of individual agency [90].

The current unsustainable practices in smaller Norwegian cities call for a shift in policies and plans to provide behavioral change (see Section 1.1). Within a Social Practice Theory framework, the change in practices requires a change in the components of it, including material, competence, and meaning.

Practices are fundamental in socio-technical transitions, therefore bringing about the need to study bundles or complexes of practices to understand prominent social phenomena [137]. This shift in perspective acknowledges that many activities, including sustainable consumption, energy use, and travel behavior, are interconnected with multiple other practices. Social Practice Theory aims to explain that human behavior cannot be reduced to individual attitudes or choices but should be seen as performances embedded within broader social processes. Furthermore, practices can align, depend upon, or support each other, creating systems or circuits of practice. Moreover, one should bear in mind the interrelation and influence of practices on each other, comparing it to an evolving ecosystem [137].

The process of behavioral transitions toward sustainable practices involves interconnected changes in various areas such as technology, economy, institutions, behavior, culture, ecology, and belief systems. These changes reinforce each other and occur through multiple causalities and co-evolution [118]. In the sustainable practices context, the focus is on understanding how specific practices, such as mobility patterns, evolve and transform [130].

The essential consideration to understand these behavioral transitions is to regard the practice itself as a dynamic integration of constitutive elements, including materiality, conventionality, and temporality. Daily walking as a practice, involves not only the availability of infrastructure and material technology but also the cultural meanings associated with the act of putting one step in front of the other and its linked rituals, which are actively and recurrently integrated into the practice [51].

The transitions in practices are governed by deliberate top-down interventions and shaped by the individuals' collective responses and interactions [130]. In the case of London's congestion charging scheme, the success of reducing car use and congestion depended on how Londoners collectively responded to the strategy [167]. The scheme's impact varied depending on existing routines, locations, and the socio-technical fabric of mobility, as well as social histories and path-dependent trajectories [88].

The dynamics of transitions are complex, involving feedback loops and continuous adjustments by individuals in anticipation of how others might respond [130]. Changes in one aspect of daily life, such as travel patterns, can have ripple effects on other interconnected habits, such as showering or breakfasting. These adjustments and readjustments, when repeated by many individuals, can lead to emergent consequences and challenges that require further strategies for managing or relieving them [39].

From another perspective, transitions refer to substantial shifts in social practices that emerge in response to changes in social, economic, and environmental conditions [129]. For example, the shift towards more sustainable mobility practices may be driven by concerns regarding climate change, air pollution, or urban congestion. Understanding the drivers of transitions and the role of interventions in enabling them is essential for developing effective policy and practice [129].

One framework utilizing social practice theory as the conceptual framing for behavioral shifts is to focus on practices rather than individual behavior or technological innovations as the unit of intervention in sustainability policy (see Figure 4.4) [137]. The framework proposes three problem framings dominant in current policy approaches: innovating technology, shifting consumer choice, and changing behavior. It introduces three alternative problem frameworks that underscore practices: re-crafting practices, substituting practices, and changing how practices interlock. According to the framework, interventions should proceed beyond individual behavior change and consumer choice and instead target practices as the key to reducing the resource intensity of current ways of life. Furthermore, it indicates that practices are not static but constantly changing, and policy interventions should aim to guide these practices in more sustainable directions. It also highlights the importance of addressing the interconnections between practices and the institutions and infrastructures that support them [137].

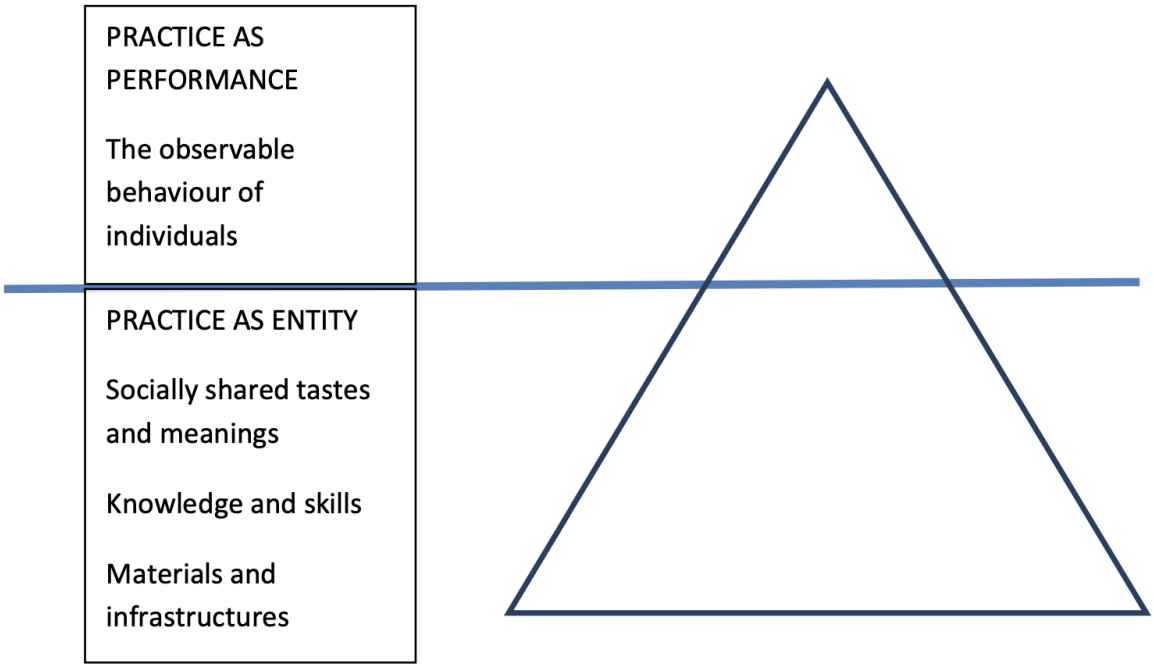

Figure 4.4: Observable behaviour being merely the tip of the iceberg, [137].

The framework argues for a more comprehensive and ambitious approach to sustainability policy, one that goes beyond incremental shifts and envisions a ”new normal” where existing everyday life patterns are radically reconfigured [137]. It acknowledges the challenges and complexities involved in intervening in established practices and calls for a better understanding of the trajectories of practices and their social, spatial, and temporal dimensions. The framework proposes three ways in which policy can intervene in practice entities: re-crafting existing practices, substituting practices with more sustainable alternatives, and changing how practices interlock. It suggests that these interventions can lead to transformative changes in sustainability by addressing the components, temporal patterns, and spatial arrangements of practices [137].

Furthermore, the framework also acknowledges the need for collaboration and multi-level governance in addressing practices that transcend administrative boundaries. It emphasizes the significance of monitoring and tracking ongoing trajectories of practices and calls for the development of new methods to assess policy impact on practices [137].

Nevertheless, the analysis has demonstrated that ”practices are always changing, and that policy always imagines (and thus reinforces) a version of normal.” [137]. By being aware of this dynamic and acknowledging that the rooted beliefs held by policymakers can po-

tentially restrict meaningful and feasible change, we can take a progressive step forward. However, this awareness also raises substantial considerations regarding equality, social justice, the significance of specific practices to individuals, and the democratic legitimacy of intervening in established ways of life [137].

4.3 Right to the City

Mobility, a crucial concept of everyday life, is a fundamental requirement for being a part of social activities, and lack of it would lead to social exclusion [170]. Guaranteeing access to mobility for all society individuals, the 'right to mobility' provides the conditions for social activities and eventually leads to social cohesion (inclusiveness) [38].

The European Union Council meeting on transport and telecommunications in April 2001 [29] defined sustainable transportation as a system that:

> *allows the basic access and development needs of individuals, companies and society to be met safely and in a manner consistent with human and ecosystem health, and promotes equity within and between successive generations; is affordable, operates fairly and efficiently, offers choice of transport mode, and supports competitive economy as well as balanced regional development; limits emissions and waste within the planet's ability to absorb them, use renewable resources at or below their rates of generation, and uses non-renewable resources at or below the rates of development of renewable substitutes while minimizing the impact on the use of land and generation of noise [29].*

This definition too brings up concepts related to 'the right to mobility' and equal opportunities for individuals regarding mobility.

The notion of the right to the city is crucial in understanding the association between urban planning and the right to transportation. One argument is that the right to the city is not merely about the right to access urban resources but also the right to participate in urban space production [8]. This point of view implies that citizens should have a say

in how we plan and develop transportation infrastructure in their cities. Furthermore, the right to transportation is interconnected with the right to mobility, which emphasizes the significance of equal access to transportation resources for all citizens [19].

The *deep distribution* initiative underscores the importance of apprehending the different factors that influence travel behavior, including gender, age, and socio-economic status [71]. This concept indicates that the development of transportation infrastructure should be accomplished while considering these factors to ensure equitable and inclusive access to transportation resources [71].

Another discussion is that the right to mobility other than access to transportation resources is about the freedom to move and use public space [14]. The implication is that transportation infrastructure should be developed with the consideration of citizens' practices in using public space for mobility. In Bogotá, cycling activism has demonstrated how playful and mobile urban practices can contribute to the right to the mobile city's development [14].

The importance of a rights-based approach to transportation planning is emphasized by the discussion that individual rights can lead to more equitable access to transportation resources [19]. However, the counter-argument is that political and social factors, including the subversive actions of drivers on the roads, can also shape the transportation system [42]. Moreover, the right to the city and human mobility transition in cases like São Paulo is developed by political and economic factors that impact transportation development [122].

Another discussion is around the intersection of urban sustainability and transport justice in the context of racialized mobility transitions. Sheller presents several principal findings highlighting the racial disparities in access to sustainable transportation options [126]. Her research reveals that marginalized communities, particularly those predominantly made up of people of color, face significant barriers to accessing sustainable modes of transportation such as public transit, walking, and cycling. These communities often experience inadequate infrastructure, limited transit services, and a lack of investment in their transportation needs. The study emphasizes the importance of recognizing and addressing the racial dimensions of transport justice to achieve urban sustainability goals.

The findings highlight the need for inclusive planning and policy approaches that prioritize the equitable distribution of sustainable transportation resources and address systemic inequalities [126].

Mobility is not simply a matter of transportation or movement but is deeply intertwined with social justice issues and inequality [127]. Access to mobility is unequally distributed among different social groups, with marginalized communities often experiencing limited transportation options and facing barriers to mobility. Considering factors such as race, class, gender, and ability is crucial in understanding and addressing mobility injustice. Additionally, the need for a comprehensive approach that recognizes the interconnectedness of mobility, urban development, environmental sustainability, and social equity should be taken into account. Therefore the pursuit of mobility justice plays a vital role in creating inclusive and equitable societies [127].

Nevertheless, one cannot undermine the interdependent relationship between housing and transportation infrastructure [116]. Another important idea in planning is paying attention to political economy and social justice when reading the landscape (the urban landscape in this case), as it highlights the significance of considering the impact of transportation infrastructure on marginalized communities [84].

4.4 Theoretical Framework Conclusions

This thesis will explore the social and material arrangements that shape the practice of walking to apply The Social Practice Theory framework to the study of walking as a choice of mobility. These study areas include the availability and quality of pedestrian infrastructure, cultural norms around walking, and the role of technology and media in shaping perceptions of walking. The research will also investigate ways to utilize transitions and interventions to facilitate a shift towards more sustainable mobility practices, such as walking, in response to environmental challenges. This will be accomplished by analyzing the case study and developing recommendations for policy and practice to support walkability improvement.

From the Social Practice Theory perspective, and within the Norwegian context, reach-

ing the sustainable, environmental, and social inclusiveness goals is possible through the focus on walkability. Furthermore, adopting a structured approach grounded in this theoretical framework can assist municipalities and road authorities in making well-informed decisions.

The research will explore how different sociodemographic groups perform and perceive the practice of walking and the differences and similarities between these performances and perceptions.

The theoretical framework of walkability in small Norwegian cities should also, to some extent, be grounded in the right to the city since it emphasizes the importance of equitable and inclusive access to urban resources and opportunities. The right to transportation is an essential component of the right to the city. Transportation and mobility planning should consider different factors, including gender, age, and socioeconomic status. Focusing on individual rights can lead to more equitable access to transportation resources, though political and social factors can also shape transportation infrastructure. Attending to political economy and social justice is crucial when developing transportation infrastructure, especially in marginalized communities.

Chapter 5

Methods

This chapter presents the methods used in this study for data collection and analysis. The significance of a coherent method demonstration is that if another research operator repeats the same data process, they deliver indistinguishable results [20]. Although transport and mobility planning appears to be a technical issue that requires quantitative tools and methods, it is also a social matter that needs to be addressed through qualitative methods.

The argument is that mobility and transport planning necessitates using qualitative and quantitative methods in addition to interdisciplinary outlooks. The emphasis is on the importance of integrating different approaches and perspectives to gain a comprehensive understanding of complex transportation systems [69]. Quantitative methods provide numerical data and statistical analysis, which offers insights into patterns, trends, and the efficiency of transportation systems. On the other hand, qualitative methods, such as interviews, observations, and case studies, offer a deeper understanding of people's behaviors, preferences, and experiences related to mobility. By combining these two approaches, planners can make informed decisions and develop effective strategies that consider both the technical aspects of transportation infrastructure and the socio-cultural context in which it operates. Additionally, an interdisciplinary perspective is crucial as it allows various fields, such as geography, urban planning, economics, and sociology, to contribute, leading to more holistic and sustainable mobility and transport planning outcomes [69].

Hence, the methodological strategy for this study is the mixed methods approach. The following sections provide a detailed description of the qualitative and quantitative methods and their advantages and challenges.

After examining the literature, documents, and reports regarding walkability in Norway, the research gaps were identified, and the research design was concluded accordingly, as shown in Figure 5.1.

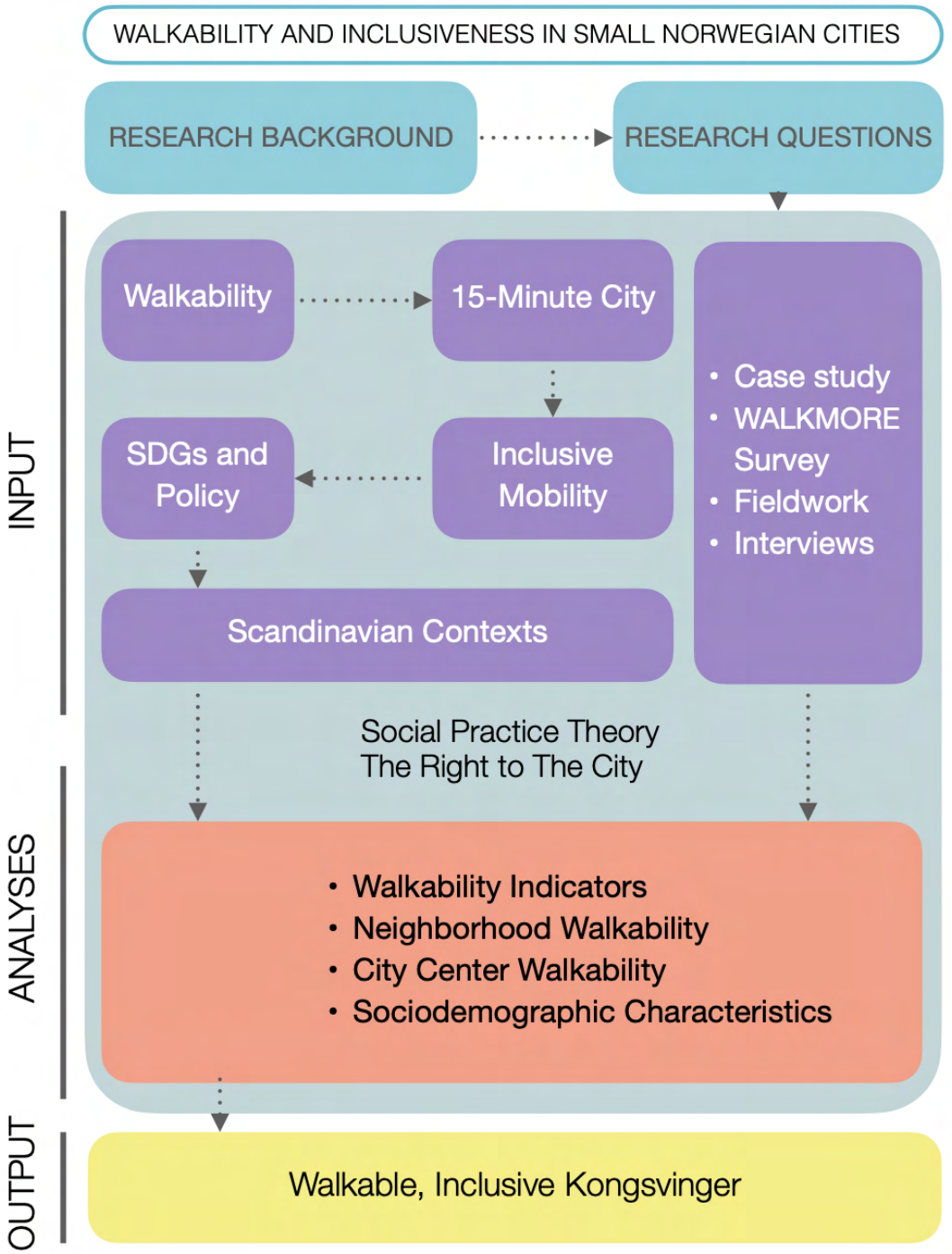

Figure 5.1: The research design, author.

5.1 Secondary Data

Statistical data played an important role in this study's data collection. This type of data source frames a holistic view of the situation, particularly the census data that delivers an account of the demography [72]. As this thesis is a part of the WALKMORE project (see Section 3.1), the pivotal data source on the target population's travel behavior was the previously collected survey data by the project. Other relevant research data collected through the literature review was complimentary to the material. Additionally, Statistics Norway, the official statistics provider in the country regarding the economy, population, and society on different scales [141], was an accessible secondary source for the respecting data in this research.

5.2 Quantitative Methods

Quantitative methods involve compiling numerical data and statistical analysis to gain a deeper understanding of patterns, trends, and the effectiveness of transportation systems. This research employs statistical analysis tools to explore the available quantitative data and conclude the associations between different elements involved in walkability and walking behavior.

5.2.1 IBM SPSS Statistics

IBM SPSS Statistics is a widely used software tool for analyzing statistical data, including in the transportation and mobility fields of study. It provides researchers with comprehensive tool sets and functionalities for data management, exploration, and statistical analysis [31]. The software allows users to import and organize large datasets, perform various data transformations, and conduct a wide range of statistical analyses, such as descriptive statistics and regression analysis. IBM SPSS Statistics enables researchers to explore relationships, identify trends, and draw meaningful insights from their data. Overall, the software serves as a powerful tool for researchers in transportation and mobility studies, empowering them to effectively analyze and interpret statistical data to enhance

their understanding of complex phenomena in the field [31].

This study has employed this tool to analyze the dataset provided by the WALKMORE project's survey. IBM SPSS has been used to categorize the participants based on their sociodemographic statistics and find the association between these factors with walkability in Kongsvinger through regression models.

Based on the number of independent variables (sociodemographic variables) and the dependant factors, including walkability indicators, this study's data requires a tool capable of providing the influence on and the relation between these variables. Multiple regression analysis expands upon bivariate regression analysis by allowing the examination of multiple independent (predictor) variables' influences on a dependent variable. Similar to the case of two variables, the objective of this method is to establish an equation or "model" that elucidates the impact or relationship among these variables [150].

In multiple regression analysis, the dependent variable is the outcome or response variable that requires explanation or prediction. It represents the variable of interest that we seek to understand better. For example, in social and political science research, the dependent variable might be voting behavior, public opinion, or income level [23].

The independent variables, also known as predictor variables, are the factors that are hypothesized to influence the dependent variable. They can be continuous or categorical variables, representing various dimensions or characteristics that may impact the outcome. Examples of independent variables in social sciences could include demographic characteristics, socioeconomic status, or political attitudes [150].

The multiple regression analysis aims to create a statistical model representing the relationship between the dependent variable and independent variables. The model estimates the influence of each independent variable while accounting for the effects of other variables in the model. It helps researchers understand how changes in the independent variables are associated with changes in the dependent variable [23].

In conducting the quantitative data analysis, the first step involved extracting the influential sociodemographic factors related to walkability from the literature review. Subsequently, relevant data on neighborhood and city center walkability, and travel behavior

in Kongsvinger, were selected from the survey dataset. Moreover, a data cleaning procedure was conducted to address missing values before executing the regression analysis to ensure data quality. The purpose of the regression analysis was to provide a comprehensive examination of the dependent and independent factors and to explore potential correlations between them.

Furthermore, a regression model outline was developed to select a suitable regression type to facilitate the regression analysis. The Multinomial Logistic Regression was a fit as it allowed for including multiple layers of dependent factors compared to the independent factors, thereby enabling a comprehensive regression analysis. Also, the acquired findings were thoroughly examined, focusing specifically on significant or closely significant associations between the dependent and independent variables. Ultimately, the findings were utilized to draw implications and conclusions regarding the study's objectives.

Figure 5.2 illustrates the settings for the Multinomial logistic regression analysis utilized to analyze the survey data.

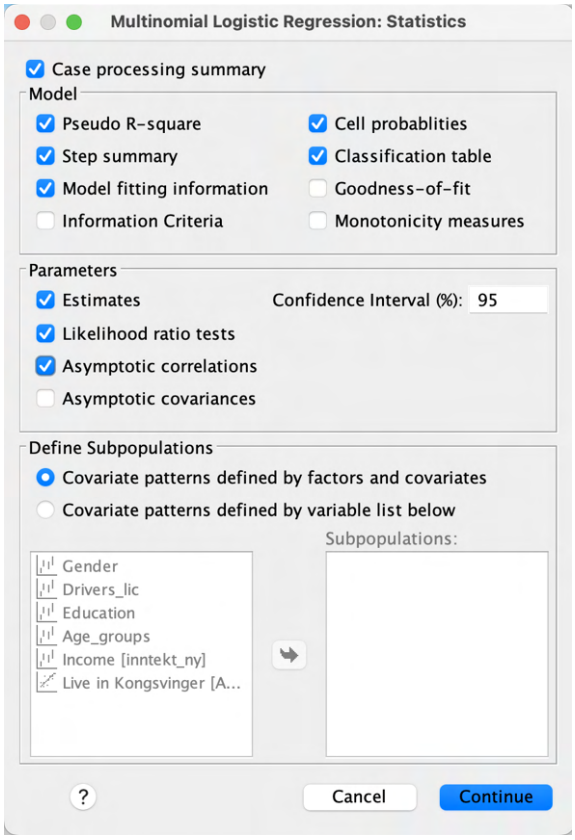

Figure 5.2: Multinomial logistic regression settings for the data analysis, author.

Furthermore, the analysis provides measures of statistical significance for the coefficients, indicating whether the relationship between an independent variable and the dependent variable is likely to be due to chance or if it is a meaningful association. Therefore the research has the possibility to determine which independent variables have a significant impact on the dependent variable [150].

The analysis produces regression coefficients, also known as beta coefficients or weights, which quantify the strength and direction of the relationship between each independent and dependent variable. These coefficients indicate the average change in the dependent variable associated with a one-unit change in the corresponding independent variable, assuming all other variables in the model remain constant [23].

Additionally, researchers assess the overall fit of the regression model using measures such as R-squared or adjusted R-squared. The R-squared value represents the proportion of variance in the dependent variable explained by the independent variables in the model. Higher R-squared values indicate a better fit of the model to the data, suggesting that the independent variables collectively explain a larger portion of the variation in the dependent variable [150].

Based on the provided data from the WALKMORE project's survey, some modifications regarding the analysis criteria were required. For instance, due to the low response variance for each query in the regression model result reviews, the significance of the independent variables' influence was the central criterion for defining meaningful correlations. Additionally, independent variables with very low variance, including "physical form" (statistics illustrated in Table 5.1), were removed from the regression analysis criteria as they could not provide valid results.

Table 5.1: Survey participants' physical ability, author.

Physical Form	Frequency	Percent
Bad	15	2.3
Not very good	117	17.7
Good	444	67.1
NA	73	11
Do not wish to answer	13	2.0
Total Valid	662	

Furthermore, the variables included in the regression analysis will be demonstrated based on the neighborhood walkability level case summary. Other regression analysis case summaries can be found in Appendix E.

The case processing summary, illustrated in Figure 5.3, provides information about the distribution of the independent variables and the walkability range in the dataset. The N (number) column shows the frequency of each level, and the marginal percentages refer to the distribution of each variable category within the total valid cases. It shows the percentage of cases that fall into each category within the respective variable [150].

The neighborhood walkability (range) here represents the walkability level of neighborhoods. It ranges from 0 to 5, where 0 indicates missing values, 1 represents the highest walkability level, and 5 represents the lowest walkability level.

Case Processing Summary

Sociodemographic variables		N	Marginal Percentage
Neighborhood walkability (range)	0	7	3.5%
	1	49	24.7%
	2	109	55.1%
	3	22	11.1%
	4	7	3.5%
	5	4	2.0%
Age groups	18-24	3	1.5%
	25-34	50	25.3%
	35-44	56	28.3%
	45-54	40	20.2%
	55-66	34	17.2%
	67-74	15	7.6%
Income	Under 399 000 kr	14	7.1%
	400 000 kr - 799 999 kr	61	30.8%
	800 000 kr - 1199 999 kr	78	39.4%
	1200 000 kr - Over 2 000 000 kr	45	22.7%
Children under 7 yo	No	101	51.0%
	1	63	31.8%
	2	32	16.2%
	3	1	0.5%
	4	1	0.5%
Gender	Male	77	38.9%
	Female	121	61.1%
Education	Elementary	6	3.0%
	Upper secondary	38	19.2%
	Technical	25	12.6%
	Up to 3 years uni or college	53	26.8%
	University or college 4 years or more	75	37.9%
Drivers license (car)	Car	183	92.4%
	no	15	7.6%
Time lived in Kongsvinger	Les than 2 years	23	11.6%
	2-5 years	28	14.1%
	5-10 years	25	12.6%
	More thhan 10 years	122	61.6%
Valid		198	100.0%
Missing		876	
Total		1074	
Subpopulation		161a	

Figure 5.3: The case processing summary for neighborhood walkability, author.

In the regression analysis, the model fitting information provides some criteria to assess how well the model fits the data. The Model Fitting Criteria includes two main areas that are elaborated beneath.

The -2 Log Likelihood is the criterion that measures the model's goodness of fit. A lower value indicates a better fit, meaning that the model's predicted values are closer to the actual values in the dataset. The -2 Log Likelihood is used because it follows a chi-square distribution [23].

Likelihood Ratio Tests are the second criterion that includes three factors. The likelihood ratio chi-square test compares the -2 Log Likelihood of the final model to the -2 Log Likelihood of a baseline model (intercept-only model). It assesses whether adding the independent variables to the model significantly improves its fit. The chi-square value is calculated by subtracting the -2 Log Likelihood of the final model from the -2 Log Likelihood of the baseline model. The degrees of freedom (df.) represents the difference in the number of parameters estimated between the final and the baseline model. Lastly, the significance level (p-value) associated with the chi-square test indicates the probability of obtaining the observed chi-square value (or a more extreme value) if there is no improvement in fit by adding the independent variables [150].

The ”Goodness-of-Fit” section in the regression analysis assesses the model's overall fit to the data. It provides two measures of goodness-of-fit: Pearson chi-square and deviance. The Pearson chi-square statistic measures the discrepancy between the observed and the expected values under the fitted model. It compares the observed frequencies of the dependent variable categories with the frequencies predicted by the model. The degrees of freedom indicate the number of the dependent variable categories minus the number of parameters estimated in the model. [23]

The significance level (p-value) is associated with the Pearson chi-square test. It indicates the probability of obtaining the observed chi-square value (or a more extreme value) if there is no significant discrepancy between the observed and expected frequencies [150]. Deviance is another measure of the discrepancy between the observed values and the fitted model. It assesses how well the model predicts the observed data by comparing the log-likelihood of the fitted model to the log-likelihood of a saturated model that perfectly predicts the observed data [23]. Additionally, the degrees of freedom for the deviance statistic is the same as the Pearson chi-square test, representing the number of categories of the dependent variable minus the number of parameters estimated in the model. Moreover, the significance level is associated with the deviance test [150].

The ”Pseudo R-Square” values in this regression analysis indicate the amount of variance explained by the model. Pseudo R-Square is a variance proportion measure in the dependent variable that can be accounted for by the independent variables in the model. However, Pseudo R-Square should be interpreted with caution as it does not have the

same interpretation as R-Square in ordinary least squares regression [23].

The Cox and Snell Pseudo R-Square is a commonly used measure in logistic regression. It represents the proportion of the maximum likelihood ratio for the model divided by the maximum likelihood ratio for a model with only an intercept. The next measure, Nagelkerke Pseudo R-Square, is an extension of the Cox and Snell Pseudo R-Square. It adjusts the Cox and Snell values to account for the number of categories in the dependent variable. The Nagelkerke Pseudo R-Square can range from 0 to 1, where 0 indicates no explanatory power, and 1 indicates perfect prediction. The McFadden Pseudo R-Square is another used measure in logistic regression. It compares the log-likelihood of the fitted model to the log-likelihood of a model with only an intercept. The McFadden Pseudo R-Square can range from 0 to 1, where 0 indicates no explanatory power, and 1 indicates perfect prediction. Furthermore, the intercept refers to the baseline or reference category in the regression model [150].

5.3 Qualitative Methods

This study implements qualitative research methods to triangulate the existing quantitative survey data from WALKMORE. For the qualitative data collection, the study employs the Participatory Learning and Action (PLA) method, which emphasizes the active participation of community members in the research process [91]. This method is particularly applicable in investigating community issues, such as walkability, as it empowers community members to take ownership of the research process and participate in shaping their habitat. Furthermore, the pivotal guides for the study's research methods are the virtues of cooperation, curiosity, creativity, empowerment, and reflexivity to foster a collaborative and inclusive research environment [146].

5.3.1 Visual Communication

The study includes utilizing visual communication tools, such as images and mapping, as Singhal [132] and Pink [102] recommend, to enable participants to communicate their experiences and perceptions of walkability more conveniently and expressively. The study

prioritizes equitable collaboration with all stakeholders, including community members, local authorities, and urban planners, to ensure that the research findings represent a holistic view of the needs and requirements [169].

5.3.2 Ethnography

The ethnography method involves the researcher walking alongside and observing the people they are studying while also partaking in the activity of walking themselves [176]. By employing this practice, the researcher can gain a better insight into the embodied experiences of walking and how it is embedded in social and cultural contexts. The first benefit of using the method is that by engaging oneself in the encounter, the researcher can obtain a more in-depth and nuanced knowledge of the practices and experiences of those they are studying. Additionally, this method is convenient for investigating the social and cultural meanings of walking and its entanglement with the lived experiences of individuals and communities. Finally, ethnography provides rich qualitative data that can be utilized to develop new understandings and theories about walking practices and experiences [176].

During the fieldwork in Kongsvinger, a cluster of long and short ethnographic walks took place. The walks were conducted at different times of the day and throughout the city to deliver a holistic comprehension of walking at differing times and places.

5.3.3 Case Study

A principal research design approach in the WALKMORE project is the case study method (see Section 3.1). The case study method entails the in-depth examination of a particular phenomenon in its real-life context, which involves the collection of multiple sources of evidence through various data collection methods, such as interviews, observations, and document analysis, to gain a comprehensive understanding of the case under investigation [178].

Since the scope and time limitations of this research do not allow the assessment to be conducted on a nationwide range, the decision was to select one of WALMORE's case

cities. The city of Kongsvinger, as one of the project's case cities, fitted into the small city category (see Section 3.1), and therefore is the case study of this research.

5.3.4 Observations

Observation is a fundamental method in urban planning to improve ways of understanding and enhancing the built environment. Observation involves using all senses to comprehend the urban environment, from sights and sounds to smells and intangible sensations [16]. It involves comprehensively studying the details of the environment, noticing patterns, and paying attention to people's customs in their interaction with the space. Observation can come about at different scales, from the street level to the city-wide level. By employing a human-centered approach and attending to the details of the environment, it is possible to attain valuable insights into the needs and preferences of the community and to identify opportunities for improvement that may not be apparent through other methods [16].

In the fieldwork phase, this research utilized the observation method to experience the environments and gain insight into the user behavior and details of the urban spaces. This method had a crucial role in comprehending the walking experience in Kongsvinger and mapping the social dynamics of the city.

5.3.5 Interviews

Interviews are a beneficial research method in qualitative research, allowing researchers to gain a deeper understanding and valuable insight into participants' experiences and perceptions [178]. This research employs three types of interviews to gather qualitative data.

This study has employed three types of interviews, including structured, semi-structured, and unstructured. Time constraints and the interview format (digital or in-person) were the main determinants in defining the type of interview. Most of the interviews were conducted in Norwegian, but in some cases, English was used. Figure 5.4 shows the interview types and the target interviewees.

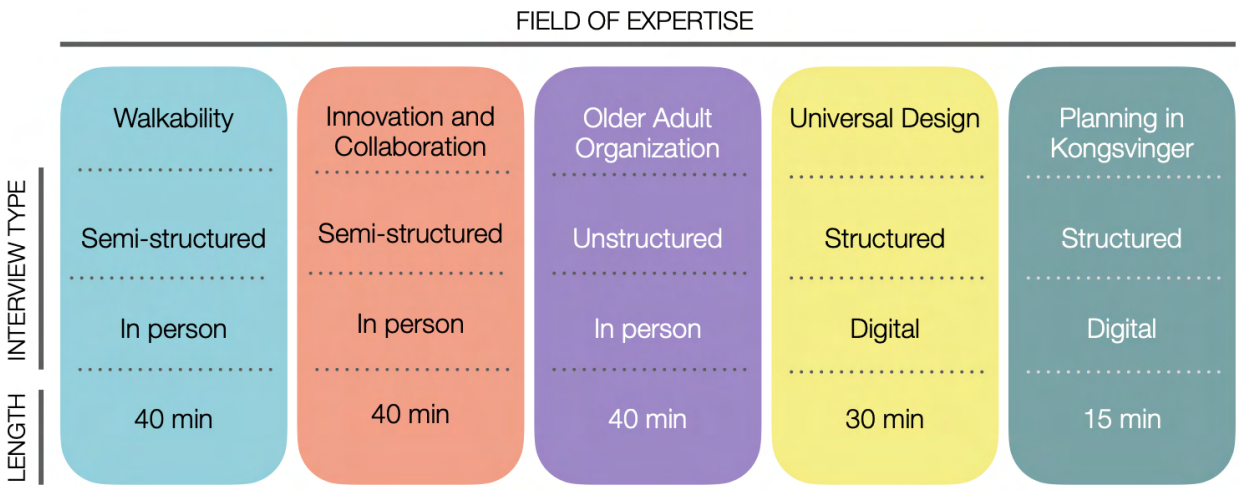

Figure 5.4: Interview types, interviewees' field of expertise and interview duration, author.

5.3.6 Focus Groups

Focus groups are a qualitative research method that involves bringing together a group of participants to discuss a particular topic or issue of interest [68]. The group dynamic in focus groups can generate rich and varied data, as participants can build on each other's responses and engage in dialogue and debate. Along with the participants' verbal expressions, the researchers can observe the manner in which they say it and their nonverbal behaviors. Additionally, focus groups can be a cost-effective and efficient way to collect data from multiple participants simultaneously [68].

The focus groups in this research consist of senior citizens, youth, and immigrants, which are three population groups that deliver a perspective on the issue of walking and mobility in different population groups. The objective behind selecting these focus groups is to investigate the influence of social background, age, and physical limitations on the population's walking behavior and to analyze the efficacy of current regulations and frameworks in Norway regarding walking as an active mobility choice.

This research was no exception when it came to this method's limitations. During the arrangement period for focus groups, the attempts to reach out to the queer community members of Kongsvinger fell short, causing the focus group to be withdrawn from the research design. Krueger [68] explains this challenge in participant recruitment as a frequent limitation of focus groups.

Recruiting the focus group participant involved utilizing several tools, such as social media platforms. Most of Norway's population uses Facebook as a platform for arrangements and communications. Another norm in reaching out to organizations and experts is through professional networks.

The focus group of mothers with kindergarten children was formed through intercept sampling at Kongsvinger College. The desired focus group was discovered after multiple interviews.

Finding immigrant communities with diverse ethnic backgrounds in Kongsvinger to arrange the immigrants' focus group was challenging. A UEP graduate working at Kongsvinger municipality was contacted to provide guidance regarding the fieldwork, and they introduced the GIV institute. Glåmdal Interkommunale voksenopplæringssenter, GIV, is an educational institute that provides training courses, including Norwegian language courses for adults. The Norwegian language courses were an excellent opportunity to reach the immigrant community and gain insight into their walking behavior and needs. The participatory process being introduced by the course instructor is illustrated in Figure 5.5.

Figure 5.5: The participatory workshop with the immigrants focus group, author.

Recruiting participants for the youth focus group was another challenge for the research due to personal data protection concerns for those under 18. However, the research took advantage of the Russetid tradition in Norway, where graduating high school students celebrate their school days coming to an end while wearing colorful overalls. The ones wearing blue or red overalls are at least 18 years old. During the fieldwork, the focus group eligible participants were identified by their uniforms and enrolled by declaring their consent.

For the senior citizens' focus group, the WALKMORE project's contact person in the city's municipality provided a referral to a person working with older adults. The further arrangements were carried out through her.

An additional focus group of the queer community in Kongsvinger was on the initial research design agenda. However, the attempts to contact the community on different platforms were unsuccessful.

5.4 Research and Fieldwork Ethics

During the fieldwork in the planning process, there is a range of ethical considerations and regulations that the researcher must bear in mind so the external factors have as less effect as possible on the results. Other than following the European General Data Protection Regulation's (GDPR) technical rules [76], taking into account the ethical being aware of dilemmas considerations of participatory research, such as reflexivity, positionality, and negotiation of fieldwork dilemmas [154] and reflecting on them in the reports [125] are ways to keep the results neutral.

After designing the research and identifying the type of required data for the thesis, a thorough review of the regulations regarding the collection, protection, and process of that data was conducted. The next step was to notify Sikt, The Norwegian Agency for Shared Services in Education and Research, about the study, its data collection, processing, and the methods used for them. As the mentioned frameworks instructed, after receiving the approval (see Appendix A), the participants got notified and then declared their consent.

5.5 Limitations

This research encountered several limitations that should be acknowledged. Firstly, due to the research being a master's thesis, the study faced constraints regarding time, depth, and the extent of the topic area it could cover. Additionally, limitations were inherent within each research method employed. For instance, difficulties were encountered in reaching out to focus groups, leading to the exclusion of one group. This challenge could be attributed to the varying recruitment approaches required for different population groups, which proved demanding within the time constraints of a master's thesis. Another limitation was observed in the broad range of concepts covered by certain keywords and terms within the study, such as inclusiveness, which encompasses diverse meanings.

In addition, external factors had an impact on the results. Notably, during the fieldwork in the case city of Kongsvinger, ongoing municipal construction activities for spatial improvements created complexities that potentially influenced the input received from residents and urban users regarding city problems. It was challenging to determine whether the residents' feedback was influenced by these construction activities.

Additionally, a noteworthy aspect was the composition of the focus group participants, with many individuals not living in Kongsvinger but rather visiting due to a lack of amenities in their nearby cities. Consequently, their perceptions of the city and their needs might differ from those of actual residents.

Language barriers were also encountered during the fieldwork, particularly in the case of the immigrant focus group. Many participants had limited proficiency in Norwegian, and some had limited English skills. As a result, modifications had to be made to the questions and data collection methods during the focus groups to ensure simplicity, potentially impacting the specificity of the results.

Lastly, the time limitation affected the data-gathering process, particularly in qualitative data collection methods like ethnography, as it was unfeasible to employ these methods over different seasons or weather conditions.

Chapter 6

Case Study and Analysis

This chapter presents a comprehensive analysis of the qualitative data collection and quantitative data analysis derived from the WALKMORE survey. The analysis is focused on examining the relationship between the sociodemographic characteristics of survey participants and various factors such as neighborhood walkability, city center walkability, and their perception of the feasibility of walking during different seasons. Furthermore, the findings from ethnographic observations, participatory workshops involving focus groups, and interviews are presented and thoroughly discussed. To facilitate the understanding regarding the placement of the locations mentioned in the data collection as well as the city's current situation regarding amenity distribution, one can refer to Figure 6.1.

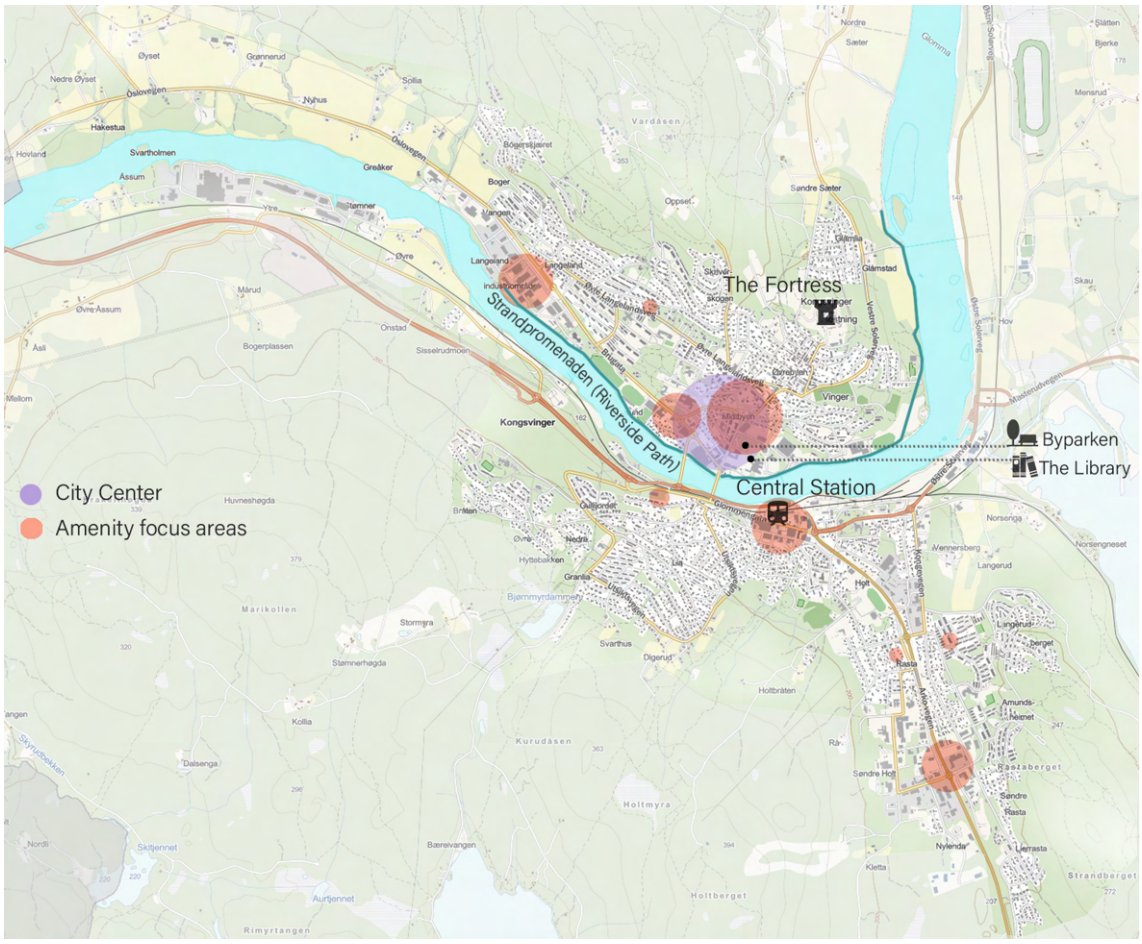

Figure 6.1: The placement of the Kongsvinger's main locations and the city's amenity distribution, author.

6.1 WALKMORE Survey

The WALKMORE project conducted a survey on the case cities between September and November 2021 and collected 481 completed surveys in Kongsvinger City. The survey consisted of two sections. One section was the part with open and closed-ended questions where the participants were asked about their experiences regarding walking in their neighborhood and the city center and their travel behavior. The second part was three questions with the possibility of answering them by putting pins on the city's map. The number of survey responses gathered in Kongsvinger, regardless of completion or residence in the case city, is 1074, which this thesis will review and analyze. Considering the scope of this study, the first part of the survey, excluding the Covid question, will be used. Moreover, the survey questions and the answer options used in this study's analyses

can be found in Appendix C. The questions asked in the focus groups were also based on these questions.

6.1.1 Quantitative Data Analysis

The initial step to study and analyze the data on walking behavior in Kongsvinger is to provide a demographic profile of the participants. Appendix D contains an overview of the sociodemographic characteristics of the survey respondents.

Sociodemographic Variables

As discussed in Chapter 4, the sociodemographic background is significant in defining the population's behavior and furnishing a shift in social practices. Therefore, the sociodemographic variables taken from Chapter 2 were utilized as independent variables to analyze the survey data. In addition to the basic sociodemographic variables like gender and age, this chapter will look into how income, education, having small children, and the time lived in a city affect the walkability levels for population groups. Moreover, the analysis will investigate the effect of having a driver's license on the population's travel behavior. Furthermore, it incorporates these variables to explore walkability in different seasons. The reason for this addition is to see the effect of the climate, as a part of the context, on walking as a social practice.

Even though many of the sociodemographic variables did not provide significant results, the lack of outcome itself can allow for implications. As discussed in Chapter 5, quantitative data analyses in exploring social dimensions, especially in transportation planning, requires to be integrated with qualitative data. This need for mixed methods might refer to the complexity of the social practices and the layers of factors involved, meaning that mere statistical data analyses are insufficient to conclude.

6.1.2 Walkability on Neighborhood Level

In this subsection, the regression analysis results with the sociodemographic variables as independent and neighborhood walkability as the dependent variables will be demon-

strated. The neighborhood walkability analysis includes 110 degrees of freedom, indicating 110 estimated parameters in the final model (see Figure 6.3). Moreover, the significance level is 1.000, which suggests that the improvement in fit between the final model and the baseline model is not statistically significant.

Three different Pseudo R-Square measures are reported in the analysis. The Cox and Snell Pseudo R-Square is 0.284, indicating that approximately 28.4% of the variance in the dependent variable is explained by the independent variables included in the model. Furthermore, the Nagelkerke Pseudo R-Square is 0.310, suggesting that approximately 31.0% of the variance in the dependent variable is explained by the independent variables. In the Pseudo R-Square table, the McFadden Pseudo R-Square is 0.135, indicating that approximately 13.5% of the variance in the dependent variable is explained by the independent variables.

In the multinomial conducted regression analysis, the ”Likelihood Ratio Tests” section provides information about the effects of different sociodemographic factors on the perceived level of walkability. Figure 6.2 shows an -2 Log Likelihood of 382.715, indicating the baseline level of perceived walkability when no other sociodemographic factors are considered. Each row belonging to each sociodemographic variable shows the effect of the variable on the fit improvement.

Likelihood Ratio Tests

Effect	Model Fitting Criteria	Likelihood Ratio Tests		
	-2 Log Likelihood of Reduced Model	Chi-Square	df	Sig.
Intercept	382.715[a]	0.000	0	
Gender	373.527[b]		25	
Education	390.170[b]	7.454	15	0.944
Children under 7 yo	385.372[b]	2.656	5	0.753
Drivers License	385.391[b]	2.676	25	1.000
Time lived in Kongsvinger	315.035[b]		20	
Age groups	380.508[b]		5	
Household Income	403.010[b]	20.295	15	0.161

Figure 6.2: The Likelihood Ratio Tests for neighborhood walkability, author.

These results indicate that in this regression analysis, only the inclusion of gender had a

significant impact on the fit of the model compared to the intercept-only model. However, the Parameter Estimates (provided in Appendix E) do not show the substantial significance required to be considered meaningful effects.

Model Fitting Information

Model	Model Fitting Criteria -2 Log Likelihood	Likelihood Ratio Tests Chi-Square	df	Sig.
Intercept Only	448.726			
Final	382.715	66.011	110	1.000

Goodness-of-Fit

	Chi-Square	df	Sig.
Pearson	1131.916	690	0.000
Deviance	348.810	690	1.000

Pseudo R-Square

Cox and Snell	0.284
Nagelkerke	0.310
McFadden	0.135

Figure 6.3: The Model Fitting Information, Goodness-of-fit and Pseudo R-Square for neighborhood walkability, author.

6.1.3 Walkability in the City Center

The results in Figure 6.4 suggest that the sociodemographic factors included in the analysis have a moderate explanatory power in predicting the perceived level of walkability in the city center. The model overall does not significantly differ from the intercept-only model, indicating that the sociodemographic indicators' inclusion did not significantly improve the fit. The goodness-of-fit measures imply that the model fits the data reasonably well.

Model Fitting Information

Model	Model Fitting Criteria	Likelihood Ratio Tests		
	-2 Log Likelihood	Chi-Square	df	Sig.
Intercept Only	426.469			
Final	338.387	88.082	88	0.477

Goodness-of-Fit

	Chi-Square	df	Sig.
Pearson	474.791	492	0.703
Deviance	314.526	492	1.000

Pseudo R-Square

Cox and Snell	0.399
Nagelkerke	0.430
McFadden	0.194

Figure 6.4: The Model Fitting Information, Goodness-of-fit and Pseudo R-Square for the walkability rate in the city center, author.

The likelihood ratio tests, provided in Figure 6.5, can be analyzed to determine which sociodemographic variable is effective in the walkability rate in the city center. As mentioned in Subsection 6.1.2, variables with lower p-values (typically below 0.05) are considered statistically significant and have a stronger association with the city center's walkability rate.

Likelihood Ratio Tests

Effect	Model Fitting Criteria -2 Log Likelihood of Reduced Model	Likelihood Ratio Tests		
		Chi-Square	df	Sig.
Intercept	208.299[a]	0.000	0	
Gender	346.414	8.026	4	0.091
Education	361.860	23.473	20	0.266
Children under 7 yo	355.100	16.713	16	0.404
Drivers License	339.393	1.005	4	0.909
Time lived in Kongsvinger	357.058	18.670	12	0.097
Age groups	362.222	23.834	20	0.250
Household Income	354.762	16.375	12	0.175

Figure 6.5: The likelihood Ratio Tests for the walkability rate in the city center, author.

Based on the likelihood ratio tests in the table, it appears that the variables "Gender," "Time lived in Kongsvinger," and "Age groups" might have some influence on the walk-

ability rate in the city center. However, none of these variables reach conventional levels of statistical significance ($p < 0.05$). Other variables do not appear to have a significant effect on the walkability rate in the city center based on the likelihood ratio tests.

6.1.4 Sociodemographic Variables and Seasonal Walkability

The results in Figure 6.6 suggest that the sociodemographic factors included in the analysis have a substantial explanatory capability in forecasting the perceived realism of trips to work or study locations during the summer half-year. The model significantly differs from the intercept-only model, indicating that including sociodemographic indicators significantly improved the fit. The goodness-of-fit measures suggest that the model fits the data well.

Model Fitting Information

Model	Model Fitting Criteria	Likelihood Ratio Tests		
	-2 Log Likelihood	Chi-Square	df	Sig.
Intercept Only	314.294			
Final	208.299	105.995	44	0.000

Goodness-of-Fit

	Chi-Square	df	Sig.
Pearson	216.923	262	0.981
Deviance	192.180	262	1.000

Pseudo R-Square

Cox and Snell	0.433
Nagelkerke	0.520
McFadden	0.318

Figure 6.6: The Model Fitting Information, Goodness-of-fit, and Pseudo R-Square for the practicality of walking to work or study location during the summer half-year, author.

The results in Figure 6.7 suggest that the sociodemographic factors included in the analysis have a substantial explanatory capability in forecasting the perceived practicality of trips to work or study locations during the summer half-year. The model significantly differs from the intercept-only model, indicating that including sociodemographic indicators significantly improved the fit. The goodness-of-fit measures suggest that the model fits

the data well. Education level, having a driver's license, and age show significant effects. Other variables, however, do not show substantial significance.

Likelihood Ratio Tests

Effect	Model Fitting Criteria	Likelihood Ratio Tests		
	-2 Log Likelihood of Reduced Model	Chi-Square	df	Sig.
Intercept	208.299[a]	0.000	0	
Gender	211.433[b]	3.134	2	0.209
Education	233.351	25.052	10	0.005
Children under 7 yo	214.461[b]	6.162	8	0.629
Drivers License	219.449[b]	11.150	2	0.004
Time lived in Kongsvinger	213.047[b]	4.748	6	0.576
Age groups	256.236[b]	47.938	10	0.000
Household Income	218.531[b]	10.232	6	0.115

Figure 6.7: The likelihood Ratio Tests for the practicality of walking to work or study location during the summer half-year, author.

Education level has a significant effect on walking as a realistic means to get to work or study location during the summer half-year. Higher levels of education are associated with a higher likelihood of walking being considered realistic. As the education level increases, the odds of walking being realistic also increase.

Having a driver's license also affects the participants' choice of walking during the summer half-year. Holding a driver's license is associated with a lower likelihood of walking being considered realistic during the summertime.

Age has a significant effect in this analysis as well. The older the participants are, the less likely they see walking to work or study places during the summer half-year.

As illustrated in Figure 6.8, the results for the winter half-year also suggest that the sociodemographic variables included in the model have a significant impact on the perception of walking to work or school during the winter half-year being realistic.

Model Fitting Information

Model	Model Fitting Criteria -2 Log Likelihood	Likelihood Ratio Tests		
		Chi-Square	df	Sig.
Intercept Only	107.676			
Final	57.616	50.060	21	0.000

Goodness-of-Fit

	Chi-Square	df	Sig.
Pearson	61.805	68	0.688
Deviance	53.457	68	0.902

Pseudo R-Square

Cox and Snell	0.385
Nagelkerke	0.581
McFadden	0.448

Figure 6.8: The Model Fitting Information, Goodness-of-fit, and Pseudo R-Square for the practicality of walking to work or study location during the winter half-year, author.

By exploring the results further, using Figure 6.9, the effect of having a driver's license and age is significant. Individuals with a driver's license are less likely to consider walking a realistic option for commuting. Additionally, in this analysis, all age groups except for the 45-54 age group have statistically significant effects on the outcome, meaning they do not see walking to work or school as realistic.

Likelihood Ratio Tests

Effect	Model Fitting Criteria	Likelihood Ratio Tests		
	-2 Log Likelihood of Reduced Model	Chi-Square	df	Sig.
Intercept	57.616a	0.000	0	
Gender	58.547	0.931	1	0.335
Education	61.997	4.381	4	0.357
Children under 7 yo	61.319	3.703	4	0.448
Drivers License	66.975	9.359	1	0.002
Time lived in Kongsvinger	62.690	5.074	3	0.166
Age groups	73.360	15.744	5	0.008
Household Income	62.297	4.681	3	0.197

Figure 6.9: The likelihood Ratio Tests for the practicality of walking to work or study location during the winter half-year, author.

6.2 Fieldwork

In this thesis, the fieldwork phase was an essential stage of the study since it provided valuable knowledge on the issue of walkability. For data collection in the case city of Kongsvinger, the fieldwork was conducted utilizing various qualitative methods to provide data on the experiences and the current situation of walkability. Among the methods were observation, ethnography, interviews, focus groups, and visual communication. The fieldwork in Kongsvinger was carried out between the 17th and 19th of April.

6.2.1 Observations and Ethnography

The observations during the fieldwork started with entering the city at the train station, continued during the whole fieldwork period, and ended at the same train station. Figure 6.10 presents a sketch of the city drawn during and based on the observations.

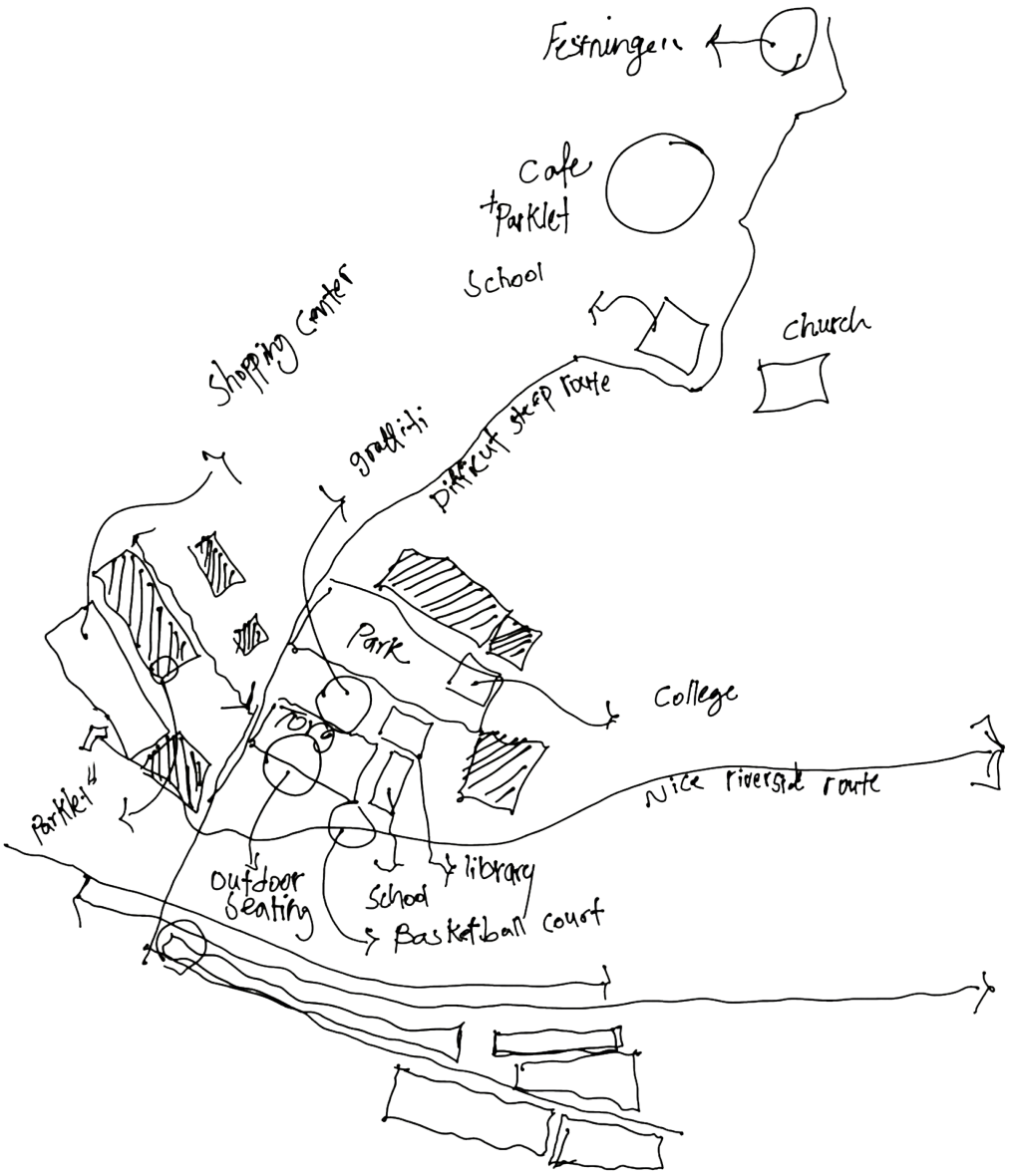

Figure 6.10: A sketch demonstrating the notable spots throughout the city identified during the observations, author.

The city of Kongsvinger is characterized by the Glomma river, which boasts a notably low elevation. Its position effectively halves Kongsvinger, and the steep terrain on either side of the river imparts a V-shaped profile to the urban landscape.

The railway tracks run next to the river, with the train station situated on one bank and the city center located in a nearly mirrored position on the opposite bank. The two distinct parts of the city are interconnected by the old and the new bridge. Throughout the field-work, it was observed that the renovation of the old bridge led to congestion on the new bridge, causing traffic issues in the surrounding area.

The majority of the antique buildings in the city are concentrated on its northern side, where the Festningen is positioned. Although there are a few buildings with notable historical significance in the central station area and on the southern side of the city, the architectural character of these structures is more contemporary and less distinguished. Furthermore, as one moves away from the station, the commercial and public buildings exhibit a progressively dated appearance, with relatively few indications of recent renovations. Notably, the Gågata commercial center, situated adjacent to the central station, appears to receive considerably fewer visitors in comparison to the principal shopping center of the city.

The most noticeable thing when entering the city from the central station was the dominance of gray, dust, and asphalt in the city's streets and facades. However, such appearance might have been caused mainly by the numerous ongoing urban transformation, restoration, and modification projects in addition to the seasonal transition from the winter and the gravels left from the recent icy conditions.

Upon visiting the city's public areas, it was observed that parking facilities are widely distributed throughout the urban landscape. One of the parking facilities is located right by the city's shopping center. The facility, the parked cars, and the lack of organized signs reduce the aesthetic attractiveness of the center, creating an unwelcoming atmosphere (see Figure 6.11a). Despite the comparatively higher prices charged for parking in the city center, there was a considerable majority of parked vehicles, suggesting that a significant portion of the inhabitants continue to rely on automobiles for transportation, despite the city's modest size and presumably short travel distances. This trend may be attributable, in part, to the presence of numerous uphill routes that make walking a more challenging means of mobility. An instance of uphill routes is illustrated in Figure 6.11b.

(a) (b)

Figure 6.11: The parking facility for the shopping center (a), and the uphill sidewalk located between the city center and the fortress (b), author.

The transportation and walking activities were more predominant during the morning hours (7-8 am) and in the evening (between 3 and 5 pm). However, the city square did not have many people visible, even during busy hours. It could be because the observations took place during weekdays. Additionally, the central square did not have many architectural aesthetic characteristics except the Sentrum secondary school and the well-designed modern library building that stood out (see Figure 6.13). The routes from the city center to the fortress started to get very steep, and the fewer sidewalks were provided, the closer one got to the fortress (see Figure 6.12).

Figure 6.12: The lack of path division and the challenges, author.

Figure 6.13: Kongsvinger's main library, author.

The city's southern part has some connected pedestrian overpasses over the RV2 road which is a main road passing through the southern part of the city. Although the pedestrians were physically safe on the overpass, the sounds from the highway and the speeding cars made it unpleasant to walk on them. Due to their steepness, the accessibility is also limited (see Figure 6.14). However, the alternative to the overpass was taking a much

farther route, which implies that, in this case, the pedestrians have limited options. The network of roads that provided pedestrian routes were not dedicated to pedestrians, and cyclists used the same road division. Additionally, a noticeable number of e-scooters were seen going around the city while cutting through the sidewalk and the car roads.

(a) (b)

Figure 6.14: The view from the overpass (a), and the steep overpasses above the highway (b), author.

The closer to the fortress from the city center, the more the architectural characteristics stood out. Most of the area's buildings had historical value, which might explain the diversity of colors, forms, and materials used. The street signage was more visible and practical near the fortress, which might be due to the concentration of historical monuments that tourists usually visit (see Figure 6.15a).

The city's greenery is in layers and intermittent. If one walked from the old bridge up to the fortress, one would see a layer of vegetation along the northern part of the river with walking routes. Then, there would be a layer of buildings and dense, mostly bleak material, followed by the Byparken and the private house gardens. On the other hand, if

one took the route to the south, one would see a green strip along the pedestrian routes on Glommengata and Gågata. However, when the central station territory starts, the plantation decreases.

The main shopping center, located in the city center area, had several stores that provided the usual brands present in most cities of Norway. Although the interior design was identical to other Norwegian shopping centers, the exterior did not offer much aesthetics. During the day, a significant number of this marketplace's visitors and customers were from the senior and youth age group.

Certain locations within the city possess significant potential for various activities and public use. However, due to limited accessibility resulting from inadequate public transportation options and insufficient active mobility choices, as well as unfavorable placement, these spots remain inaccessible to a substantial portion of the population. Figure 6.15b, and Figure 6.16 serve as illustrative examples of such instances.

(a) (b)

Figure 6.15: The signage in the fortress area dedicated to pedestrians (a), and a parklet beside the city's shopping center (b), author.

Figure 6.16: A parklet by a cafe near the fortress, author.

An additional aspect of untapped potential within public spaces in Kongsvinger is the incorporation of art. Through fieldwork conducted, various forms of art were encountered, including graffiti created by citizens (see Figure 6.17) and sculptures by notable artists (Figure 6.18) positioned along the pedestrian route in the Gågata. This observation highlights the considerable potential for future spatial implementations that harness the power of art, fostering community engagement and a sense of ownership.

Figure 6.17: A graffiti mural right across the library in the central square, author.

Figure 6.18: A sculpture developed as a project of art in public spaces with notable Norwegian artists involved, author.

A part of the observation included ethnography and demographic observations. Not many parents with strollers were visible in the city. They might have been driving one of the many cars parked in one of the numerous available parking spots. Moreover, the visual and auditory ethnography indicated that in Kongsvinger, the immigrants have more visibility or have an extensive population.

6.2.2 Focus Groups

The focus groups were selected based on various sociodemographic indicators to provide an in-depth understanding of the diverse needs of different population groups. In addition, the criteria behind the selection were to augment the survey results through triangulation. The initial aim of the focus groups was to provide insights on inclusive mobility and transportation. Each group was selected to provide distinct information.

The first focus group consisted of young women with children under seven years old, aiming to comprehend the needs of this group and to investigate how those requirements align with the sustainable transportation plans on a national level in light of Norway's demand for population growth. The second focus group comprised teenagers, who would form a significant portion of Norway's future workforce population. The knowledge of this group's needs would help shape strategies to direct their mobility choices toward sustainable goals. The third focus group consisted of immigrants, who, in addition to contributing to the discourse on inclusive mobility, provided some insights into how the integration process manifests in their everyday practices. The final focus group incorporated senior citizens, who represent a significant portion of the future population in Norway. Considering their needs is essential to provide an inclusive and sustainable transportation system.

Young Mothers

Young mothers with small children (under seven years old) were the first arranged focus group. The participant recruitment was conducted on Monday, 17th of April, through an hour-long presence at Kongsvinger College. The arrival at the college was during the last office hours (14 to 15 afternoon), so the potential participants would be approached while leaving the school. After a few tries, the target population was discovered, and the focus

group method was set up with three participants. All participants belonged to the 25-34 years old age group (see Table 6.1).

Table 6.1: Young mothers focus group, participant demographics, author.

Participant number	Driver's license	Access to private car
1	Yes	Yes
2	Yes	Yes
3	Yes	NA

During the focus group discussion, participants shared their views based on questions about transportation and walking in Kongsvinger. One participant mentioned that she enjoyed walking around the fortress and in the forest. She also appreciated the "Ny gågate" project by the municipality and liked the view from the higher part of the city's southern half, where she lives and works, towards the city center. However, this participant also expressed a low level of attractiveness for walking in her neighborhood.

> *"My neighborhood is not very pleasing to walk in because there's a lot of littering and you don't feel safe there ... I don't mean crime because it's Norway! But the feeling of not being safe."*
>
> - Female, 30, mother of a child under 7 years old

This participant had experience living in Oslo and walking very long distances within the city. She prefers to take the train when traveling to Oslo, in case of any business, as it is more convenient for her. While in Oslo, she usually walks around the city and only uses a car if she has multiple errands or is visiting someone outside central Oslo. In Kongsvinger, she walks and cycles during the summer when taking their child to the nearby kindergarten. However, she generally drives due to convenience and the challenges of walking in the city.

Two other participants lived within an hour's proximity of Kongsvinger and shared a car to get to school. They usually drive but walk and cycle when the weather is pleasant.

One of them works 2 km away from their residence but prefers to take the car due to convenience and time constraints. They rarely need to travel to Oslo as they can find the brands they need in their city. However, they prefer to drive to Oslo instead of taking the train, as the train does not have a stop in their city.

Overall, all participants were satisfied with Kongsvinger municipality's maintenance of the roads, sidewalks, and paths. They reported that snow and gravel were cleaned up promptly. They were also unanimously pleased with the "Ny gågate" project. Although, they all referred to the weather, the steepness, and the low attractiveness of the pedestrian routes as obstacles to walking in Kongsvinger.

Youth

The second focus group recruitment was conducted over two days in April (the 17th and the 18th), using visual recruitment methods and offering incentives to encourage participation. The sociodemographic information about the focus group is presented in Table 6.2

On the first day, the recruitment process was performed in front of a secondary school in the city center in the afternoon when schools usually close (15-16). The first approach involved visual recruitment methods and offering incentives such as baked goods. However, this method failed to recruit any participants. However, two participants joined after adopting the new strategy of approaching those wearing "Russ" uniforms. Both participants lived 30 minutes from Kongsvinger and commuted to school by bus, as they did not have a driver's license.

During the focus group, participants were asked about their transportation preferences. They commented on the number of ongoing constructions (see Figure 6.19 and Figure 6.20a) in the city, which they were unhappy about, as it caused much traffic. One of the participants working in Kongsvinger stated that she walks from school near the fortress to work when the weather allows. During the winter, both participants take the bus for trips due to the cold and icy conditions.

Figure 6.19: The ongoing constructions in the city center and their effect on the attractiveness of urban spaces, author.

Participants were then presented with a map of Kongsvinger and asked about their favorite places to walk and hang out in the city (see Figure 6.20b). One participant said she enjoys spending time at the shopping center, while the other preferred the area around the central station because of the old building architecture and the park in front of the bank building (shown in Figure 6.21 and Figure 6.22). However, the first participant mentioned that she does not prefer noisy areas for walking, so the central station area is not ideal for her.

(a) (b)

Figure 6.20: The youth focus group: The ongoing renovation on the city's old bridge and the limitations pedestrian and cyclists encounter(a), and the visual and participatory methods used for the youth focus group (b), author.

Figure 6.21: The old building styles near the central station, author.

Figure 6.22: The central station building, author.

The participants were asked about the city's central square and its level of activity throughout the day. One participant responded that the square experiences more foot traffic on Fridays and Saturdays, traditionally the busiest days of the week. However, in general, after 17:00, the square becomes relatively empty (see Figure 6.23).

Figure 6.23: The central square in the city and the many empty spaces with improvement potential, author.

Table 6.2: Youth focus group, participant demographics, author.

Demographic variable	Frequency
Female	9
Male	2
Kongsvinger residents	7
Total Participants	**11**

On the second day of the youth focus group study, the enrollment process took place in a school near the fortress where all the participants were wearing ”Russ” uniforms, indicating the legal age of 18 and their capability of providing consent for the interview. The first question asked was about their means of transportation for getting to school or moving around Kongsvinger. Private cars were the dominant means of transport due to the inconvenience of infrequent buses and the obstacles of walking, being the steepness of the terrain. Participants also noted the lack of unchallenging walking spaces. They argued that the city is spread out and cut into two parts. They would prefer everything concentrated in the city center, all amenities situated in one place.

Parents were the primary reason many participants drove, as they were being pushed to do so.

> *”It’s easier for them if we drive. My parents say that if you want to go to the shopping center and want to take the bus instead of the car, only two buses are going during the whole day [They are not frequent]. So, it takes more time to go there.”*
>
> - Female, 18, with access to a private car
>
> *”The parking is cheap. We might have walked more if it was more expensive.”*
>
> - Female, 18, with access to a private car

Most of the male participants expressed the purpose of their walks as warm-ups for their training, and the areas were often suitable for hiking or running as their favorite places to

walk. One male participant mentioned that he sometimes cycled during the summer.

The participants enjoyed walking in areas with greenery, such as the library area (see Figure 6.24). They stated that they would like to have places near the shopping center where they can sit and have lunch. However, the most available spots with suitable furniture for sitting and having food in the city center are cafes and restaurants, where one must buy something and is not allowed to bring food. The participants also expressed their enjoyment of the ”Ny gågata” project (shown in Figure 6.25) and disappointment with the setting disappearing. Moreover, one of the participants, who lives in a nearby city, pointed out that she could have cycled or walked if proper infrastructure existed along the rest of the riverside path towards the North.

Figure 6.24: The walking paths between the library (right) and Byparken (left), author.

Figure 6.25: The Ny gågata (new walking street) project by Kongsvinger municipality that was popular among residents, [78].

Participants did not like walking on icy roads during winter as it made it almost impossible to walk. Snow cleanups were inefficient from their perspective as the maintenance and cleanup operators piled up the snow on the side of the sidewalks (shown in Figure 6.26), blocking most of the pedestrian routes and discouraging walking. Some of the quotes were:

> *"They should either not clean it up or do it properly."* - Female, 18
>
> *"We would like to have places to go and buy things like McDonald's."* - Female, 18

Figure 6.26: A pile of pushed away snow in the city's central square in the city center, author.

They enjoyed walking in the area close to the fortress because of the traditional and older architecture of the buildings and the preserved historical structures constantly maintained and renovated. Most did not appreciate the city's brick buildings, considering them "ugly." They preferred older traditional and historical architectural-style buildings or modern buildings like the library.

The parties mentioned plans that were discussed for the city center's renewal, which would have modern commercial buildings with facilities like cinemas and hotels. They conveyed that these types of places are something their age group would like to have in the city.

The participants were annoyed by the construction and bridge renovation's consequences, being a lot of traffic, dust, and unappealing scenes. However, they understood that it was for the better and that the city would look attractive when the projects were complete.

Participants mentioned that driving in Kongsvinger was relatively challenging due to the steep terrain, but it was still more convenient than walking. One participant, living in the city's southern section, mentioned that walking is impractical and unappealing for her as her destinations were distant, and the buses were infrequent.

During the visual methods and showing the potential of the routes along the river, partici-

pants mentioned the city of Fredrikstad and the riverside routes and bridges they had over there.

There were three concurrent methods of visuals, participation, and discussion. The focus group participants were asked to map out the routes they referred to parallel to the dialogue. Toward the end of the focus group, the youth were asked to write down keywords indicating the challenges and possible improvements regarding walking in Kongsvinger on Post-it notes. The illustration of the concluded map and the keywords can be found in Figure 6.27, Figure 6.28 and, Figure 6.29. Comparing these maps with the GIS analysis results from the survey (see Appendix F) shows the similarity of the results in the two data collection methods. This applies to the next focus groups as well.

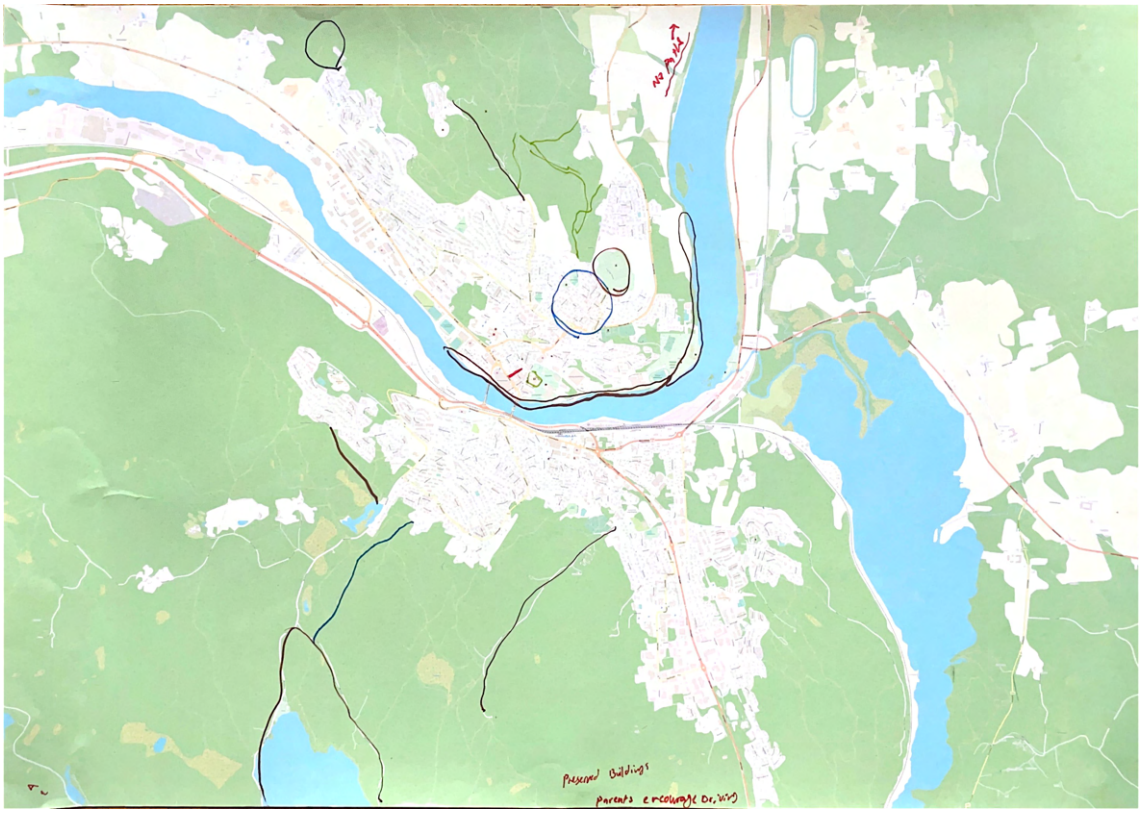

Figure 6.27: The map-based input and keywords from the youth focus group, author.

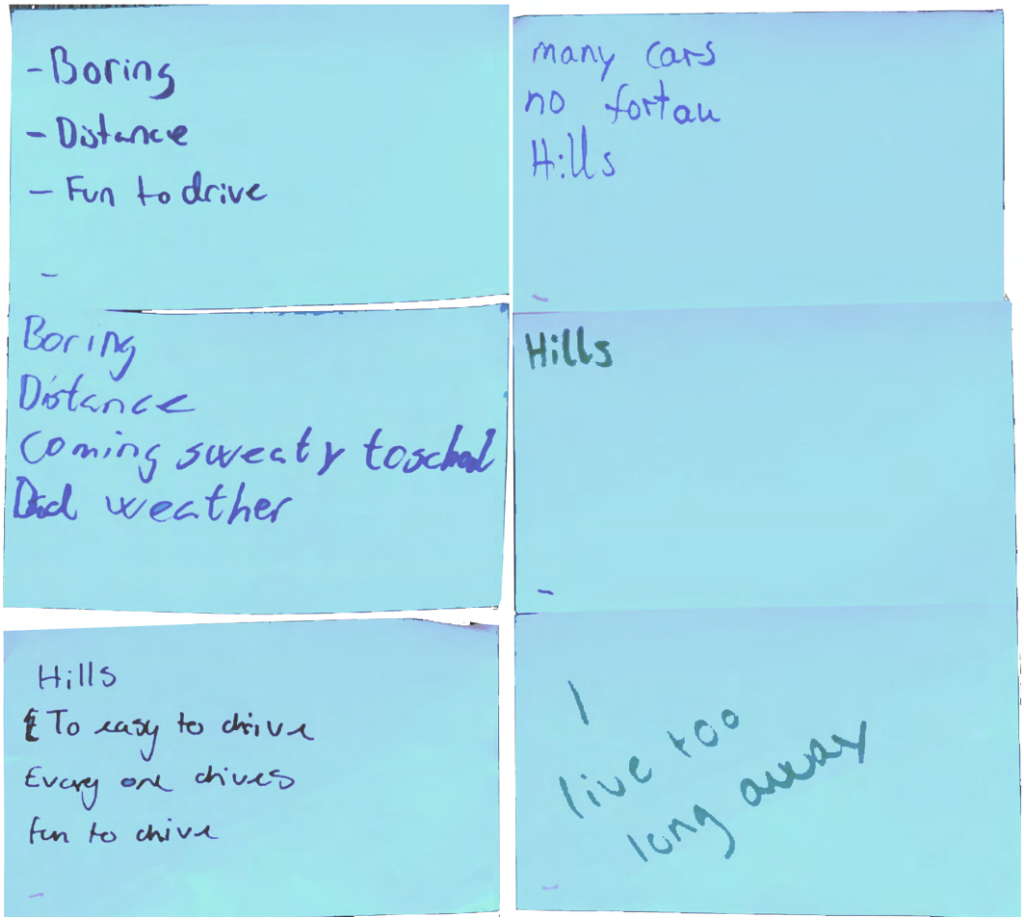

Figure 6.28: The notes from the youth participants on what prevents them from walking to get to places, author.

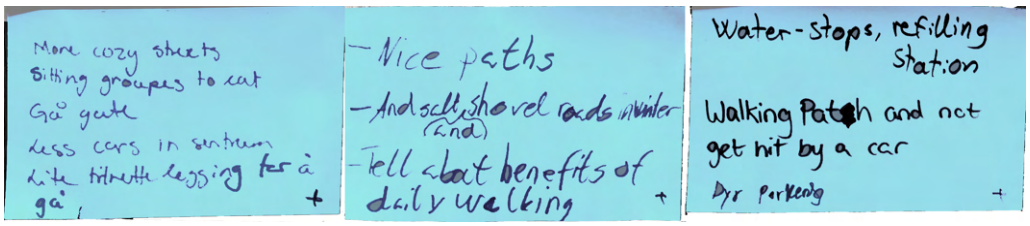

Figure 6.29: The notes from the youth participants on what can be done to encourage people to walk, author.

Immigrants

To recruit participants for this focus group, the GIV Institute in Kongsvinger, an educational center that offers Norwegian language courses for immigrants, was contacted. The focus group session was conducted during one of the regular classes offered by the institute on the 19th of April. The language used to facilitate the discussion was primarily Norwegian, although some participants were allowed to respond in English to ensure

better comprehension. The majority of the participants came from Ukraine, while others originated from countries in the Middle East. They resided in both Kongvinger and nearby cities. The generality of the participants was female, and their average age fell within the 25-34 age range. Table 6.3 shows the information about the participants in this focus group.

Table 6.3: Immigrants focus group, participant demographics, author.

Demographic variable	Frequency
Female	11
Male	7
Kongsvinger residents	5
Total Participants	**18**

The focus group was initiated by asking about the participants' preferred modes of transportation to their language classes in Kongsvinger. It was observed that many of them relied on private cars, while the remaining individuals opted for train travel. Subsequently, the participants were requested to utilize the map to indicate their favorite locations for walking within the city. Numerous participants in the focus group had prior experience residing in larger urban centers. Therefore, when asked to compare their walking experiences in Kongsvinger with those in their hometowns, they encountered difficulty drawing direct comparisons because of the substantial difference in city scale.

During the dialogue, it became evident that several participants faced challenges in navigating Kongsvinger due to inadequate signage. As a result, they turned to using digital mapping applications, such as Google Maps, for assistance. Furthermore, some participants emphasized the lack of informative signage and city guides, especially for newcomers. Both residents of Kongsvinger and nearby cities expressed their limited knowledge about the city's offerings. Consequently, despite their desire to engage in walking activities, they refrained from doing so due to their unfamiliarity with the surroundings. For instance, most of the direction signs throughout the city are in Norwegian and do not provide symbols as alternatives (see Figure 6.30a).

Some participants commuted from other cities to attend classes in Kongsvinger. While they opted to drive, their children, who attended secondary school in Kongsvinger, relied on train transportation because of the suitable alignment of train schedules with school timings. These participants also mentioned that the absence of train stops in their city urged them to rely on infrequent bus services. Consequently, using their private cars was a more convenient option. In contrast, a few participants residing in Kongsvinger still chose to drive to class as they needed to pick up their children from kindergarten. In terms of time management, private car usage came across as more convenient. However, these participants highlighted the issue of expensive parking prices near the institute (the city center), where a two-hour parking session costs 32 kroner. Therefore, they expressed a preference for unpaid parking facilities.

Many participants complimented the pleasant cityscape and scenic views of Kongsvinger. They particularly highlighted routes along the river, which offered beautiful sceneries. However, they complained about the lack of amenities, such as cafes or benches, along these paths (see Figure 6.30b). Despite this, many regarded these routes as ideal for walking. Some participants residing outside of Kongsvinger also mentioned ”Gågata,” a pedestrianized street near the train station, as a favorable location for walking. It served naturally as the pathway to reach their language classes.

(a) (b)

Figure 6.30: Most of the signage in the city is designed for the passing cars (a), and well-designed benches that exist but are not in the locations they are needed the most. (b), author.

Regarding the challenges and issues related to mobility and transportation in Kongsvinger, participants raised concerns about conflicts between pedestrians, cyclists, and scooter users on sidewalks and the infrequency of public transport. One participant specifically mentioned the difficulty of locating public restrooms or those within cafes and restaurants when accompanied by her children.

In terms of potential improvements, the focus group proposed several measures. These included discounted public transport tickets, the introduction of regional train services, increased green spaces, more benches, and reduced traffic congestion in the city. These suggestions aimed to address the identified challenges and to enhance the overall mobility and walking experience in Kongsvinger. The output map from the session is illustrated in Figure 6.31. The inputs from both the immigrants (lighter colors and black) and the senior citizens' focus groups (blue) were drawn on this map.

Figure 6.31: The output map from the immigrants and senior citizens focus group, author.

Senior Citizens

Following an interview with the contact person from the Walkmore project in Kongsvinger municipality, as it was expressed that a focus group consisting of senior citizens was required, the contact person provided a referral to the municipality's seniors' center, which operates on Wednesdays and Thursdays. The focus group was recruited after an exercise session at the center on April 19th. The sociodemographic information about the focus group is shown in Table 6.4.

Table 6.4: Senior citizen focus group, participant demographics, author.

Demographic variable	Frequency
Female	1
Male	3
Kongsvinger residents	4
Total Participants	**4**

During the focus group discussion, the participants highlighted their experiences and challenges related to walking and mobility as senior citizens in Kongsvinger. Three participants arrived at the senior center by car, while the last participant chose to cycle. The cyclist mentioned that cycling was their preferred mode of transportation within the city. When asked about the locations and purposes of their walking trips, the participants remarked leisurely walks in the city center and forested areas. They particularly enjoyed walking along the river and praised the ”Promenaden” route for its well-designed cycling and walking paths. Contrarily, they identified the area around Festningen as the most challenging part of the city to navigate on foot.

Regarding the city center and available amenities, the participants noted a relative lack of activity on both sides, with most of the occurrences concentrated in the northern part of the city. One participant speculated that this distribution could be attributed to the city's historical background and the significance of the fortress in Kongsvinger's development. While the participants expressed satisfaction with the amenities, one mentioned the absence of fish markets. However, this change might be due to the variety of products now offered by Norwegian grocery stores, which have become the preferred source of fresh meat and fish.

A participant with impaired vision shared their difficulties and concerns related to sidewalk traffic, particularly the presence of e-scooters. The group further discussed the challenges posed by e-scooters, highlighting the pedestrians' feelings of insecurity and fear caused by the power transporters' high speeds. Although the situation was considered better than in Oslo, where e-scooters dominate more, the participants anticipated a poten-

tial increase in their usage within Kongsvinger. They argued that with the existing poor quality and unevenness of the sidewalks, these fast mobility tools only worsen the challenges faced by pedestrians. As a result, the participants believed that e-scooters should be banned from sidewalks.

After using a map to mark the routes (Figure 6.32), their quality, and places related to walking activity, the discussion shifted to addressing the participants' needs. They mentioned that before constructing the first bridge in the city, residents relied on boats to cross the river. Subsequently, the first bridge and the bridge for vehicular traffic were built. The participants emphasized the necessity for an additional bridge specifically catering to pedestrians and cyclists, passing over the train station and connecting the two shopping centers on either side of the city, and additionally providing improved access to the schools on the Northern side from the southern part of Kongsvinger.

Figure 6.32: The visual and participatory methods used for the senior citizens and focus group, author.

When asked about the municipality's measures to promote active mobility, such as mon-

itoring the number of cyclists on digital displays (shown in Figure 6.33), the participants expressed confusion regarding the project's objective.

Figure 6.33: The monitor and sensor that counts the number of cyclists during the day, author.

> *"To be honest, I don't understand the point of it. If I'm walking that path, I don't enjoy (or get encouraged) to see how many have cycled there."*
>
> - Male, older adult

Instead, the participants suggested that the municipality should focus on enhancing the cycling paths throughout the city.

The participants also shared their observations regarding the planning and decision-making process in the area. They remarked on the peculiarities within the city, highlighting a lack of understanding or awareness among the authorities (county municipality) responsible for decision-making. According to the participants, these authorities mistakenly perceive the city as a ”cycling city”, but the steep terrain makes it challenging to do so. The final output map from this group is illustrated in Figure 6.31.

6.3 Interviews

To attain an adequate apprehension of the research gaps and issues, interviews with experts in the related fields were conducted. The experts were selected based on the main study focus being demographic factors, inclusive mobility, cooperation between actors, and adequate methodologies. The interview structures were designed as mentioned in Chapter 5. However, minor modifications were performed in the following interviews based on additional inquiries after newly collected data.

The interviews with the experts were in the domain of walkability in Norway and various dimensions of the topic. The discussions began with questions regarding the professionals' perspectives on the planning system's influence on walkability and the challenges faced in planning within the Norwegian context. Subsequently, dialogues shifted towards accessibility, universal and inclusive design, and the extent to which different population groups are accounted for in their areas of expertise. Furthermore, based on the insights gained from the interviews, the interviewees were asked about specific issues concerning planning and decision-making during the winter season.

6.3.1 Planning for Walkability

When considering the planning system in Norway, it becomes evident that while it has been practical in terms of transportation and mobility at the national level, it has relatively undermined the importance of walkability, particularly at the local level. As concluded from discussions with experts working on walkability in Norway, the focus on planning for walking falls between the state and regional levels, with attempts made to reconcile the

two. However, there is a paradox, as the emphasis is primarily on car transport and other mobility choices rather than walking and cycling. Additionally, the consideration given to planning for walking is developed on car usage, which can illustrate the shortcomings of the large-scale perspective in transportation planning in Norway. Moreover, the national walking strategy is not obligatory for municipalities to follow, making it a weak regulation. Other aspects of city planning are becoming more specific while walking strategies are being brushed aside. One viewpoint is that those interested in achieving the goals of walking strategies often deliver suitable schemes, though funding is the challenge. For instance, cities like Kongsvinger have well-designed action plans, but they lack the necessary support from the government. On the other hand, cities like Trondheim, involved in urban agreements like ”Miljøpakken” or ”Byvekstavltale”, have the opportunity to secure funding for their walking strategy projects.

Collaboration among various actors emerges as a crucial aspect of the walkability enhancement objective in Norway, as highlighted in Section 2.6. The expert interviews included perspectives assuming that effective communication exists among similar departments in large Norwegian cities like Trondheim. However, walkability experts emphasize that the prevailing planning system in Norway, particularly within the public sector, tends to focus either on land use or transport individually rather than on integrated land-use and transport considerations. This disjointed approach becomes evident in the mismatch between walking-related plans and land use zones. One noteworthy example of an integrated approach is the Kongsvinger 2050 project, which is implemented across different levels of governance. Although not exclusively centered on walking, it presents a viable strategy for addressing various forms of mobility and serves as a potential solution. However, there remains significant progress in respect of maintenance, as the current emphasis has primarily been on planning rather than the ongoing upkeep of walking infrastructure.

6.3.2 Pedestrians Vs. Cyclists

The transportation plans in Norway often regard walking and cycling routes as integrated. Dialogues with experts within innovation and collaboration resulted in highlighting two notable examples in Trondheim regarding this issue. Kjøpmannsgata has a

well-maintained, designated cycle path, while the sidewalk is narrow, cracked, and poses safety risks for pedestrians. Another striking example is the road between Gløshaugen and Tiller. Although the distance is just over 6 kilometers, making it feasible for walking, the route is primarily designed for cyclists, featuring steep angles that favor downhill cycling, whereas pedestrians witness bicycles zooming past them. The expectation is that redevelopment efforts will make the path more accommodating to both pedestrians and cyclists. Furthermore, the issue that pedestrians often feel like second-class citizens in terms of transportation, with cyclists receiving better treatment, should be emphasized.

Regarding maintenance, walkability expert interviews imply that, generally, priority is given to bicycles and their infrastructure. Separate infrastructure tends to work better, considering distinct requirements and patterns of pedestrians and cyclists. Long stretches without crossings are desirable for cycling, whereas walking necessitates more flexibility and the ability to crisscross through the city. However, conflicts and confusion arise in Norway due to the allowance of cycling on sidewalks, whereas some Nordic and European countries prohibit it. This lack of regulation is an issue worth addressing, especially considering the emergence of electric scooters, which are allowed on pedestrian infrastructure but pose challenges related to speed control. While some changes have been implemented in Oslo, there is room for further improvement. It is essential to have appropriate infrastructure in place for bicycles, as using sidewalks poses risks to pedestrians. Mixed solutions may not be the most effective approach for promoting walking.

6.3.3 Inclusive for whom?

When examining inclusive mobility and design, it becomes evident that the focus in Norway primarily revolves around physical disabilities and, to some extent, age groups. Discussions with researchers working on walkability additionally revealed that the maintenance efforts during winter, particularly for cycling lanes, while walking paths receive less attention for maintenance. Snow is often pushed toward sidewalks in areas like Bakklandet in Trondheim, making it challenging for pedestrians to walk. Considering the aging population, it is essential to ensure that sidewalks are accessible, not only for people with physical disabilities but also for senior citizens. This issue requires collaboration between

the maintenance and infrastructure design departments within municipalities. Additionally, the importance of considering the needs of other groups, such as parents with strollers or people with cognitive impairments, should be underscored.

It is crucial to consider the diverse population groups to ensure the inclusivity of the urban models. The discussions with universal design experts illustrated the extent of the measures taken to ensure inclusive design concerning walkability. The universal design departments in Norwegian municipalities strive to create socially inclusive spaces by establishing meeting places and implementing designs suitable for people of all ages. Trondheim, for instance, has earned recognition as an elderly-friendly city in Norway, achieved through accessible infrastructure and thoughtful design provision.

When discussing indicators of universal design within Norwegian municipalities like Trondheim, one highlight was the concept of the ”eye-level” scale of the city, meaning the elements and activities at people's eye level and on the first floors of buildings. To create inclusive and walkable spaces, one emphasizes the importance of ensuring that these eye-level surroundings, for instance, building facades, are dynamic and engaging. By incorporating active and stimulating features into the immediate visual environment, pedestrians are more likely to feel connected to their surroundings and encouraged to explore on foot.

With regards to addressing the needs of different social groups, such as immigrants, and overcoming challenges related to language barriers and decision-making mechanisms, the universal design experts accentuated the role of designated meeting places. These spaces are intentionally designed to be suitable for various generations and cultures, fostering inclusivity and social interaction. To elaborate, in Trondheim's case of the signage use, the universal design department employs symbols, in cases like ”Snarvei,” to convey information to a broader range of users. This approach helps ensure that vital information is accessible to individuals with possible limited proficiency in the local language.

The planning processes in Norway prioritize citizen input and employ participatory methods as critical components. However, one significant challenge arises from the diverse perspectives' inclusion, as any individual who comes forward can contribute their input. Innovation and collaboration experts discussed their experience with participation mech-

anisms, and they highlighted a contrast between planners' Utopian vision of an inclusive community and their preference for relying on their assumptions rather than actively listening to opinions.

When addressing the challenge of ensuring broad and diverse participation in research and planning processes, particular attention is required for communities such as immigrants. For instance, some participants in the immigrant focus group (see Subsection 6.2.2) lacked familiarity with the city, as they were still adjusting and integrating into society. Innovation and collaboration experts suggested that if migrants are unaware of available infrastructure, it represents a significant civic failure on Norway's part. They emphasized the importance of migrants actively engaging and immersing themselves in the host society. An anecdote drawn from the interviews was about an individual who deliberately distanced himself from his fellow compatriots to improve his English skills and facilitate integration. While personal efforts are respected, the government also bears responsibility for tackling the challenge. For example, having individuals with a Bangladeshi heritage, born in Norway and fluent in Norwegian, can bridge the gap by helping their community access essential services. Failure to provide necessary information and support can result in isolation and prevent immigrants from fully participating in their new society.

The innovation and collaboration experts further emphasized the need for the government to gain more accurate information on the residential locations of migrants, enabling targeted interventions and provision of resources such as Norwegian language classes. While some migrant communities receive appropriate attention and assistance, there are instances where vulnerable groups, like the Vietnamese family residing in a predominantly European area, may not have access to essential information and support. Another suggestion was a proactive approach to ensure that all nationalities are informed and engaged, acknowledging that a more comprehensive understanding of residents' locations can facilitate targeted outreach efforts. This approach does not imply intrusive actions but rather a strategic effort to reach out to communities effectively. The experts remarked that the "new Norwegians" term is now commonly used to describe immigrants who eventually become Norwegian citizens. However, without proactive efforts from the government, individuals may become isolated within their ethnic communities, highlighting the

government's responsibility to provide support and inclusiveness.

The discussions with these innovation and collaboration experts also resulted in an emphasis on the challenges faced by immigrants who have experienced traumatic situations such as war. In such cases, the priority for these individuals is often their safety and well-being, with assimilation into the new society not being an immediate concern. However, he encouraged active involvement and immersion in Norwegian culture for those planning for a long-term residency. Engagement in activities such as joining a football club allows individuals to be part of the social fabric, even without initially having proficient language skills. Additionally, community spaces where individuals born in Norway or long-term residents can share their knowledge and support newcomers to adjust to the Norwegian lifestyle can play a crucial role in the integration processes. While there is progress regarding these issues, resistance to multiculturalism and instances of discrimination pose additional challenges. The hope lies in the younger generations, who are expected to be more open-minded and tolerant, enabling a globally aware and inclusive society. Regardless, there is much to be done to promote understanding and acceptance.

A relevant example of the issue of acceptance and understanding among stakeholders is the acceptability of using cemeteries as recreational spaces in Nordic countries [93]. One indication is that the recreational use of cemeteries is generally seen as socially acceptable, with visitors appreciating the calm and peaceful atmosphere for activities such as walking and relaxation. Cemetery administrators also recognize the changing needs of society and support the integration of recreational activities within cemetery grounds. However, tensions can arise between mourners and recreational visitors, necessitating clear guidelines and communication strategies to ensure respectful coexistence. The emphasis here is on the importance of inclusive planning processes and creating designated areas for recreational practices while preserving other meanings and activities within the same space [93].

6.3.4 The Walking Culture

The cultural aspects of walking and its integration into citizens' lifestyles are influenced by awareness and strategic approaches employed by local governments. Interviews with

experts studying walkability underlined the unique walking strategy adopted by Trondheim, setting it apart from other municipalities. Trondheim's approach revolves around positive measures encouraging lifestyle changes, such as initiatives like "takk for at du går" (thank you for walking) or free lunches for those who walk to work. When combined with the presence of appropriate infrastructure, these measures play a crucial role in fostering a positive walking culture. It is also important to instill walking habits in younger populations, as evidenced by the Norwegian policy of encouraging children to walk to school instead of relying on parental transportation. However, there may be a recent shift where parents opt to drive their children to school, deserving renewed attention to this aspect. Integrating leisure walking habits into everyday practices is another important consideration, as Norwegians tend to engage in outdoor activities like skiing during winter but adapt to driving for work commutes. This matter underscores the need to assign value to travel, considering factors such as the value of time and the convenience of driving compared to walking. However, it is essential to recognize that walking offers health benefits and can contribute to reduced stress levels.

In the context of the Covid-19 pandemic, there has been a noticeable transformation in the utilization of technology and its impact on various population segments and lifestyles. One discussed example is that during the pandemic in Norway, individuals shifted their preference from driving to forested areas to engaging in city walks. With the closure of establishments, people embraced urban walking while wearing athleisure clothing, increasing walking activities. Moreover, individuals began incorporating city walks into their leisure time. Other than during the pandemic, numerous locations implemented initiatives to promote walking as a means of commuting to work.

The walkability experts noted that studies focusing on the older population demonstrate that daily walking positively influences their general health compared to those that usually rely on driving. Notably, the "younger older" adults aged 65 to 79 exhibit a strong car dependence, and even after retirement, they tend to retain private vehicles as their primary mode of transportation. This dependence occurs while public transport options are readily accessible in city centers. The persistence in car usage, and the adverse health effects associated with driving, raise concerns. The experts expressed that studies, including interviews with participants from this age group, reveal a lack of interest in uti-

lizing mobile applications. Paradoxically, many attendees at these interview meetings arrive at the location by car and use mobile apps to pay for parking, reflecting the role of mindset in technology adoption. People tend to embrace technology when they have no alternative but may exhibit skepticism against using apps to pay for public transport. As for campaigns focusing on promoting behavioral shifts in mobility, experts suggested that there are some ongoing initiatives; however, their effectiveness can be compromised when they are too generalized, leading individuals to perceive them as irrelevant. Tailoring campaigns to specific groups, particularly children, tends to furnish better results. An example is the ”cycle to work” initiative, which incentivizes active mobility through point systems, primarily focusing on cycling.

Furthermore, smart mobility solutions can reduce car usage and car dependency. Among the younger elderly population (aged 65-79), these solutions can contribute to active and independent aging [121]. Nevertheless, there is a knowledge gap about the reasons behind this group's level of car dependency and what public and private stakeholders can do to increase smart mobility usage in this population. Many younger elderly individuals show a positive attitude towards smart mobility solutions, but their adoption requires that these solutions incorporate accessibility, ease of use, and relevance to their travel needs. The issue seems relatively new and underdeveloped among public and private stakeholders, with a relatively low level of knowledge about everyday travel patterns and the usage of smart solutions among younger elderly individuals. As mentioned earlier, efforts are required to encourage more younger elderly individuals to embrace smart mobility solutions [121].

Another measure is using digital tools like smartphone applications. For example, Kobla is a mobile phone application that promotes sustainable travel habits by providing users with information about their travel patterns, including CO2 emissions, time, and cost [61]. The app aims to increase users' awareness of their habits and encourage behavior change. It incorporates gamification elements, such as competition and goal-setting, and rewards users with incentives for choosing environmentally friendly modes of travel and is suitable for different age groups. By addressing various problem areas, such as the high usage of private vehicles, and lack of awareness about travel alternatives, the Kobla app seeks to reduce CO2 emissions and contribute to achieving several Sustainable Development

Goals [61].

6.3.5 The 15 Minute City

The concept of the 15-minute city model was also explored in the interviews. While it is seen as a positive approach, there are challenges associated with its implementation. Balancing density and well-being is essential, as higher density can cause reduced access to green spaces and other amenities. Another issue emphasized by innovation and collaboration experts is the importance of providing accessible green spaces and ensuring they are designed to be inclusive, accommodating the needs of all individuals.

Furthermore, the issue of car dependency in small cities and rural areas was discussed, with the walkability experts noting the need for municipalities to implement measures that encourage walking and reduce reliance on cars, such as pedestrian-friendly infrastructure and improved public transportation options.

6.3.6 Planning and Inclusive Mobility in Kongsvinger

As explained in Section 2.3, the inclusive mobility concept refers to transportation accessibility for all groups, irrespective of their physical abilities, socioeconomic status, or social origins. The interviewed experts were asked about the different population groups' situations regarding mobility and planning to improve the understanding of this concept within the context of the case city and Norway at large.

An interview with an expert working with older adults was conducted to explore the walkability aspects of Kongsvinger, focusing on the perspectives of a resident familiar with the routines and amenities for senior citizens in Kongsvinger. They shared insights into various areas, landmarks, and recreational activities available for pedestrians in the city, especially the older population.

The expert interviewee highlighted the presence of a picturesque riverside walkway known as "Strandpromenaden", which stretches along the riverbank. This pathway offers a pleasant walking experience and connects to different parts of the city. Notably, a popular café

named Gjemselund is situated along the Strandpromenaden, attracting seniors and providing an ideal spot for socializing at reasonable prices.

Furthermore, Glåmlia is an area with significant foot traffic, particularly around Skansen, where people frequently walk. The interviewee also pointed out the forested areas. They emphasized that Vardåsen poses challenges due to its steep terrain, making it less accessible for older individuals.

The expert discussed various recreational activities suitable for seniors and other residents. Walking groups, organized by both the Frivillighetssentralen and Norsk Turistforening, offer opportunities for group walks and excursions to different locations. Additionally, they mentioned the availability of lighted trails, ski routes, and a large bathing lake, all of which attract outdoor enthusiasts.

Additionally, the interviewee drew attention to the fortress (Festningen) site and mentioned the broad and well-maintained pathway, making it possible to walk around it. Although the terrain is steep in certain areas, efforts have been made to accommodate individuals with mobility aids such as rollators.

During the interview, they argued that walking uphill in many areas can be physically demanding, particularly for older individuals. The interviewee mentioned a desire for more clothing stores catering to seniors and suggested improvements to enhance aesthetics and pedestrian-friendliness in some parts of the city.

The expert highlighted several senior-friendly existing facilities and activities in Kongsvinger. These include a swimming pool adjacent to the sports field. In addition, the seniors' center, a community space run by the municipality for older adults, has several activities, including senior exercise classes, senior dancing sessions, and cultural events organized through initiatives like "den kulturelle spaserstokken". Generally, the seniors' center is a hub for various programs and events.

In order to delve into the intricate aspects of walkability and planning in Kongsvinger, an interview was conducted with a planning expert from the Kongsvinger municipality. When asked about the current plans and initiatives to enhance walkability, They highlighted a municipal plan that prioritizes walking and cycling while providing a compre-

hensive strategy. As a partner in the WALKMORE project, Kongsvinger municipality has translated the walking and cycling strategy into concrete actions. These actions include physical measures, namely the development of a pedestrian route network, along with non-physical measures, like campaigns aimed at shifting the mindset of residents.

The focus then shifted to asking whether the local administration maintained a specific emphasis on walking, separated from cycling. In response, the planning expert explained that the municipality is actively planning a principal cycling network and a main pedestrian shortcut network. However, a considerable challenge lies in the narrow road network in the city center, which causes difficulties in widening sidewalks and separating them from cycling routes. Therefore, cyclists frequently turn to use the sidewalks due to these constraints. They acknowledged that although plans for a future pedestrian and cycling bridge over the river are in place, creating adequate space for divided paths is a large-scale project that requires extensive planning in the long term.

Turning attention to the maintenance of pedestrian paths, the expert remarked on the established standards the maintenance operators meet during the winter. However, with the shortcut networks implemented, pedestrians can expect improved conditions during winter maintenance.

When discussing the population groups that receive focus in the planning process, the planning expert underlined the priority of reducing vehicle traffic congestion, as many inhabitants currently rely on private cars for commuting. Encouraging active mobility alternatives, such as cycling, and promoting everyday walking are pivotal elements of the Kongsvinger municipality's strategy. Additionally, measures are being taken to ensure traffic safety for children.

Regarding the involvement of specific groups, such as immigrants, in the planning process for active mobility, the discussions concluded that there is currently no particular focus on that aspect. However, it was recognized that for those who cannot afford a car, walking and public transportation become crucial options. While acknowledging the importance of considering this perspective, the expert noted that it is not currently on the agenda.

From the standpoint of interdepartmental communication within the Kongsvinger municipality, the close collaboration among similar departments was highlighted. Regular

meetings are held to facilitate communication about ongoing projects and processes. Additionally, due to the small size of the city and municipality, such updates are effortlessly communicated.

Chapter 7

Conclusions

This research has analyzed walkability in small Norwegian cities and investigated strategies and methods to incorporate walkability into creating inclusive spaces. Initially, in this concluding chapter, the sub-research questions will be answered by outlining the findings from the analyses. Lastly, these answers will be utilized to answer the main research question.

7.1 Answers to the Research Questions

How important is walkability in designing inclusive spaces?

Walkability is a significant contributor to designing inclusive spaces. The significance of considering factors such as street design, connectivity, land use mix, safety, and aesthetics, in assessing walkability has been emphasized. By creating pedestrian-friendly environments, cities can promote active mobility and ensure equitable access to essential services and amenities. Walkable spaces contribute to social inclusiveness by allowing individuals of diverse backgrounds and abilities to navigate and participate in urban life more easily.

What is the importance of sociodemographic groups in designing inclusive mobility

and spaces?

The importance of population groups in designing inclusive mobility and spaces is significant for several reasons. Firstly, understanding the social and material arrangements that influence walking practices among different sociodemographic groups is essential. Factors such as pedestrian infrastructure availability and quality, cultural norms surrounding walking, and the influence of technology and media on perceptions of walking all shape the population's mobility choices. Examining these factors allows for identifying barriers and opportunities for promoting inclusive walking practices.

Secondly, addressing environmental challenges and achieving sustainability goals can be facilitated by promoting walkability. The focus on creating walkable environments enables municipalities and road authorities to contribute to sustainable and inclusive urban development. This approach aligns with the Social Practice Theory framework, which emphasizes the role of social practices in shaping individual behavior and societal norms.

Furthermore, adopting a structured approach grounded in the Social Practice Theory framework allows decision-makers to make informed choices in transportation and mobility planning. Considering the performances and perceptions of different sociodemographic groups regarding walking practices helps ensure that policies and initiatives are inclusive and meet the population's diverse needs.

Additionally, the 'right to the city' concept is applicable in the walkability context in small Norwegian cities. Emphasizing equitable and inclusive access to urban resources and opportunities, the right to the city framework highlights the importance of transportation as a fundamental aspect of urban life. Taking into account factors such as gender, age, and socioeconomic status in transportation and mobility planning can promote equitable access to transportation resources and infrastructure.

What are the different needs for walking in different sociodemographic groups?

Based on the findings from focus groups and survey data, the perception and needs for walking vary across different sociodemographic groups. Age influences how individuals perceive walking, particularly among older adults and youth. For older adults, suitable

infrastructure surfaces and manageable inclines are noteworthy considerations for walking longer distances. Ensuring their safety through dedicated pedestrian infrastructure is crucial to enhance their feeling of security. On the other hand, youth prioritize the attractiveness of amenities and various services in the city. Aesthetically appealing urban facades can encourage exploration and walking behavior among this group. Policy interventions should focus on providing engaging and diverse schemes to discourage reliance on private cars, as the travel habits internalized during youth shape future populations' travel behavior and influence the economy.

In addition, the pricing of parking and possession of a driver's license have notable implications for the extent of car dependency among the population. Despite the high cost associated with obtaining a driver's license in Norway, it has not deterred individuals from encouraging their teenagers to pursue this form of licensure. Conversely, in the context of Kongsvinger, the parking prices appear relatively low. These instances involving policy and pricing underscore the importance of meticulous and well-informed decision-making processes while considering the broader ramifications on transportation behavior and mode choices.

Gender also influences the perception of walking as a mobility choice. Women tend to view walking more as a mode of transportation, while men perceive it primarily as a form of exercise, as evident from the focus groups and observations.

The presence of small children significantly impacts car dependency, particularly when public transportation networks are insufficient or underdeveloped. Private cars are a convenient option in such situations.

Moreover, regarding different social and ethnic backgrounds, language proficiency and access to information about the city and urban amenities emerge as crucial issues. In order to achieve social cohesion, integration, and equity, urban service designs must cater to the diverse social backgrounds present in the population. Therefore, including the needs of various social groups in urban planning is essential for creating inclusive cities.

Which areas of the planning process in Norwegian municipalities require improvement to optimize the plans regarding walkability and inclusiveness in small cities?

Fostering collaboration among stakeholders is a crucial area of focus for enhancing walkability in Norway. In addition to interdepartmental communication at the municipality level, there is a need for integrated planning that considers both land use and transport. The mismatch between walking-related plans and designated zones emphasizes the importance of a cohesive approach. Moreover, efforts are required to prioritize maintenance alongside planning. Achieving comprehensive and sustainable walkability necessitates ongoing collaboration and a shift toward integrated planning and maintenance practices.

Which methodologies can be applied to study and improve walkability for different sociodemographic groups? How can these methodologies be structured to be readily adopted by the (Norwegian) municipalities?

In order to optimize plans regarding walkability and inclusiveness in small cities, several areas in the planning process require improvement. Firstly, the city should focus on facilitating purposes and incentives for people to engage in walking practices. This can be achieved through campaigns conducted on digital platforms, such as social media, which promote specific walking purposes. For instance, initiatives like city-wide ”no car” campaigns or collaborations with stakeholders to incentivize different trip purposes, such as commuting, can be effective. Additionally, during different seasons, the municipality can collaborate with the city's services and communities to create activities or temporary spatial changes along routes that lack an encouraging environment. Engaging existing community structures, such as NGOs, cultural centers, or immigrant communities, can foster a sense of ownership among residents and promote their active involvement in city projects.

Another crucial aspect is the commitment to universal design principles in creating walkable and inclusive urban environments. By prioritizing socially inclusive spaces, considering the eye-level scale of the city, and implementing user-friendly symbols for communication, municipalities can demonstrate a holistic approach to accommodating diverse populations and fostering inclusivity within the urban fabric.

Furthermore, the findings from focus groups have important implications for the design and management of public spaces in Kongsvinger. For instance, if the central square is

predominantly used during weekends, it may be more practical to concentrate programming and events around those days to maximize its utilization. Similarly, addressing the relatively empty state of the central square during weekday evenings calls for strategies to activate the space during those hours, such as adding more seating, greenery, or lighting. These efforts can enhance the attractiveness and functionality of public spaces, making them more inclusive and vibrant.

In conclusion, the answer to the research question: **How can walkability be utilized to provide inclusive mobility and spaces in small Norwegian cities?** is a combination of all these answers.

Walkability plays a crucial role in designing inclusive spaces in small Norwegian cities. The assessment of factors such as street design, connectivity, land use mix, safety, and aesthetics is significant in understanding and promoting walkability. Creating pedestrian-friendly environments allows for active mobility and equitable access to essential services and amenities, fostering social inclusiveness among individuals of diverse backgrounds and abilities.

Furthermore, the importance of considering different population groups in designing inclusive mobility and spaces cannot be understated. Understanding the social and material arrangements that shape walking practices among various sociodemographic groups is essential for identifying barriers and opportunities to promote inclusively. By addressing environmental challenges and aligning with sustainability goals, promoting walkability contributes to sustainable and inclusive urban development. The principles of Social Practice Theory and the 'right to the city' concept emphasize the importance of considering demographic shifts and specific population needs in transportation and mobility planning.

Inclusive urban planning should address the diverse needs for walking among population groups to create inclusive cities. These needs for walking vary among different sociodemographic groups. Factors such as infrastructure surfaces and inclines are crucial considerations for older adults, while the attractiveness of amenities influences the walking behavior of youth. Gender, possession of a driver's license, presence of small children, and social and ethnic backgrounds also impact the perception and walking requirements.

Improving walkability and inclusiveness in small cities requires collaboration among

stakeholders, integrated planning that considers both land use and transport, prioritization of maintenance, and the adoption of comprehensive assessment frameworks. Methodologies such as campaigns and community engagement can be employed to study and improve walkability for different demographic groups. Emphasizing the eye-level scale of the city and activating public spaces during low-utilization periods can enhance inclusively and vibrancy.

An overall reflection of these concepts in the spatial design and strategies is illustrated in Figure 7.1 and Figure 7.2.

Figure 7.1: Revitalizing the less-used urban spaces through community engagement and placemaking methods, author.

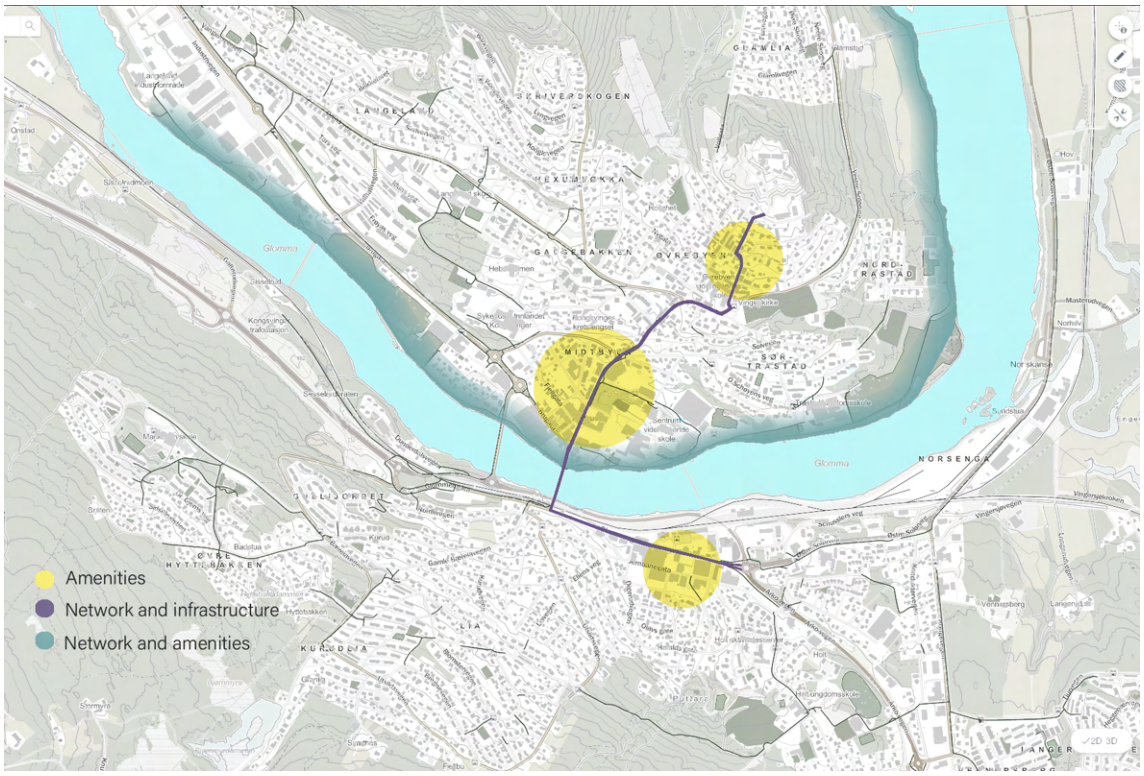

Figure 7.2: Potential walkability improvement areas in Kongsvinger based on the citizen inputs, author.

7.2 Thoughts for Future Research

This research has identified several intriguing areas that fall beyond the scope of the current study but hold significant potential for future investigation. Firstly, given the increasing impact of climate change and its associated extreme weather events, it would be valuable to explore how these environmental shifts influence the practices of different population groups. Specifically, investigating the extent to which inclusive measures are integrated into climate change adaptation strategies and planning processes would provide valuable insights.

Secondly, there is a potential for exploring the challenges and opportunities presented by social media and digital tools in the transportation planning context. This investigation could encompass various aspects, including data collection, feedback mechanisms, and evaluation methods. Understanding how these technological advancements can be effectively leveraged as tools within the transport planning domain would contribute to

improved decision-making processes.

Furthermore, studying municipal and governance structures in Norway from an interdisciplinary perspective would be beneficial. This inquiry could explore the need for potential modifications to existing systems, considering factors such as collaboration, coordination, and the integration of diverse expertise and perspectives.

By exploring these suggested areas, future research endeavors can expand the knowledge base in transportation and mobility planning, contributing to more comprehensive and effective strategies for creating sustainable, inclusive, and resilient urban environments.

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Appendices

Appendix A

SIKT Application

Sikt

Notification Form

Reference number
276907

Which personal data will be processed?

- Name (also with signature/written consent)
- Date of birth
- Sound recordings of people
- Background data that can identify a person
- Sex life or sexual orientation

Describe which background data that can identify individual persons you will be processing

Workplace

Project information

Project title

Ways to stratify walking as an inclusive choice of mobility and a means to create inclusive spaces

Project description

This research will explore walking as a strategy for inclusive mobility and creating inclusive places for walking. The ambition of this thesis is to create a more stratified understanding of walking, and the goal is to add on the walkability and group discussion in Norway.

Explain why it is necessary to process personal data in the project

For the interviews with professionals, it is necessary to acquire their insight on projects they have been involved with and to use these interviews as references.

External funding
Ikke utfyllt
Type of project
Student project, Master's thesis

Contact information, student
Sara Hafezi, sarahafe@stud.ntnu.no, tlf: 46272218

Data controller

Data controller (institution responsible for the project)
Norges teknisk-naturvitenskapelige universitet / Fakultet for arkitektur og design (AD) / Institutt for arkitektur og planlegging

Project leader (academic employee/supervisor or PhD candidate)
Tanu Priya Uteng, tanu@ntnu.no, tlf: 90533684

Will the responsibility of the data controller be shared with other institutions (joint data controllers)?
Yes

Joint data controllers

Institution
Transportøkonomisk institutt

Project leader (academic employee/supervisor or PhD candidate)
Tanu Priya Uteng, tanu.priyauteng@toi.no, 90533684, Project leader

Sample 1

Describe the sample

Kongsvinger municipality

Describe how you will recruit or select the sample

The municipality's head of environment and community development will be contacted for a refferal to a contact person who is a transportation and mobility expert in the municipality. Then the contact person will be asked for an interview.

Age
25 - 68

Personal data relating to sample 1
- Name (also with signature/written consent)
- Sound recordings of people

How will you collect data relating to sample 1?

Personal interview

Attachment

Interview)_questions.docx

Legal basis for processing general categories of personal data
Consent (General Data Protection Regulation art. 6 nr. 1 a)

Information for sample 1

Will you inform the sample about the processing of their personal data?
Yes

How?
Written information (on paper or electronically)

Information letter

information_letter_Expert_sample.doc

Sample 2

Describe the sample

Elderly focus group
A focus group workshop with a group from the elderly population.

Describe how you will recruit or select the sample

By contacting organizations/their Facebook group and setting up a workshop gathering in order to have the focus group

Age
65 - 85

Personal data relating to sample 2
- Name (also with signature/written consent)
- Date of birth
- Sound recordings of people

How will you collect data relating to sample 2?

Workshop

Legal basis for processing general categories of personal data
Consent (General Data Protection Regulation art. 6 nr. 1 a)

Information for sample 2

Will you inform the sample about the processing of their personal data?
Yes

How?
Written information (on paper or electronically)

Information letter

People.doc

Sample 3

Describe the sample

Youth population

Describe how you will recruit or select the sample

Through youth clubs and Facebook groups for Kongsvinger youth

Age
18 - 23

Personal data relating to sample 3
- Name (also with signature/written consent)
- Date of birth
- Sound recordings of people

How will you collect data relating to sample 3?

Workshop

Legal basis for processing general categories of personal data
Consent (General Data Protection Regulation art. 6 nr. 1 a)

Information for sample 3

Will you inform the sample about the processing of their personal data?
Yes

How?
Written information (on paper or electronically)

Information letter

People.doc

Sample 4

Describe the sample

Queer population

Describe how you will recruit or select the sample

Through community organizations/Facebook groups in Kongsvinger

Age
18 - 60

Personal data relating to sample 4

- Name (also with signature/written consent)
- Date of birth
- Sound recordings of people
- Sex life or sexual orientation

How will you collect data relating to sample 4?

Workshop

Legal basis for processing general categories of personal data
Consent (General Data Protection Regulation art. 6 nr. 1 a)

Legal basis for processing special categories of personal data
Explicit consent (General Data Protection Regulation art. 9 nr. 2 a)

Explain your choice of legal basis

Information for sample 4

Will you inform the sample about the processing of their personal data?
Yes

How?
Written information (on paper or electronically)

Information letter

People copy.doc

Third Persons

Will you be processing data relating to third persons?
No

Documentation

How will consent be documented?
- Manually (on paper)

How can consent be withdrawn?

Upon contact with the thesis supervisor/ student.

How can data subjects get access to their personal data or have their personal data corrected or deleted?

Upon contact with the thesis supervisor/ student.

Total number of data subjects in the project
1-99

Approvals

Will you obtain any of the following approvals or permits for the project?
Ikke utfyllt

Processing

Where will the personal data be processed?
- Computer belonging to the data controller

Who will be processing/have access to the collected personal data?
- Project leader
- Student (student project)

Will the collected personal data be transferred/made available to a third country or international organisation outside the EU/EEA?
No

Information Security

Will directly identifiable data be stored separately from the rest of the collected data (e.g. in a scrambling key)?
Yes

Which technical and practical measures will be used to secure the personal data?
- Personal data will be anonymised as soon as no longer needed
- Personal data will be stored in encrypted form
- Restricted access

Duration of processing

Project period
03.03.2023 - 13.06.2023

What happens to the data at the end of the project?
Personal data will be anonymised (deleting or rewriting identifiable data)

Which anonymization measures will be taken?
- Personally identifiable information will be removed, re-written or categorized

Will the data subjects be identifiable (directly or indirectly) in the thesis/publications from the project?
No

Additional information

All the data will be anonymised before storage in the server annd all the survey data will be turned into categories.

TØI will provide anonymised data from previous surveys including travel behavior, gender and a categorised area of resdience within the city done by the Walkmore project. This data will be analysed in the NTNU secure servers and TØI will have access to the final analysis.

NSD reference number for WALKMORE project by TØI: Ref.nr. 313806

Appendix B

Consent Forms

Are you interested in taking part in the research project (master thesis)

"Walkability and Inclusive Spaces: A study on Walkability and Inclusiveness in Small Norwegian cities"?

This is an inquiry about participation in a research project where the main purpose is to explore walking as a strategy for inclusive mobility and creating inclusive places for walking. The ambition of this thesis is to create a more stratified understanding of walking**. In this letter we will give you information about the purpose of the project and what your participation will involve.**

Purpose of the project

This research focuses on walkability in small Norwegian cities and explores strategies and methods to incorporate walkability into creating inclusive spaces. The thesis aims to contribute to the walkability discussion in Norway by investigating the existing decision-making and planning structures and processes in small Norwegian cities regarding walkability.

This study, as a part of the ongoing Walkmore research project, will conduct a data analysis on travel behavior in two small cities of Narvik, in northern Norway, and Kongsvinger, in eastern Norway. The analysis will utilize the existing project survey data and explore the role and share of walking in participants' different trips, map the trips in different sections of the city, and how this information projects into diverse demographic groups. The quantitative analysis will be supplemented with qualitative data extracted from focus groups. This research will analyze how the concluded framework can be translated into a practical roadmap on urban planning, social inclusion, and other relevant sectors to contribute to an overall lift of social inclusion and sustainable mobility.
This master thesis, seeks to answer these research questions:
Main research question: How can walkability be utilized to provide inclusive mobility and spaces in small Norwegian cities?

Who is responsible for the research project?
AD faculty, NTNU is the institution responsible for the project.
TØI (Transportøkonomisk institutt) is also partially engaged with the project.

Why are you being asked to participate?
The reason you have been selected for participation is your professional expertise and/or your familiarity with case study.

Your contact information has been taken from the official online platforms of your office.

What does participation involve for you?
If you choose to take part in this project, this will involve that you take part in an interview with the method of your choice (online or in person). Generally, it will take around 45 minutes, but it can be changed to fit your availability. The content of the interview will be recorded electronically, the main points will later be extracted, and the recording will be deleted.

Participation is voluntary
Participation in the project is voluntary. If you chose to participate, you can withdraw your consent at any time without giving a reason. All information about you will then be made anonymous. There will be no negative consequences for you if you chose not to participate or later decide to withdraw.

Your personal privacy – how we will store and use your personal data
We will only use your personal data for the purpose(s) specified in this information letter. We will process your personal data confidentially and in accordance with data protection legislation (the General Data Protection Regulation and Personal Data Act).

- To ensure that no unauthorized persons are able to access the personal data, we will replace your name and contact details with a code. The list of names, contact details and respective codes will be stored separately from the rest of the collected data. We will store the data on an NTNU server, encrypted.

In the final publication, your name, your occupation and/or expertise will be mentioned upon your approval. To do so, please check the boxes at the bottom of the form.

What will happen to your personal data at the end of the research project?
The project is scheduled to end by June 2023. At the end of the project, the raw personal data will be deleted from the data storage entirely.

Your rights
So long as you can be identified in the collected data, you have the right to:

- access the personal data that is being processed about you
- request that your personal data is deleted
- request that incorrect personal data about you is corrected/rectified
- receive a copy of your personal data (data portability), and
- send a complaint to the Data Protection Officer or The Norwegian Data Protection Authority regarding the processing of your personal data

What gives us the right to process your personal data?
We will process your personal data based on your consent.

Based on an agreement with NTNU and TØI, Data Protection Services has assessed that the processing of personal data in this project is in accordance with data protection legislation.

Where can I find out more?
If you have questions about the project, or want to exercise your rights, contact:

- Department of architecture and planning, Architecture and design faculty, NTNU, Tanu Priya Uteng Tanu@ntnu.no (Tanu Priya Uteng is employed in both institutions)
- Our Data Protection Officer: Thomas Helgesen, Thomas.helgesen@ntnu.no +47 93 07 9038
- Data Protection Services, by email: (personverntjenester@sikt.no) or by telephone: +47 53 21 15 00.

Yours sincerely,

Tanu Priya Uteng (Supervisor)

Sara Hafezi (Msc. Candidate)

Consent form

Consent can be given in writing (including electronically) or orally. NB! You must be able to document/demonstrate that you have given information and gained consent from project participants i.e. from the people whose personal data you will be processing (data subjects). As a rule, we recommend written information and written consent.

- *For written consent on paper you can use this template*
- *For written consent which is collected electronically, you must chose a procedure that will allow you to demonstrate that you have gained explicit consent (read more on our website)*
- *If the context dictates that you should give oral information and gain oral consent (e.g. for research in oral cultures or with people who are illiterate) we recommend that you make a sound recording of the information and consent.*

If a parent/guardian will give consent on behalf of their child or someone without the capacity to consent, you must adjust this information accordingly. Remember that the name of the participant must be included.

Adjust the checkboxes in accordance with participation in your project. It is possible to use bullet points instead of checkboxes. However, if you intend to process special categories of personal data (sensitive personal data) and/or one of the last four points in the list below is applicable to your project, we recommend that you use checkboxes. This because of the requirement of explicit consent.

I have received and understood information about the project *[insert project title]* and have been given the opportunity to ask questions. I give consent:

- ☐ to participate in an interview
- ☐ for my name to be published in the final publication
- ☐ for my occupation to be published on the final publication
- ☐ for my expertise to be published on the final publication

I give consent for my personal data to be processed until the end date of the project, approx. 14/06/2023

(Signed by participant, date)

Are you interested in taking part in the research project (master thesis)

"Walkability and Inclusive Spaces: A study on Walkability and Inclusiveness in Small Norwegian cities"?

This is an inquiry about participation in a research project where the main purpose is to explore walking as a strategy for inclusive mobility and creating inclusive places for walking. The ambition of this thesis is to create a more stratified understanding of walking, and the goal is to add on the walkability and group discussion in Norway.**. In this letter we will give you information about the purpose of the project and what your participation will involve.**

Purpose of the project

This research focuses on walkability in small Norwegian cities and explores strategies and methods to incorporate walkability into creating inclusive spaces. The thesis aims to contribute to the walkability discussion in Norway by investigating the existing decision-making and planning structures and processes in small Norwegian cities regarding walkability.

This study, as a part of the ongoing Walkmore research project, will conduct a data analysis on travel behavior in two small cities of Narvik, in northern Norway, and Kongsvinger, in eastern Norway. The analysis will utilize the existing project survey data and explore the role and share of walking in participants' different trips, map the trips in different sections of the city, and how this information projects into diverse demographic groups. The quantitative analysis will be supplemented with qualitative data extracted from focus groups. This research will analyze how the concluded framework can be translated into a practical roadmap on urban planning, social inclusion, and other relevant sectors to contribute to an overall lift of social inclusion and sustainable mobility.
This master thesis, seeks to answer these research questions:
Main research question: How can walkability be utilized to provide inclusive mobility and spaces in small Norwegian cities?

Who is responsible for the research project?
AD faculty, NTNU is the institution responsible for the project.
TØI (Transportøkonomisk institutt) is also partially engaged with the project.

Why are you being asked to participate?
The reason you have been selected for participation is that you belong to the age/ gender/ social group among Kongsvinger residents that we are interested to focus on.

What does participation involve for you?
If you choose to take part in this project, this will involve that you take part in workshop we have a group discussion with you and other participants about your walking habits and practices. Generally, it will take around 45 minutes, but it can be changed based on the discussion. The content of the

interview will be recorded electronically, the main points will later be extracted, and the recording will be deleted.

Participation is voluntary
Participation in the project is voluntary. If you chose to participate, you can withdraw your consent at any time without giving a reason. All information about you will then be made anonymous. There will be no negative consequences for you if you chose not to participate or later decide to withdraw.

Your personal privacy – how we will store and use your personal data
We will only use your personal data for the purpose(s) specified in this information letter. We will process your personal data confidentially and in accordance with data protection legislation (the General Data Protection Regulation and Personal Data Act). The data including your personal information will be anonymised before the analysis.

- To ensure that no unauthorized persons are able to access the personal data, we will replace your name and contact details with a code. The list of names, contact details and respective codes will be stored separately from the rest of the collected data. We will store the data on an NTNU server, encrypted.
- The pictures of the workshop will be manipulated later so the participants' figures are anonymised. The faces and clothes will be covered.

What will happen to your personal data at the end of the research project?
The project is scheduled to end by June 2023. At the end of the project, the raw personal data will be deleted from the data storage entirely.

Your rights
So long as you can be identified in the collected data, you have the right to:

- access the personal data that is being processed about you
- request that your personal data is deleted
- request that incorrect personal data about you is corrected/rectified
- receive a copy of your personal data (data portability), and
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What gives us the right to process your personal data?
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Based on an agreement with NTNU and TØI, Data Protection Services has assessed that the processing of personal data in this project is in accordance with data protection legislation.

Where can I find out more?
If you have questions about the project, or want to exercise your rights, contact:

- Department of architecture and planning, Architecture and design faculty, NTNU, Tanu Priya Uteng Tanu@ntnu.no (Tanu Priya Uteng is employed in both institutions)
- Our Data Protection Officer: Thomas Helgesen, Thomas.helgesen@ntnu.no +47 93 07 9038
- Data Protection Services, by email: (personverntjenester@sikt.no) or by telephone: +47 53 21 15 00.
- You can also read about the type of consent you are giving to us and the regulations regarding our responsibilities on the general data protection regulation art. 9 nr. 2 a: https://lovdata.no/dokument/NL/lov/2018-06-15-38/gdpr%2FARTIKKEL_9

Yours sincerely,

Tanu Priya Uteng (Supervisor)

Sara Hafezi (Msc. Candidate)

Consent form

Consent can be given in writing (including electronically) or orally. NB! You must be able to document/demonstrate that you have given information and gained consent from project participants i.e. from the people whose personal data you will be processing (data subjects). As a rule, we recommend written information and written consent.

- *For written consent on paper you can use this template*
- *For written consent which is collected electronically, you must chose a procedure that will allow you to demonstrate that you have gained explicit consent (read more on our website)*
- *If the context dictates that you should give oral information and gain oral consent (e.g. for research in oral cultures or with people who are illiterate) we recommend that you make a sound recording of the information and consent.*

If a parent/guardian will give consent on behalf of their child or someone without the capacity to consent, you must adjust this information accordingly. Remember that the name of the participant must be included.

Adjust the checkboxes in accordance with participation in your project. It is possible to use bullet points instead of checkboxes. However, if you intend to process special categories of personal data (sensitive personal data) and/or one of the last four points in the list below is applicable to your project, we recommend that you use checkboxes. This because of the requirement of explicit consent.

I have **received and understood information about the project** *[Walkability in Norway]* and have been given the opportunity to ask questions. I agree to participate in the workshop and I give **explicit consent** for my **personal data** to be processed until the end date of the project, approx. 14/06/2023.

(Signed by participant, date)

Appendix C

WALKMORE Survey Questions

WALKMORE Project Survey

Walking in Kongsvinger city
Base on the preview of version 3.0

- We start with the background questions: Are you?

- ☐ Male
- ☐ Female
- ☐ other

- What year were you born in?

- What is your level of education?
- ☐ Elementary school
- ☐ Secondary school
- ☐ Technical education as a skilled worker
- ☐ Up to 3 years of university or college
- ☐ University or college education of 4 years or more
- ☐ Do not wish to answer

- What is your households annual income?
- ☐ Under 200 000 krl
- ☐ 200 000 - 399 999 kr
- ☐ 400 000 - 599 999 kr
- ☐ 600 000 - 799 999 kr
- ☐ 800 000 - 999 999 kr
- ☐ 1000 000 - 1199 999 kr
- ☐ 1200 000 - 1 399 999 kr
- ☐ 1 400 000 - 1 599 999 kr
- ☐ 1 600 000 - 1 799 999 kr
- ☐ Over 2 000 0000 kr

- Do you have any household members other than yourself?
- ☐ Yes
- ☐ No

- How many household members (including yourself) are in the following age groups?
- ☐ Under 7 yo
- ☐ 7-17 yo
- ☐ Over 18 yo

- Do you have a driver's license?
- ☐ Yes, for car
- ☐ Yes, but only for motorcycle/ moped
- ☐ No, I don't have a driver's license

- How long have you been living in Kongsvinger?

☐ Less than 2 years
☐ 2-5 years
☐ 5-10 years
☐ More than 10 years

- We would like to know more about how is it to walk in your neighborhood. What characterizes the surroundings in the neighborhood that you like to walk in? Several answers are possible.

☐ Shops and facilities
☐ The people in the street
☐ Meeting places
☐ Trees and greenery
☐ Clean and tidy
☐ Less noise
☐ Benches
☐ Shortcuts without car traffic
☐ Less/ no car traffic
☐ Division between pedestrian and cycling routes
☐ There are sidewalks
☐ Even surface and/or low curbstones
☐ Good cleanup/graveling in the wintertime
☐ Good lighting
☐ I feel safe from other people
☐ Other reasons (write down)
☐ Not relevant

- How do you think it is to walk in your neighborhood?

☐ Very good
☐ Good
☐ Neutral
☐ Not very good
☐ Not good at all

- What should be done to make it better to walk in your neighborhood? Several answers are possible.

☐ More shops and facilities
☐ More people in the street
☐ More meeting places
☐ More trees and greenery
☐ Better cleaning and maintenance
☐ Less noise
☐ More benches
☐ More shortcuts without car traffic
☐ Less car traffic
☐ Better division between pedestrian and cycling routes
☐ Sidewalks
☐ Even surface and/or low curbstones
☐ Better/more frequent cleanup/graveling in the wintertime
☐ Better lighting
☐ Better facilitation regarding the steep terrain
☐ Other (write down)

☐ Not relevant

- We would like to know about your everyday travel behavior. Is it realistic for you to walk all the way to your work/study location everyday in the summer half-year?

☐ Yes
☐ No
☐ skip, I'm not employed/ studying

- Why is it not realistic? Several answers possible.
☐ The distance is too long
☐ I'm not in a good enough physical shape
☐ I'm dependent on using a car to carry out everyday activities
☐ I have too much to carry
☐ It is not facilitated well enough
☐ Other reasons (write down)

- We would like to know about your everyday travel behavior. Is it realistic for you to walk all the way to your work/study location everyday in the winter half-year?

☐ Yes
☐ No
☐ skip, I'm not employed/ studying

- Why is it not realistic? Several answers possible.
☐ It's too dark
☐ The snow clean up/ graveling is insufficient
☐ It's too cold
☐ It takes too much time
☐ Other reasons (write down)

- How do you think it is to walk in the city center?
☐ Very good
☐ Good
☐ Neutral
☐ Not very good
☐ Not good at all

- What should be done to make it better to walk in Kongsvinger's city center? Several answers are possible.

☐ Better sidewalks and walking paths
☐ More shops services in short walking distances
☐ It should become safer
☐ Pedestrian streets
☐ Better looking buildings
☐ Reduced car traffic
☐ Lower speeds for car traffic
☐ Better lighting along the paths
☐ More people in the streets
☐ More shortcuts without car traffic
☐ Separated lanes for pedestrians and cyclists
☐ Submerged levels in curbstones and the sidewalk

- ☐ More benches
- ☐ More places that facilitate activities
- ☐ More trees and greenery
- ☐ Longer green lights for pedestrians
- ☐ Better snow clean-ups (earlier and more often)
- ☐ More frequent graveling on the sidewalks
- ☐ Convenient shortcuts
- ☐ Other (write down)
- ☐ I don't know

- How do you describe your physical shape?
- ☐ Bad
- ☐ Not very good
- ☐ Good
- ☐ Excellent
- ☐ Do not wish to answer

Appendix D

WALKMORE Survey Participants' Sociodemographic Statistics

Table D.1: Survey participants' gender statistics, author.

Gender	Frequency	Percent
Female	558	62.8
Male	329	37
Other	1	0.1
Total Valid	888	

Table D.2: Survey participants' age statistics, author.

Age Group	Frequency	Percent
13-17	2	0.2
18-24	28	3.2
25-34	129	14.7
35-44	162	18.5
45-54	238	14.7
55-66	205	23.4
67-74	92	10.5
+75	19	2.2
Total Valid	875	

Table D.3: Survey participants' education statistics, author.

Education	Frequency	Percent
Elementary school	48	5.5
Secondary school	189	21.6
Trained craftsman or skilled worker	120	13.7
Up to 3 years of university or college education	226	25.9
4 years or more university or college education	277	31.7
Do not wish to answer	13	1.5
Total Valid	875	

Table D.4: Survey participants' household statistics, author.

Household	Frequency	Percent
Single	173	20.4
More than one person	676	79.6
Total Valid	849	

Table D.5: Survey participants with children under 7 years old, author.

Children under 7	Frequency	Percent
Yes	133	46.7
No	152	53.3
Total Valid	285	

Table D.6: Survey participants' annual income statistics, author. The income groups are sorted based on the income categories in SSB income statistics [139].

Income Group	Frequency	Percent
Low income	109	12.8
Lower-middle income	334	39.2
Higher-middle income	219	25.7
High income	191	22.4
Total Valid	853	

Appendix E

SPSS Regression Analyses Details

Case Processing Summary

Sociodemographic variables		N	Marginal Percentage
City center walkability	1	23	13.3%
	2	82	47.4%
	3	44	25.4%
	4	19	11.0%
	5	5	2.9%
Age groups	18-24	2	1.2%
	25-34	41	23.7%
	35-44	52	30.1%
	45-54	36	20.8%
	55-66	29	16.8%
	67-74	13	7.5%
Income	Under 399 000 kr	12	6.9%
	400 000 kr - 799 999 kr	50	28.9%
	800 000 kr - 1199 999 kr	68	39.3%
	1200 000 kr - Over 2 000 000 kr	43	24.9%
Children under 7 yo	No	85	49.1%
	1	56	32.4%
	2	30	17.3%
	3	1	0.6%
	4	1	0.6%
Gender	Male	68	39.3%
	Female	105	60.7%
Education	Elementary	5	3.0%
	Upper secondary	32	18.5%
	Technical	20	12.0%
	Up to 3 years uni or college	49	28.3%
	University or college 4 years or more	66	38.2%
Drivers license (car)	Car	160	92.5%
	no	13	7.5%
Time lived in Kongsvinger	Les than 2 years	21	12.1%
	2-5 years	25	14.5%
	5-10 years	25	14.5%
	More thhan 10 years	102	59.0%
Valid		173	100.0%
Missing		901	
Total		1074	
Subpopulation		146a	

Figure E.1: The Case Processing Summary for city center walkability multinomial regression analysis, author.

Case Processing Summary

Sociodemographic variables		N	Marginal Percentage
Walking being realistic in the summer half year	Yes	103	55.1%
	No	70	37.4%
	Not studying/working	14	7.5%
Age groups	18-24	3	1.5%
	25-34	50	25.3%
	35-44	56	28.3%
	45-54	40	20.2%
	55-66	34	17.2%
	67-74	15	7.6%
Income	Under 399 000 kr	14	7.1%
	400 000 kr - 799 999 kr	61	30.8%
	800 000 kr - 1199 999 kr	78	39.4%
	1200 000 kr - Over 2 000 000 kr	45	22.7%
Children under 7 yo	No	93	49.7%
	1	60	32.1%
	2	32	17.1%
	3	1	0.5%
	4	1	0.5%
Gender	Male	73	39.0%
	Female	114	61.0%
Education	Elementary	6	3.2%
	Upper secondary	34	18.2%
	Technical	23	12.3%
	Up to 3 years uni or college	52	27.8%
	University or college 4 years or more	71	38.0%
Drivers license (car)	Car	183	92.4%
	no	15	7.6%
Time lived in Kongsvinger	Les than 2 years	23	11.6%
	2-5 years	28	14.1%
	5-10 years	25	12.6%
	More thhan 10 years	122	61.6%
Valid		187	100.0%
Missing		887	
Total		1074	
Subpopulation		154a	

Figure E.2: The Case Processing Summary for walkability during the summer half-year multinomial regression analysis, author.

Case Processing Summary

Sociodemographic variables		N	Marginal Percentage
Walking being realistic in the winter	Yes	79	76.7%
	No	24	23.3%
Age groups	18-24	2	1.9%
	25-34	25	24.3%
	35-44	35	34.0%
	45-54	22	21.4%
	55-66	18	17.5%
	67-74	1	1.0%
Income	Under 399 000 kr	10	9.7%
	400 000 kr - 799 999 kr	28	27.2%
	800 000 kr - 1199 999 kr	39	37.9%
	1200 000 kr - Over 2 000 000 kr	26	25.2%
Children under 7 yo	No	43	41.7%
	1	38	36.9%
	2	20	19.4%
	3	1	1.0%
	4	1	1.0%
Gender	Male	32	31.1%
	Female	71	68.9%
Education	Elementary	4	3.9%
	Upper secondary	15	14.6%
	Technical	11	10.7%
	Up to 3 years uni or college	28	27.2%
	University or college 4 years or more	45	43.7%
Drivers license (car)	Car	90	87.4%
	no	13	12.6%
Time lived in Kongsvinger	Les than 2 years	13	12.6%
	2-5 years	14	13.6%
	5-10 years	14	13.6%
	More thhan 10 years	62	60.2%
Valid		103	100.0%
Missing		971	
Total		1074	
Subpopulation		90a	

Figure E.3: The Case Processing Summary for walkability during the winter half-year multinomial regression analysis, author.

Parameter Estimates

neighborhood walkability range[a]		B	Std. Error	Wald	df	Sig.	Exp(B)	95% Confidence Interval for Exp(B) Lower Bound	Upper Bound
0	Intercept	29.530	3007.854	0.000	1	0.992			
	[Age_groups=2.00]	36.093	6922.552	0.000	1	0.996	########	0.000	.[b]
	[Age_groups=3.00]	45.993	209.978	0.048	1	0.827	#########	########	#########
	[Age_groups=4.00]	1.121	114.827	0.000	1	0.992	3.069	5.569E-98	#########
	[Age_groups=5.00]	9.442	93.112	0.010	1	0.919	12603.885	6.969E-76	#########
	[Age_groups=6.00]	22.765	391.241	0.003	1	0.954	########	0.000	.[b]
	[Age_groups=7.00]	0[c]			0				
	[Income=1.00]	-45.791	317.781	0.021	1	0.885	1.298E-20	########	#########
	[Income=2.00]	7.828	210.947	0.001	1	0.970	2508.670	########	#########
	[Income=3.00]	6.519	210.945	0.001	1	0.975	677.952	########	#########
	[Income=4.00]	0[c]			0				
	[Children under 7=.00]	-8.171	67.246	0.015	1	0.903	0.000	1.629E-61	#########
	[Children under 7=1.00]	0[c]			0				
	[Gender=1.00]	-14.682	92.631	0.025	1	0.874	4.204E-07	5.967E-86	#########
	[Gender=2.00]	0[c]			0				
	[Education=1.00]	-26.685	7487.362	0.000	1	0.997	2.577E-12	0.000	.[b]
	[Education=2.00]	-10.042	2935.840	0.000	1	0.997	4.355E-05	0.000	.[b]
	[Education=3.00]	25.407	2944.458	0.000	1	0.993	########	0.000	.[b]
	[Education=4.00]	-20.809	2934.769	0.000	1	0.994	9.179E-10	0.000	.[b]
	[Education=5.00]	-8.651	2932.410	0.000	1	0.998	0.000	0.000	.[b]
	[Education=6.00]	0[c]			0				
	[Drivers_lic=1.00]	-4.642	622.476	0.000	1	0.994	0.010	0.000	.[b]
	[Drivers_lic=3.00]	0[c]			0				
	[Time lived in Kongsvinger=.00]	54.536	277.009	0.039	1	0.844	#########	########	#########
	[Time lived in Kongsvinger=1.00]	-11.167	526.720	0.000	1	0.983	1.413E-05	0.000	.[b]
	[Time lived in Kongsvinger=2.00]	0.393	101.331	0.000	1	0.997	1.481	8.272E-87	#########
	[Time lived in Kongsvinger=3.00]	-10.649	289.220	0.001	1	0.971	2.373E-05	########	#########
	[Time lived in Kongsvinger=4.00]	0[c]			0				
1	Intercept	49.568	3254.261	0.000	1	0.988			
	[Age_groups=2.00]	1.872	6936.981	0.000	1	1.000	6.500	0.000	.[b]
	[Age_groups=3.00]	36.794	188.214	0.038	1	0.845	########	########	#########
	[Age_groups=4.00]	-7.752	67.219	0.013	1	0.908	0.000	2.607E-61	#########
	[Age_groups=5.00]	-0.466	2.257	0.043	1	0.836	0.628	0.008	52.302
	[Age_groups=6.00]	12.742	380.007	0.001	1	0.973	########	0.000	.[b]
	[Age_groups=7.00]	0[c]			0				
	[Income=1.00]	-55.584	252.048	0.049	1	0.825	7.244E-25	########	#########
	[Income=2.00]	-11.938	180.750	0.004	1	0.947	6.538E-06	########	#########
	[Income=3.00]	-11.645	180.750	0.004	1	0.949	8.767E-06	########	#########
	[Income=4.00]	0[c]			0				
	[Children under 7=.00]	-7.733	67.233	0.013	1	0.908	0.000	2.588E-61	#########
	[Children under 7=1.00]	0[c]			0				
	[Gender=1.00]	-15.607	92.627	0.028	1	0.866	1.667E-07	2.385E-86	#########
	[Gender=2.00]	0[c]			0				
	[Education=1.00]	3.545	7598.892	0.000	1	1.000	34.625	0.000	.[b]
	[Education=2.00]	10.843	3211.813	0.000	1	0.997	51164.118	0.000	.[b]
	[Education=3.00]	46.736	3219.692	0.000	1	0.988	#########	0.000	.[b]
	[Education=4.00]	0.184	3210.833	0.000	1	1.000	1.203	0.000	.[b]
	[Education=5.00]	12.730	3208.678	0.000	1	0.997	########	0.000	.[b]
	[Education=6.00]	0[c]			0				

Figure E.4: The parameter estimates for neighborhood walkability multinomial regression analysis, author.

Parameter Estimates

å gå i sentrum[a]		B	Std. Error	Wald	df	Sig.	Exp(B)	95% Confidence Interval for Exp(B) Lower Bound	Upper Bound
Veldig godt	Intercept	15.501	6721.200	0.000	1	0.998			
	[Gender=1]	-1.675	1.660	1.018	1	0.313	0.187	0.007	4.848
	[Gender=2]	0[b]			0				
	[Education=1]	-8.205	3787.782	0.000	1	0.998	0.000	0.000	.[c]
	[Education=2]	5.694	3386.138	0.000	1	0.999	297.056	0.000	.[c]
	[Education=3]	19.960	3412.970	0.000	1	0.995	########	0.000	.[c]
	[Education=4]	1.285	3386.137	0.000	1	1.000	3.614	0.000	.[c]
	[Education=5]	3.806	3386.137	0.000	1	0.999	44.987	0.000	.[c]
	[Education=6]	0[b]			0				
	[Husstandsmedlemmer Under 7 år:=0]	11.336	5769.365	0.000	1	0.998	83778.620	0.000	.[c]
	[Husstandsmedlemmer Under 7 år:=1]	10.657	5769.365	0.000	1	0.999	42504.243	0.000	.[c]
	[Husstandsmedlemmer Under 7 år:=2]	8.229	5769.365	0.000	1	0.999	3746.465	0.000	.[c]
	[Husstandsmedlemmer Under 7 år:=3]	4.075	11422.214	0.000	1	1.000	58.870	0.000	.[c]
	[Husstandsmedlemmer Under 7 år:=4]	0[b]			0				
	[Driver License=1]	-12.856	705.633	0.000	1	0.985	2.610E-06	0.000	.[c]
	[Driver License=3]	0[b]			0				
	[Time lived in Kongsvinger=1]	-3.557	2.096	2.879	1	0.090	0.029	0.000	1.736
	[Time lived in Kongsvinger=2]	0.042	2.236	0.000	1	0.985	1.042	0.013	83.394
	[Time lived in Kongsvinger=3]	-0.506	2.407	0.044	1	0.833	0.603	0.005	67.397
	[Time lived in Kongsvinger=4]	0[b]			0				
	[Age_groups=2.00]	-3.581	3230.861	0.000	1	0.999	0.028	0.000	.[c]
	[Age_groups=3.00]	-10.985	959.655	0.000	1	0.991	1.695E-05	0.000	.[c]
	[Age_groups=4.00]	-10.780	959.654	0.000	1	0.991	2.081E-05	0.000	.[c]
	[Age_groups=5.00]	-14.133	959.653	0.000	1	0.988	7.278E-07	0.000	.[c]
	[Age_groups=6.00]	-12.358	959.653	0.000	1	0.990	4.297E-06	0.000	.[c]
	[Age_groups=7.00]	0[b]			0				
	[Income=1.00]	-7.603	3.428	4.919	1	0.027	0.000	6.022E-07	0.413
	[Income=2.00]	-2.600	1.768	2.164	1	0.141	0.074	0.002	2.373
	[Income=3.00]	0.097	1.765	0.003	1	0.956	1.102	0.035	35.015
	[Income=4.00]	0[b]			0				
Godt	Intercept	40.438	5784.864	0.000	1	0.994			
	[Gender=1]	-1.220	1.603	0.579	1	0.447	0.295	0.013	6.841
	[Gender=2]	0[b]			0				
	[Education=1]	5.965	2766.119	0.000	1	0.998	389.362	0.000	.[c]
	[Education=2]	-7.206	2368.753	0.000	1	0.998	0.001	0.000	.[c]
	[Education=3]	6.783	2406.954	0.000	1	0.998	882.695	0.000	.[c]
	[Education=4]	-10.563	2368.752	0.000	1	0.996	2.586E-05	0.000	.[c]
	[Education=5]	-9.201	2368.752	0.000	1	0.997	0.000	0.000	.[c]
	[Education=6]	0[b]			0				
	[Husstandsmedlemmer Under 7 år:=0]	-0.663	5237.426	0.000	1	1.000	0.515	0.000	.[c]
	[Husstandsmedlemmer Under 7 år:=1]	-2.501	5237.426	0.000	1	1.000	0.082	0.000	.[c]
	[Husstandsmedlemmer Under 7 år:=2]	-5.549	5237.426	0.000	1	0.999	0.004	0.000	.[c]
	[Husstandsmedlemmer Under 7 år:=3]	-9.343	10588.945	0.000	1	0.999	8.760E-05	0.000	.[c]

Figure E.5: The parameter estimates for city center walkability multinomial regression analysis, author.

Parameter Estimates

å gå i sentrum[a]		B	Std. Error	Wald	df	Sig.	Exp(B)	95% Confidence Interval for Exp(B) Lower Bound	Upper Bound
Veldig godt	Intercept	15.501	6721.200	0.000	1	0.998			
	[Gender=1]	-1.675	1.660	1.018	1	0.313	0.187	0.007	4.848
	[Gender=2]	0[b]			0				
	[Education=1]	-8.205	3787.782	0.000	1	0.998	0.000	0.000	.[c]
	[Education=2]	5.694	3386.138	0.000	1	0.999	297.056	0.000	.[c]
	[Education=3]	19.960	3412.970	0.000	1	0.995	########	0.000	.[c]
	[Education=4]	1.285	3386.137	0.000	1	1.000	3.614	0.000	.[c]
	[Education=5]	3.806	3386.137	0.000	1	0.999	44.987	0.000	.[c]
	[Education=6]	0[b]			0				
	[Husstandsmedlemmer Under 7 år:=0]	11.336	5769.365	0.000	1	0.998	83778.620	0.000	.[c]
	[Husstandsmedlemmer Under 7 år:=1]	10.657	5769.365	0.000	1	0.999	42504.243	0.000	.[c]
	[Husstandsmedlemmer Under 7 år:=2]	8.229	5769.365	0.000	1	0.999	3746.465	0.000	.[c]
	[Husstandsmedlemmer Under 7 år:=3]	4.075	11422.214	0.000	1	1.000	58.870	0.000	.[c]
	[Husstandsmedlemmer Under 7 år:=4]	0[b]			0				
	[Driver License=1]	-12.856	705.633	0.000	1	0.985	2.610E-06	0.000	.[c]
	[Driver License=3]	0[b]			0				
	[Time lived in Kongsvinger=1]	-3.557	2.096	2.879	1	0.090	0.029	0.000	1.736
	[Time lived in Kongsvinger=2]	0.042	2.236	0.000	1	0.985	1.042	0.013	83.394
	[Time lived in Kongsvinger=3]	-0.506	2.407	0.044	1	0.833	0.603	0.005	67.397
	[Time lived in Kongsvinger=4]	0[b]			0				
	[Age_groups=2.00]	-3.581	3230.861	0.000	1	0.999	0.028	0.000	.[c]
	[Age_groups=3.00]	-10.985	959.655	0.000	1	0.991	1.695E-05	0.000	.[c]
	[Age_groups=4.00]	-10.780	959.654	0.000	1	0.991	2.081E-05	0.000	.[c]
	[Age_groups=5.00]	-14.133	959.653	0.000	1	0.988	7.278E-07	0.000	.[c]
	[Age_groups=6.00]	-12.358	959.653	0.000	1	0.990	4.297E-06	0.000	.[c]
	[Age_groups=7.00]	0[b]			0				
	[Income=1.00]	-7.603	3.428	4.919	1	0.027	0.000	6.022E-07	0.413
	[Income=2.00]	-2.600	1.768	2.164	1	0.141	0.074	0.002	2.373
	[Income=3.00]	0.097	1.765	0.003	1	0.956	1.102	0.035	35.015
	[Income=4.00]	0[b]			0				
Godt	Intercept	40.438	5784.864	0.000	1	0.994			
	[Gender=1]	-1.220	1.603	0.579	1	0.447	0.295	0.013	6.841
	[Gender=2]	0[b]			0				
	[Education=1]	5.965	2766.119	0.000	1	0.998	389.362	0.000	.[c]
	[Education=2]	-7.206	2368.753	0.000	1	0.998	0.001	0.000	.[c]
	[Education=3]	6.783	2406.954	0.000	1	0.998	882.695	0.000	.[c]
	[Education=4]	-10.563	2368.752	0.000	1	0.996	2.586E-05	0.000	.[c]
	[Education=5]	-9.201	2368.752	0.000	1	0.997	0.000	0.000	.[c]
	[Education=6]	0[b]			0				
	[Husstandsmedlemmer Under 7 år:=0]	-0.663	5237.426	0.000	1	1.000	0.515	0.000	.[c]
	[Husstandsmedlemmer Under 7 år:=1]	-2.501	5237.426	0.000	1	1.000	0.082	0.000	.[c]
	[Husstandsmedlemmer Under 7 år:=2]	-5.549	5237.426	0.000	1	0.999	0.004	0.000	.[c]
	[Husstandsmedlemmer Under 7 år:=3]	-9.343	10588.945	0.000	1	0.999	8.760E-05	0.000	.[c]

Figure E.6: The parameter estimates for walkability during the summer half-year multinomial regression analysis, author.

Parameter Estimates

RGH vinterhalvåret ?[a]		B	Std. Error	Wald	df	Sig.	Exp(B)	95% Confidence Interval for Exp(B) Lower Bound	Upper Bound
Ja	Intercept	36.469	1510.608	0.001	1	0.981			
	[Gender=1]	0.917	0.986	0.865	1	0.352	2.501	0.362	17.263
	[Gender=2]	0[b]			0				
	[Education=1]	-15.275	1510.608	0.000	1	0.992	2.323E-07	0.000	.[c]
	[Education=2]	1.120	1.381	0.657	1	0.417	3.065	0.204	45.931
	[Education=3]	0.431	1.310	0.108	1	0.742	1.539	0.118	20.070
	[Education=4]	-0.039	0.885	0.002	1	0.965	0.962	0.170	5.447
	[Education=5]	0[b]			0				
	[Husstandsmedlemmer Under 7 år:=0]	-0.971	1.043	0.866	1	0.352	0.379	0.049	2.927
	[Husstandsmedlemmer Under 7 år:=1]	-0.378	0.943	0.161	1	0.688	0.685	0.108	4.346
	[Husstandsmedlemmer Under 7 år:=2]	-0.307	0.000		1		0.736	0.736	0.736
	[Husstandsmedlemmer Under 7 år:=3]	-21.717	0.000		1		3.703E-10	3.703E-10	3.703E-10
	[Husstandsmedlemmer Under 7 år:=4]	0[b]			0				
	[Driver License=1]	-17.892	1510.607	0.000	1	0.991	1.697E-08	0.000	.[c]
	[Driver License=3]	0[b]			0				
	[Time lived in Kongsvinger=1]	0.463	1.098	0.178	1	0.673	1.588	0.185	13.666
	[Time lived in Kongsvinger=2]	-1.851	1.053	3.088	1	0.079	0.157	0.020	1.238
	[Time lived in Kongsvinger=3]	-0.582	0.984	0.350	1	0.554	0.559	0.081	3.846
	[Time lived in Kongsvinger=4]	0[b]			0				
	[Age_groups=2.00]	-18.360	2.219	68.429	1	0.000	1.063E-08	1.372E-10	8.235E-07
	[Age_groups=3.00]	-17.045	1.361	156.931	1	0.000	3.956E-08	2.748E-09	5.694E-07
	[Age_groups=4.00]	-16.535	1.377	144.200	1	0.000	6.594E-08	4.437E-09	9.799E-07
	[Age_groups=5.00]	14.281	2310.232	0.000	1	0.995	########	0.000	.[c]
	[Age_groups=6.00]	-14.977	0.000		1		3.130E-07	3.130E-07	3.130E-07
	[Age_groups=7.00]	0[b]			0				
	[Income=1.00]	-2.822	1.839	2.355	1	0.125	0.059	0.002	2.186
	[Income=2.00]	-1.680	1.113	2.276	1	0.131	0.186	0.021	1.653
	[Income=3.00]	-0.105	1.025	0.010	1	0.919	0.901	0.121	6.712
	[Income=4.00]	0[b]			0				

a. The reference category is: Nei.
b. This parameter is set to zero because it is redundant.
c. Floating point overflow occurred while computing this statistic. Its value is therefore set to system missing.

Figure E.7: The parameter estimates for walkability during the winter half-year multinomial regression analysis, author.

Appendix F

WALKMORE Survey GIS Analysis Maps

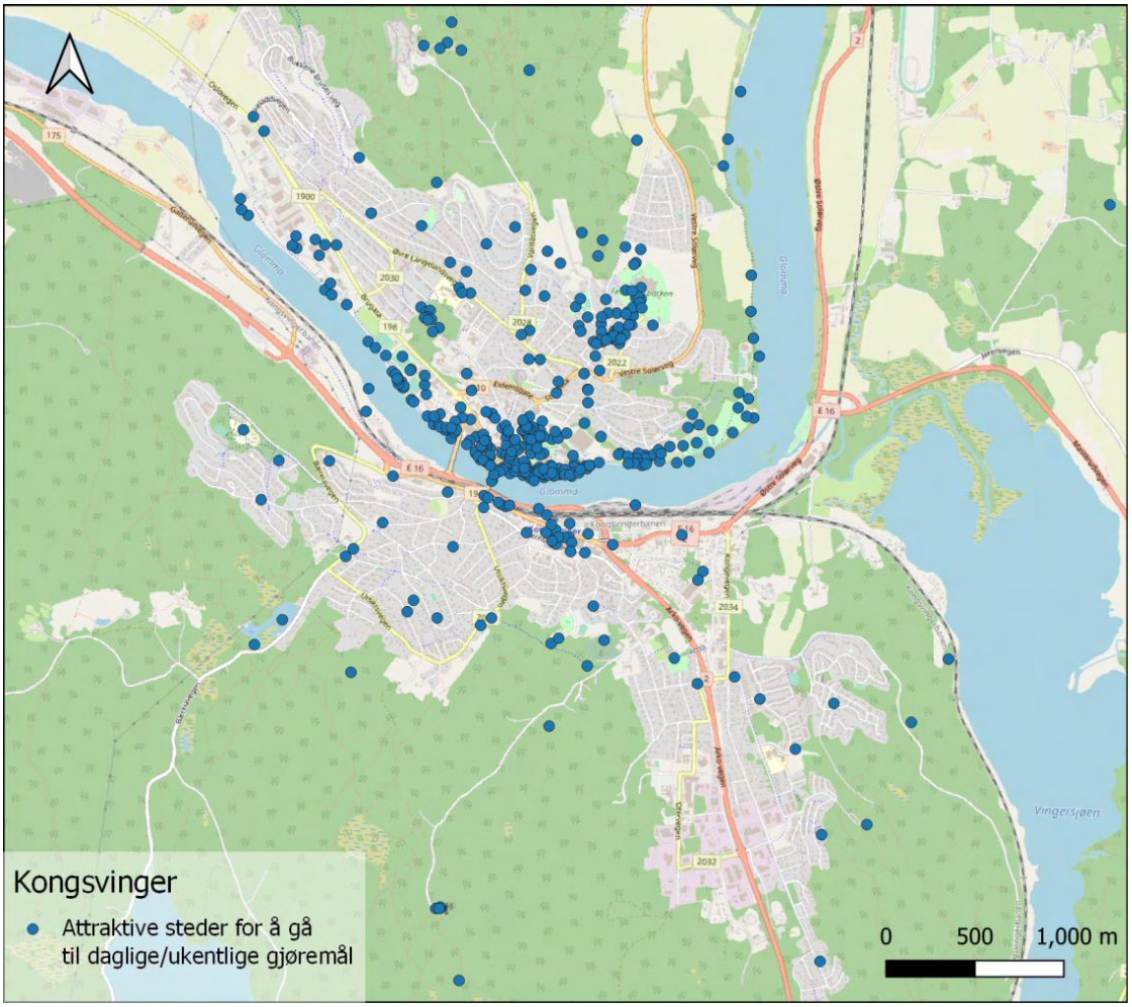


Figure F.1: The map points from the WALMORE survey showing the places that are attractive for people to walk for everyday purposes, [89].

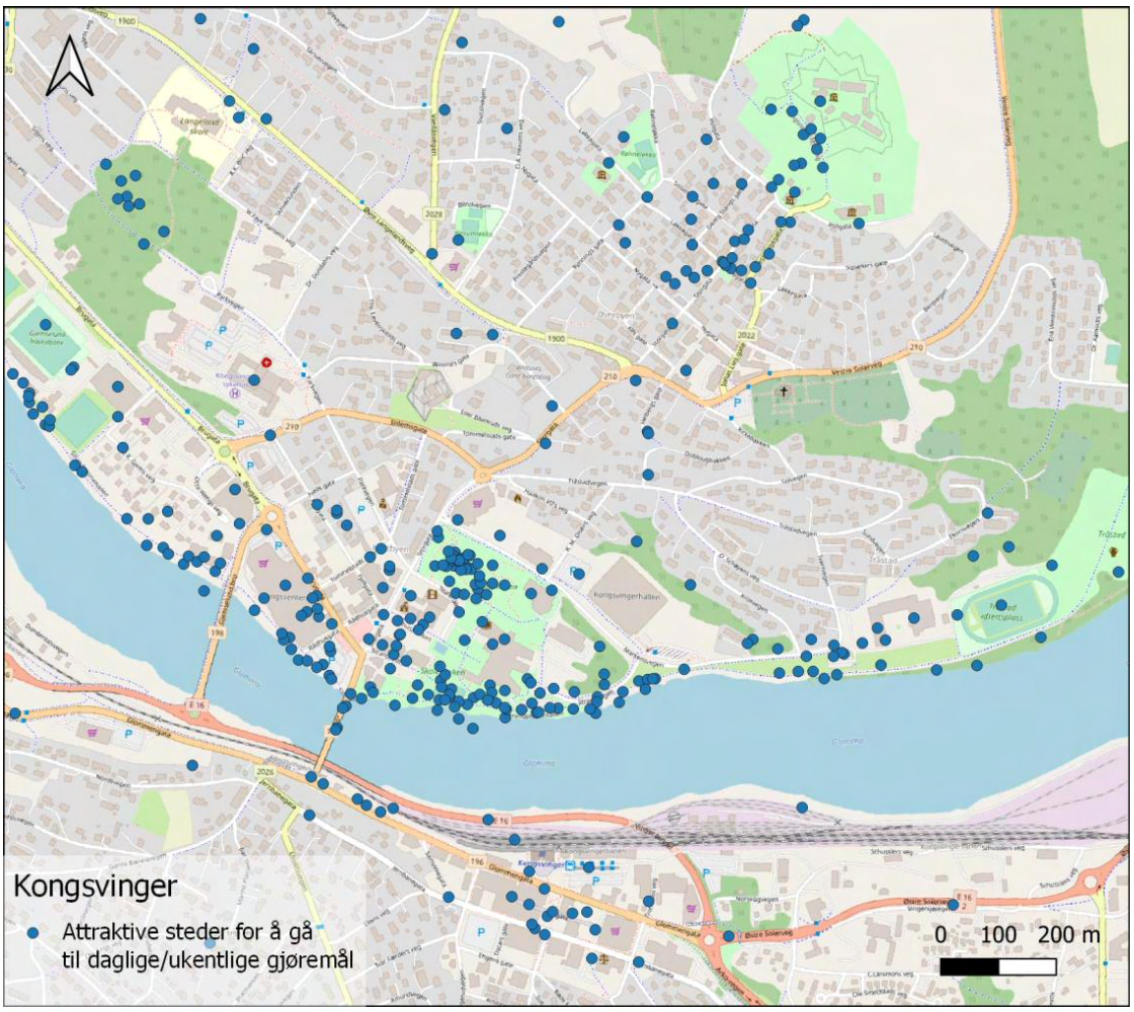


Figure F.2: The map points from the WALMORE survey showing a focused area of the city center with the places that are attractive for people to walk for everyday purposes, [89].

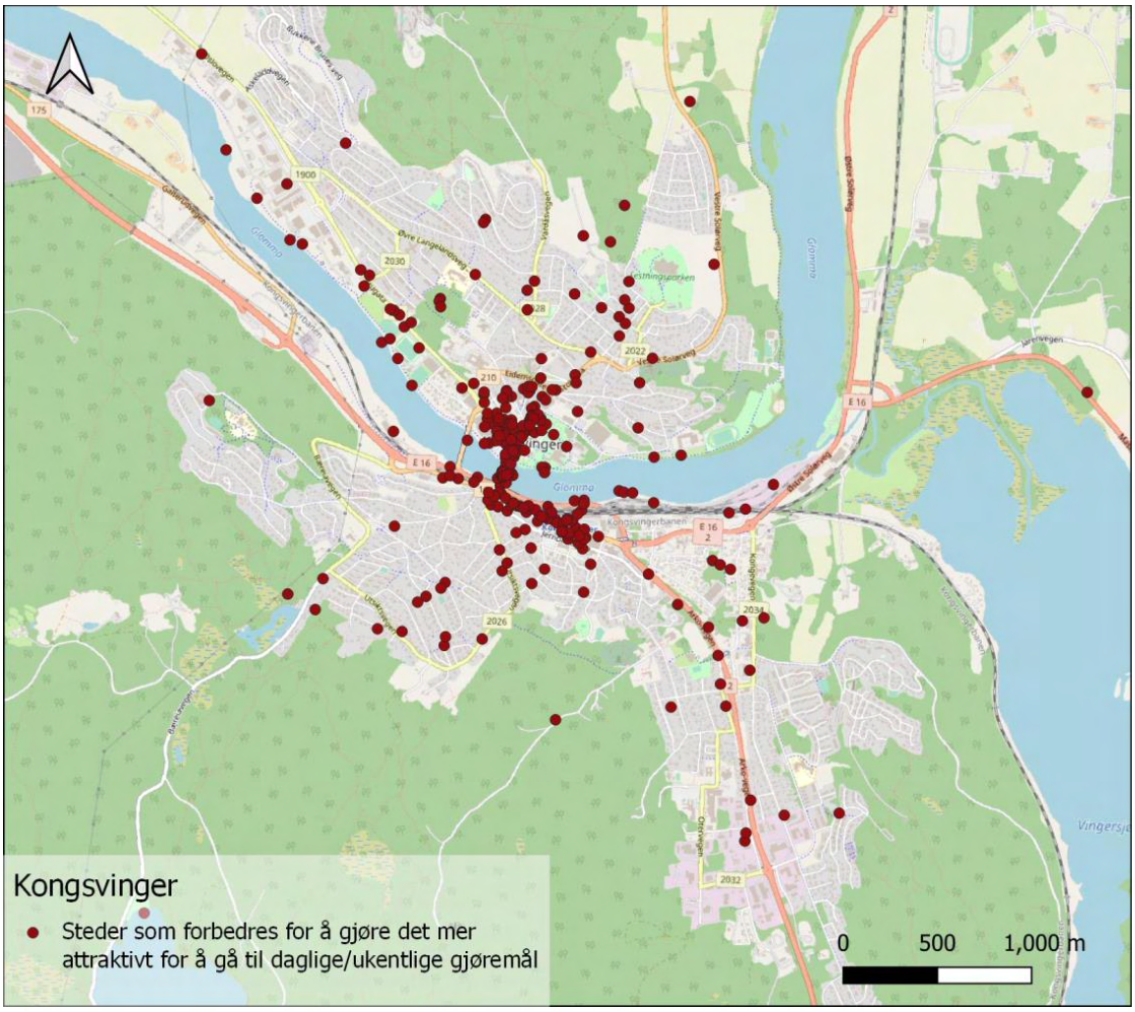


Figure F.3: The map points from the WALMORE survey showing the places that people think could have improvements to make walking more attractive, [89].

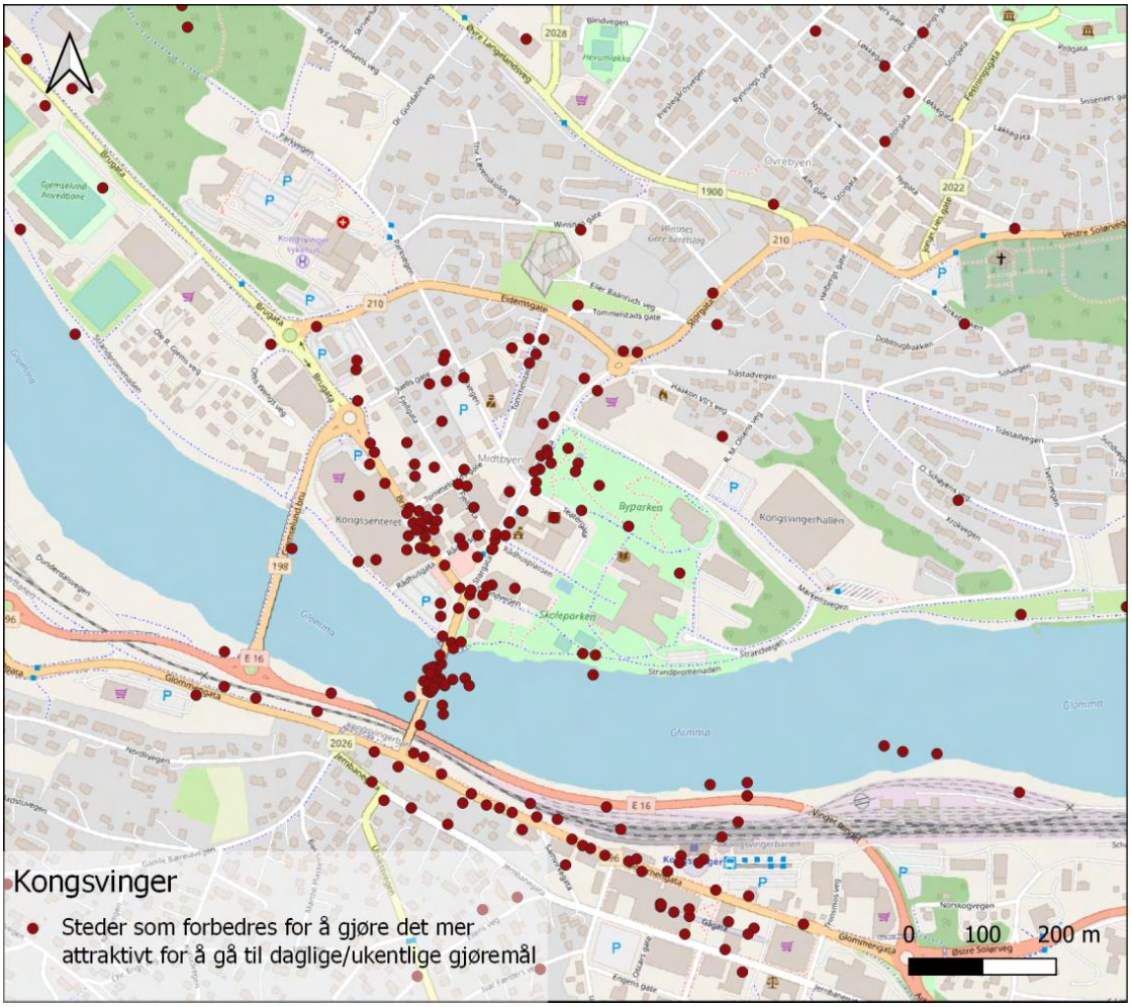
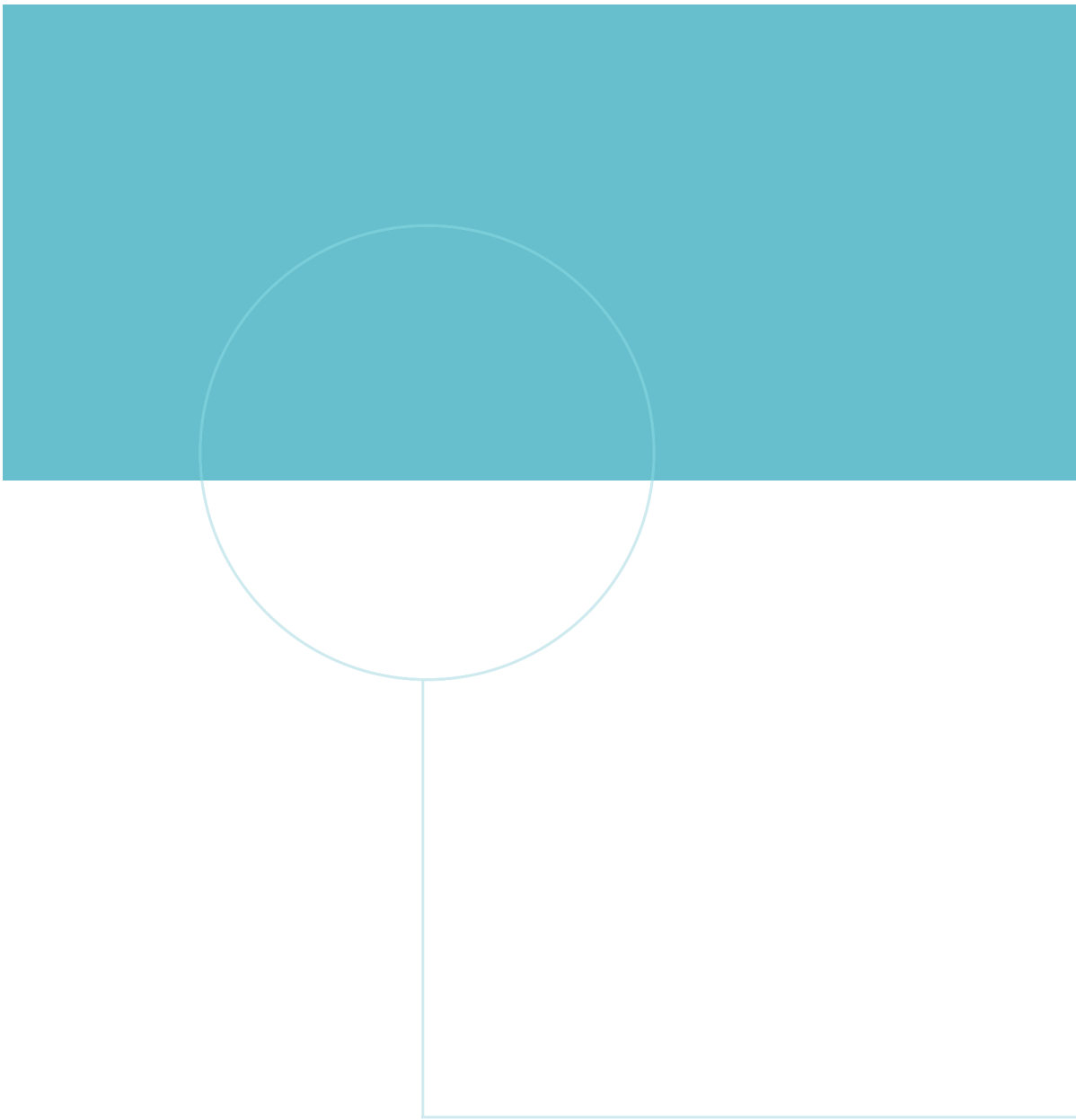


Figure F.4: The map points from the WALMORE survey showing the a focused area of the city center that people think could have improvements to make walking more attractive, [89].



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