



Faculty of Humanities, Social Sciences and Education

Bike – Train Integration

The Role of Bicycle Parking in Promoting Sustainable Transportation along Norway's Jæren Line

Christoph Beidenhauser

Master's thesis in Nordic Urban Planning Studies SPL-3901-1, June 2024



Photo by the author

Abstract

Norway has set itself ambitious goals for the green transitioning of its transport. Intermodal mobility, meaning the integration of two or more green modes of transportation to use the advantages of each mode, has been put forward as a theoretical competitor to undesirable car transportation. The process of integration requires infrastructures to accommodate commuters' needs and make sustainable traveling attractive with the ultimate goal of reducing car traffic. One such infrastructure is bicycle parking.

This qualitative research project examines how bicycle parking as can function as a measure to increase intermodal commuting along the Jæren Line in South-West Norway. By employing a combined analytical framework, approaching cycling as a social practice, bicycle parking as designed objects and its facilitation as a collaborative process, the relationship between bicycle parking and cycling practice are explored. For this, a broad set of qualitative data is obtained through processes of mapping, auto-ethnographic fieldwork and conducting expert interviews with informants at relevant organisations. Subsequent analysis revealed how existing designed bicycle parking infrastructures, particularly in the context of bicycle theft, impact local cycling practices of intermodal commuters. Overall, this supports the notion that secure and convenient bicycle parking is an important measure to facilitate for more cycling, that should not come as an afterthought. However, findings also reinforce the understanding that shifting commuting behaviours is a complex endeavour and that wide range of other infrastructure, communication, incentive and regulative measures are also of importance for making intermodal transportation a viable option for commuters.

Acknowledgements

Først og fremst vil jeg takke alle informantene som viste interesse for prosjektet, deltok i intervjuene og bidro med innsikt i dokkers arbeid. Takk til alle medstudentene som gjorde denne masteren så fantastisk som den var. Til slutt vil jeg takke veilederen Arild Buanes.

Ein großer Dank an meine Eltern und Brüder daheim, auf deren Unterstützung ich für meine Abenteuer im hohen Norden zu jeder Zeit zählen kann und konnte.

Finally, I am happy to mention you in an acknowledgement: Thank you, Marine, for support and companionship during this semester.

Table of Contents

<u>ABSTRACT</u>	<u>I</u>
<u>ACKNOWLEDGEMENTS</u>	<u>II</u>
<u>1. INTRODUCTION.....</u>	<u>1</u>
1.1 CYCLING, INTERMODALITY AND BICYCLE PARKING	1
1.2 CYCLING AND BICYCLE PARKING ALONG THE JÆREN LINE.....	3
1.2 PROBLEM DESCRIPTION AND RESEARCH QUESTION	5
1.3 LOCAL TRANSPORTATION AND PLANNING CONTEXTS.....	8
1.3.1 PUBLIC TRANSPORTATION AND CYCLING IN SOUTH-ROGALAND TODAY	8
1.3.2 RELEVANT ACTORS FOR THE FACILITATION OF BICYCLE PARKING	10
1.3.3 POLICY AND MEASURES	11
<u>2. ANALYTICAL FRAMEWORK.....</u>	<u>13</u>
2.1 MOBILITIES AND SOCIAL PRACTICE THEORY.....	13
2.2 CYCLING CULTURE	17
2.3 MOBILITY DESIGN APPROACH TO BICYCLE PARKING	19
2.4 COLLABORATIVE-ORGANISATIONAL APPROACH TO BICYCLE PARKING	20
<u>3. BICYCLE PARKING AND INTERMODAL TRAVEL IN EMPIRICAL RESEARCH</u>	<u>22</u>
3.1 BUILT FORMS OF BICYCLE PARKING FACILITIES	22
3.2 BIKE-TRAIN INTERMODALITY AND BICYCLE PARKING	25
3.3 BICYCLE PARKING ATTRACTIVITY AND USAGE IN RESEARCH	28
3.3.1 SECURITY AND PROTECTION	28
3.3.2 CONNECTIVITY & PROXIMITY	29
3.3.3 MEETING USER NEEDS.....	30
3.3.4 TRIP CONTEXTS AND DEMOGRAPHICS	30
3.4 MODEL OF FACTORS FOR ATTRACTIVE BICYCLE PARKING AT STATIONS.....	32
<u>4. METHODOLOGY & RESEARCH DESIGN</u>	<u>35</u>

4.1	OVERALL RESEARCH DESIGN	35
4.2	MAPPING OF CASE AREAS.....	37
4.3	AUTO-ETHNOGRAPHY AND MOBILITY	39
4.3.1	PARTICIPANT OBSERVATIONS	40
4.3.2	IN-SITU ETHNOGRAPHIC INTERVIEWS	41
4.3.3	ANALYSIS	41
4.4	EXPERT INTERVIEWS.....	42
4.5	ETHICAL CONSIDERATION.....	43
5.	<u>RESULTS AND ANALYSIS.....</u>	<u>45</u>
5.1	QUALITATIVE MAPPING OF BICYCLE PARKING AT SELECTED STATIONS	45
5.1.1	STAVANGER S.....	45
5.1.2	GAUSEL.....	47
5.1.3	BRYNE.....	49
5.1.4	SUMMARY.....	51
5.2	AUTO-ETHNOGRAPHIC FIELDWORK	51
5.2.1	MATERIALS	52
5.2.2	MEANINGS	58
5.2.3	COMPETENCES	59
5.2.4	CYCLING PRACTICES IN NORTH JÆREN & BICYCLE PARKING IN CASE AREAS	60
5.3	EXPERT INTERVIEWS.....	61
5.3.1	BICYCLE PARKING AS A MEASURE AND CHANGING COMMUTING BEHAVIOUR.....	62
5.3.2	BICYCLE PARKING AND -HOTEL DESIGN.....	64
5.3.3	ORGANISATIONAL FOCI, OVERLAPS, AND GAPS.....	65
6.	<u>FINAL DISCUSSION AND CONCLUSION.....</u>	<u>69</u>
6.1	SUMMARY OF FINDINGS.....	69
6.2	INFORMING CURRENT AND FUTURE PRACTICE.....	71
6.3	BICYCLE PARKING AS A MEASURE.....	73
6.4	CONCLUDING REMARKS.....	74
	<u>REFERENCES.....</u>	<u>76</u>
	BIBLIOGRAPHY.....	76

IMAGES AND PHOTOS	85
DATASETS & MAPS	86

APPENDICES.....87

APPENDIX A.: COMMONLY FOUND BICYCLE RACK TYPES AT STATIONS ALONG THE JÆREN LINE.....	87
APPENDIX B. MAPPING GUIDE	90
APPENDIX C. THEMATIC GUIDE FOR EXPERT INTERVIEWS.....	92
APPENDIX D. STATION PROFILES FROM FIELD WORK.....	93

List of Figures & Tables

Figure 1 Research Questions.....	7
Figure 2 Main Actors within Public Mobility & Bicycle Parking in Rogaland.....	11
Figure 3 Constitutive Elements of a Social Practice and their Interrelations after Shove et al. 2012.....	16
Figure 4 Bicycle Parking in Public Spaces, Synthesised Typology, based on: Pucher & Buehler 2012; Czowalla et al. 2017; Herheim 2020.....	24
Figure 5 Image Gallery of Different Bicycle Locks; from left to right: O-Lock by Karthik M., Chain Lock by Danil Polshin, U-Lock by sofi. Full accreditations in the bibliography.....	25
Figure 6 Segmentation of the Bike-Train Concept (Kager et al. 2016).....	27
Figure 7 Important factors for the attractiveness of bicycle parking and the bike-train building on Kager et al.	34
Figure 8 Table: Bicycle hotels along the Jærbanen, Bicycle parking spots, and average occupancy (Parking subscriptions/parking spots). Based on numbers by Bane NOR (Bane NOR 2022).....	37
Figure 9 Image gallery over the use of bicycle helmets. Left: Bicycle helmet loosely attached to the handle. Right: Helmet stored in the bicycle's basket.....	53
Figure 10 Image gallery on two-tier bicycle Parking. Top-left: Bicycle tires too wide for the railing. Top-right: Bicycle parked from the opposing side. Bottom-left: Scarcely used upper tier. Bottom-right: Inadequate locking possibilities for parked bicycles.	55
Figure 11 Image gallery of public bicycle racks. Top-left: Parked bicycle with stroller attached. Top-right: Bicycles exclusively parked under roof. Bottom-left: Bicycles parked both forwards and backwards. Bottom-right: Bicycle parked outside of rack.	57

Figure 12 Image gallery of adaptive behaviour. Use of caps and plastic bags to protect saddles from rain	60
Figure 13 Informant Codes for Expert Interviews	61

List of Maps

Map 1 (Left) Bicycle Hotels along the Jæren Line	4
Map 2 (Right) Population Density along the Jæren Line, based 250m grid-level data from 2023.	4
Map 3 Stavanger S, overview map.....	46
Map 4 Gausel station, overview map	48
Map 5 Bryne station, overview map	50

Sources of images, photos and datasets used for the creation of maps and other illustrative purposes not produced by the author are accredited in the bibliography.

1. Introduction

Every bicycle trip starts and ends with a parked bicycle. Be it at the train station, work, grocery store, for most of the day most bicycles, even of those who cycle daily, are parked in garages, basements, public bicycle racks, or in other forms of bicycle parking (Heinen & Buehler 2019). For many cities with high cycling numbers, such as Copenhagen or Amsterdam, bicycle parking has come as an afterthought, as parked and abandoned bicycles start obstructing entrances to shops, buildings and transport hubs (Larsen 2017a). Many other places, however, where cycling is not a dominant part of daily commuting behaviour, bicycle parking is also evaluated as a measure to increase cycling numbers and encourage the use of sustainable forms of transportation, as research suggests a general correlation between the availability of bicycle parking and cycling numbers (Heinen & Buehler 2019). Subsequently, new and innovative forms of bicycle parking have been trialled and implemented.

In the following, the Norwegian *sykkelhotell* (hereafter bicycle hotel) is introduced as one such innovative bicycle parking solution and contextualised with current Norwegian climate and transportation policy. Then, to open a local perspective, the implementation of bicycle hotels is described in light of the Jæren-line's role for the transportation system in South-Rogaland. Lastly, current problems surrounding the bicycle hotels and gaps in international bicycle parking research are explored, which guide the formulation of the thesis' research question.

1.1 Cycling, Intermodality and Bicycle Parking

There are many reasons for why cycling is desirable. In 2022 this has been internationally recognised with the UN resolution 'Integration of the bicycle into public transportation systems for sustainable development', "acknowledging the uniqueness, longevity and versatility of the bicycle, which has been in use for two centuries, and that it is a simple, affordable, reliable, clean and environmentally fit sustainable means of transportation, fostering environmental stewardship and health [...]" (United Nations 2022, 1 f.). This international praise has a strong footing in contemporary research, arguing for cycling's public health benefits (Garrard et al. 2012) and environmental and climate benefits (Massink et al. 2011). Norwegian policy makers have recognised the benefits of the bicycle and cycling as well, and consequently endorsed increased cycling as a policy objective for reducing climate gas emissions, traffic congestion,

environmental pollution and increasing public health. In detail, the Norwegian government has set itself modal-share objectives for cycling, of increasing modal-shares for cycling nation-wide to 8% and to 20% in metropolitan areas with the introduction of the ‘National Cycling Strategy’ in 2014 (SFD 2013). Another important cornerstone in the Norway’s transport policy is the *nullvekstmål* (hereafter zero-growth objective). Initially defined as the “absorbing [of] the growth of passenger transport in major urban areas through public transportation, bicycling, and walking.” (Klima- og miljødepartementet 2012,9), it has far-reaching implications for spatial and transportation planning and development and emphasises the importance of sustainable transport modes.

The Norwegian national cycling and zero-growth objective are complex and extensive policy goals, requiring sweeping measures for reaching them. The idea of intermodality has often been forwarded as one possible way of out-competing car usage. Intermodality, as defined by the European Commission in 1997, “[.] is a characteristic of a transport system that allows at least two different modes to be used in an integrated manner in a door-to-door transport chain. In addition, intermodal transport is a quality factor of the level of integration between different transport modes. In that respect more intermodality means more integration and complementarity between modes, which provides scope for a more efficient use of the transport system” (European Commission 1997,1). Intermodal personal transportation systems that combine the benefits of cycling, walking and public transportation in a seamless fashion have been hailed as “the pinnacle of green transportation” (Cheng & Liu 2012, 1691). In turn there is a wide set of measures to integrate cycling with public transportation. Bicycle parking is a crucial component of making the bike-train transportation attractive, as “[m]ost research finds a positive relationship between bicycle parking supply and public transport ridership cycling levels, or the stated likelihood to cycle to access public transport” (Buehler et al. 2021, n.d.; see also: Heinen & Buehler 2019; Ravensbergen et al. 2018; Van der Spek & Scheltema 2015)

Before the background Norwegian transportation policy, Bane NOR, the Norwegian government agency responsible for the maintenance and development of railway infrastructure, describes the organisation’s understanding of its role in the following:

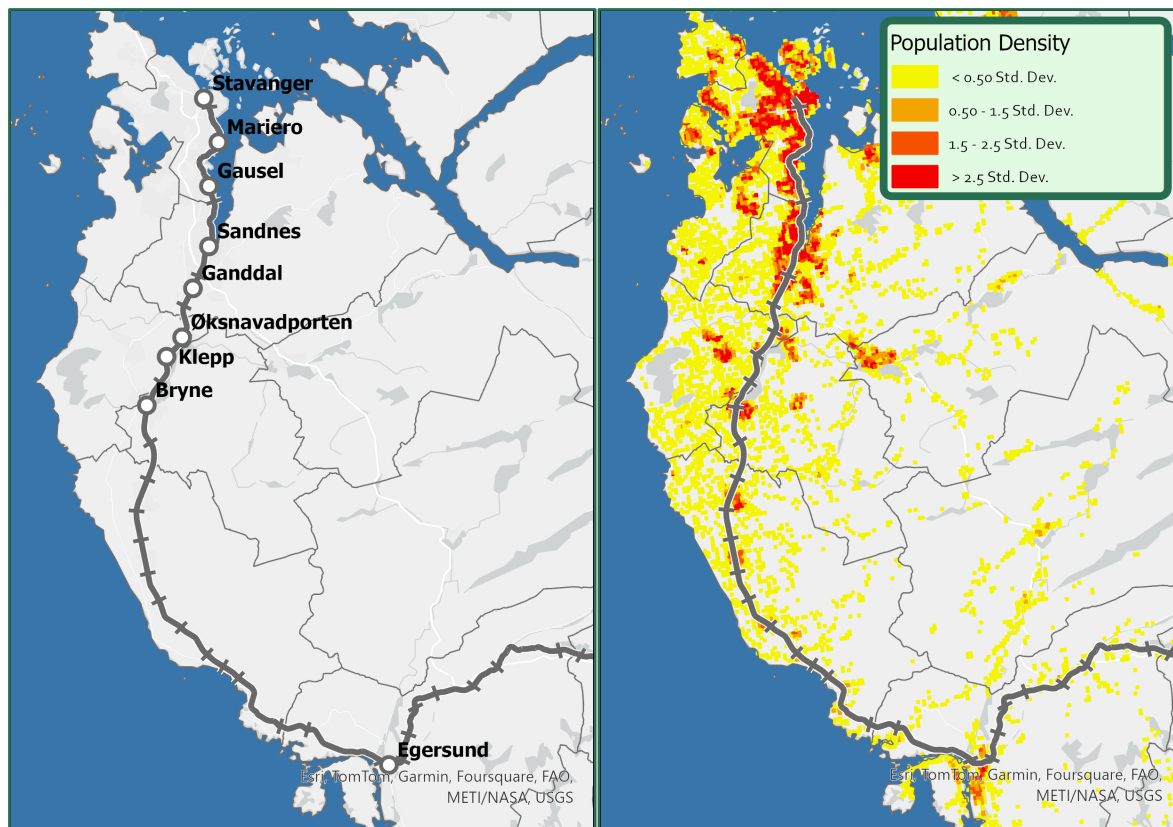
To reach the goals on limiting the number of cars in urban areas it is important to facilitate for changed travel habits including walking, cycling and public transportation.

Bane NOR facilitates attractive mobility hubs at stations, so that the train can be a competitive and attractive mode of transportation (Fjellstad & Hallås 2020, n.d.; author's translation).

As part of this policy, Bane NOR set out to improve bicycle parking infrastructure at its stations. For this, it settled for the bicycle hotel, as their flagship solution for bicycle parking. Bicycle hotels offer ideally bicycle parking that is protected from theft, vandalism, and meteorological conditions. Bane NOR built and currently operates bicycle hotels at 39 of its stations with parking spots for in total 3500 bicycles. In terms of design, a bicycle hotel should provide a roofed contingent of bicycle racks, that are protected by video surveillance and a code-locked door which can be opened after the purchase of a subscription via a smartphone app. It is important to note, however, that there are no set standards for the design of bicycle hotels (Røhl et al. 2018).

1.2 Cycling and Bicycle Parking along the Jæren Line

With its length of about 75 km, the Jæren line (nor. *Jærbanen*) passes through seven municipalities in which its 19 stations are located. The Jæren line is one of the structuring elements of Nord-Jæren and Jæren, stretching from Stavanger via Sandnes and small townships to Egersund (see Map 1). This also points to the role of the Jæren line as an intraregional transport mode. Further, it is part of the railway link between Oslo and Stavanger via Kristiansand, the Sørlandet line. The eight northernmost stations are all within Stavanger's and Sandnes' respective municipal borders, thus placing them within the region of North-Jæren and Norway's third largest metropolitan area (see Map 2). Although public transportation, when compared to the metropolitan areas of Trondheim and Bergen, plays a smaller role in North-Jæren's transport patterns (Bjørnará et al. 2023), the Jæren Line is one of Norway's busiest railways. Operated by the Scandinavian branch of the British company Go-Ahead, just over 5 million passengers were transported on the Jæren line in 2023 (Tog24 2024). A significant annual increase compared to 2013's passenger volume of about 3,4 million (Rogaland fylkeskommune 2021).



Map 1 (Left) Bicycle Hotels along the Jæren Line

Map 2 (Right) Population Density along the Jæren Line, based 250m grid-level data from 2023.

In addition to population size and density, North-Jæren also differs in terms of traffic behaviour from the remaining district of South-Jæren and the district of Dalene. While the latter two districts can be described as widely car dependent, North-Jæren has comparatively high usage of sustainable transportation modes with a modal share of 7% for cycling, 21% for walking, and 9% for public transportation and only a modal share of 51% for driving, compared to 66% in Dalene (Rogaland flykeskommune 2021). A recently published study on commuting in the region finds that North-Jæren has the potential of quadrupling the amount of every-day cycling to 35% modal share. However, it is also pointed out that the actual development of cycling numbers so far has been below the growth-rate of 4,4% necessary to achieve local objectives of 14% cycling modal share by 2032 (Pritchard & Lovelace 2022). While growth of cycling numbers is relatively slow, cycling as a practice appears to be changing, as a recently conducted study on travel behaviour and attitudes finds a substantial uptake in e-bike usage for work commutes from 2018 to 2022 (Bjørnå et al. 2023), indicating the increased relevance of e-bicycles for cyclists.

In short, both the Jæren Line and cycling can be identified as two important components of the South-Rogaland's transportation system. Particularly cycling has a sizable potential to become a dominating part of mobility structure. Bane NOR has taken steps to facilitate the integration of bicycle and rail transportation by providing ample bicycle parking, also in the form of bicycle hotels, and exploring opportunities for new green transportation solutions (Fjelstad & Halllås 2020). Today there are nine bicycle hotels at stations along the Jæren Line.

1.2 Problem Description and Research Question

This short introduction already lays out how bicycle parking at stations relates to far reaching political ambitions in transport policy. As shown by the example of the Jæren Line, in recent years, many municipalities and public transportation providers in Norway have lent their support for the construction of some of Bane NOR's bicycle hotels. However, the enthusiasm about bicycle hotels has ebbed off, as reports of cost inefficiency and bicycle theft from supposedly secure hotels mount, and many of the newly built hotels remain scarcely used and with few sold subscriptions (Bane NOR 2022; Røhl et al 2018). Bicycle hotels at stations along the Jæren Line, as well, exhibit large differences in occupancy indicated by the subscriptions sold in relation to available parking spots. In 2022, Gausel, Sandes and Klepp station were all among the least used bicycle hotels in Bane NOR's entire portfolio (Bane NOR 2022), while internal numbers from Bane NOR in 2023 indicate, that bicycle hotels in Stavanger, Egersund, and Bryne have high occupancy rates. This, of course, begs the question for the reasons why bicycle hotels have not to this day become a success in terms of attracting users. Interestingly, the troubles bicycle hotel are encountering also coincide with the fact that, despite a joint effort of municipalities, counties, public institutions, state and other actors, national progress towards reaching national cycling objectives has been stagnant since their introduction in 2014 (Opedal et al. 2022).

Previous research has also suggested inadequate parking and threat of bicycle theft have been argued to stand in the way of popularising cycling (Larsen 2017a). This is also reflected in an older survey published in 2014, that finds that the one important reason why stations do not attract more cyclists, because of the lack of safe bicycle parking, with 23 % of respondents maintain that they would cycle more if there was safer bicycle parking (Christiansen & Usterud Hanssen 2014). And indeed, in Norway bicycle theft is rampant. From 2016-19 bicycle theft

rose by 21% in 2021 to 17 800 reported bicycle thefts (Politidirektoratet & Riksadvokaten 2021). For 2022 this number further increased to 19 800 thousand cases of bicycle thefts reported to the police (Politidirektoratet & Riksadvokaten 2022). Despite the volume of cases, according to the insurance firm *Gjensidige*, in reference to numbers by Statistics Norway, 97% of all cases remain unresolved (Gjensidige 2023). Actual numbers of bicycle theft might run much higher as many victims without a bicycle insurance may not file a report, making it worthwhile to inquire whether how bicycle theft impacts both parking facilities, parking behaviour and cycling practices overall.

Ultimately, those phenomena, empty bicycle hotels and slow cycling development, can be interpreted as two sides to the same underlying discourse and crux of current transportation policy: how can people be moved towards the use of sustainable modes of transportations? All in all, these research interests can be operationalised in the following research question: *How can bicycle parking serve as a measure to increase intermodality along the Jæren Line?* To aid assessing this question two supplementary sub-questions are put forward. On the one hand, looking closely at existing infrastructure and research, it is asked what the important qualities of station and bicycle parking design are and how they are represented at local stations. On the other hand, building on the first question by including notions of social practice theory, the relation between bicycle parking and -hotels and wider cycling practices is inquired. Also, to help delineate bicycle parking as a measure and given an overall open and explorative approach, the research also seeks to uncover challenges and limitations, when bicycle parking is utilised as a measure for increased bike-train intermodality. Based on this following research question and following sub-questions are developed:

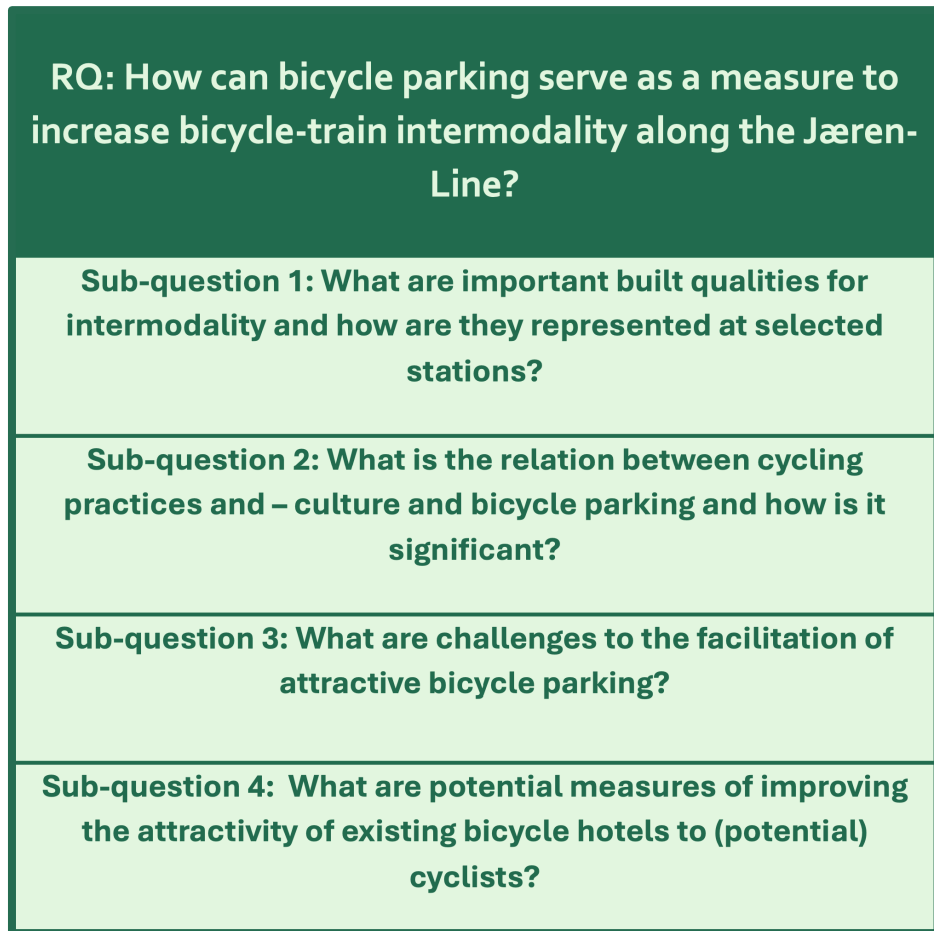


Figure 1 Research Questions

From a scholarly perspective, despite the attention bicycle parking received on the ground by practitioners, in research, bicycle parking has been mostly overlooked. This comes as a surprise, because even though bicycles are stationary, parked or stored away most of the day, research is mainly concerned with bicycles in movement. (Heinen & Buehler 2019; see also: Buehler et al. 2021; Egan et al. 2023) Considering the limited research available, most of the available knowledge on bicycle parking stems from quantitative research, and there is little qualitative research exploring the effect the qualities of bicycle parking have on cycling behaviour overall (Heinen & Buehler 2019). Similarly, EGAN ET AL. conclude that:

“It is notable that the vast majority of these studies are quantitative, which arguably demonstrates a lack of more exploratory and in-depth inquiries into the likely differentiated experiences and practices of cycle parking in relation to public transport integrated journeys, which could be extremely useful in informing future promotional efforts” (Egan et al. 2023, 3).

This research project aims to contribute towards closing this empirical gap within bicycle parking research by employing a decidedly qualitative methodological approach and to develop a deepened understanding of bicycle parking as a measure for increased intermodal bicycle and train usage, that goes beyond the understanding of bicycle infrastructure as just a basic banality.

1.3 Local Transportation and Planning Contexts

Building on the initial presentation of the Jæren Line, this section further illuminates the role of cycling and the Jæren Line in the local transportation system. For this relevant actors, measures, and planning contexts for the facilitation of bicycle parking and bicycle hotels at stations are described in the following.

1.3.1 Public Transportation and Cycling in South-Rogaland Today

In addition to cycling and train transportation, the everyday transportation in South-Rogaland today is still mostly dominated by cars (Rogaland flykeskommune 2021). The most used sustainable transport mode in Rogaland is the public bus system. In 2022, it moved a passenger volume of almost 29 million in all of Rogaland, compared to the 5 million that were transported by train in 2023. Of those bus travels, 23 million were made in North-Jæren alone (Kolumbus AS 2023), making it the regional centre of activity in public transportation.

As highlighted before, cycling, despite the slow progress, has the potential to become the dominating transport mode in the region (Pritchard & Lovelace 2022). And at the same time there is a significant uptake in use of e-bikes (Bjørnara et al. 2023). This is also supported in PRITACHARD & LOVELACE's cycling potential analysis on the North-Jæren region. While the amount of people owning bicycles in the region decreased from 81% in 2014 to 71% in 2019, the ownership for e-bicycles rose from 3% to 12% in the same time frame. Overall, 21% of the population in North-Jæren owned a e-bike in 2021. This falls in line with a national trend of rising e-bike sales (Dahl et al. 2023). In traffic, observations conducted as part of the same study, e-bikes represent 39% of all bicycles on the road, (Pritchard & Lovelace 2022), suggesting an overrepresentation of e-bikes compared to mechanical bikes, given that more people own mechanical bikes.

As a side note, on a national level, this shift to more expensive e-bikes is also indicated in the damages caused by bicycle theft on a national level. According to calculations of the Employer's interest organisation of the financial sector in Norway, *Finans Norge*, insurance companies made about 154 million Norwegian Crowns in insurance pay-outs for bicycle theft in 2022. An increase of 300 % from 2005's numbers of approximately 50 million NOK in pay-outs. At the same time the average individual pay-out has almost doubled from 2005 to 2022 from about 5 500 to 10 500 NOK (currency adjusted to inflation, *Finans Norge* n.d.).

As introduced before, the Jæren Line forms both a regional transport link between smaller townships in South-Jæren and Dalene, and the dense, urban North-Jæren region. An analysis of the commuter streams and workplace density along the rail line reveals that the main commuter streams are from south to north. Significant commuter streams within North-Jæren are from Sandnes to Stavanger and vice versa. The most important workplace concentration in the region is Forus with 3000 businesses and 40 000 employees, which is located about 15 minutes from Gausel station by bicycle (Fjellstad & Hallås 2020). Overall, FJELLSTAD & HALLÅS conclude, that the Jæren Line, particularly during rush hours, can be a viable competitor to commuting by car (*ibid.*).

1.3.2 Relevant Actors for the Facilitation of Bicycle Parking

The planning and provision of bicycle parking at stations and regional public transportation at large involves many different actors. On the national level, Bane NOR is the public organisation owning and maintaining for the country's railway infrastructure and stations. The railway services themselves are, however, provided by private contractors, as is the case with the Jæren Line, which is operated by the private cooperation Go-Ahead Nordic. On a regional level, *Rogaland Fylkeskommune* (hereafter "Rogaland County Authority") has two main responsibilities connected to mobility and public transport. Firstly, it is responsible for the planning and maintenance of the about 2 500 kilometres of regionally owned road infrastructure, including adjacent bicycle and pedestrian infrastructure. Secondly it is responsible for the facilitation of public transportation in the region (Rogaland Fylkeskommune 2021). Rogaland County Authority has given over part of its responsibilities to Kolumbus AS. Since 2020 it is acting as the region's main provider of public mobility. This makes it responsible for the administration and facilitation of bus, speed boat and ferry transportation, but also for changing mobility patterns and development of new mobilities, such as the *Bysykkel* scheme, the county's shared-bicycle system. It is thus also a central actor for reaching the zero-growth objective in the region (ibid., Kolumbus AS n.d.). The Jæren Line is an integrated part of the transport system and tickets bought through Kolumbus' application are also valid on the train (Rogaland Fylkeskommune 2021). Another set of crucial actors for the development and maintenance of built infrastructure, including bicycle parking, at and in the immediate surroundings of Jæren Line's stations are, the different municipalities the stations are located in. Shortly summarised the actors can be mapped in following graph (see Figure 2).

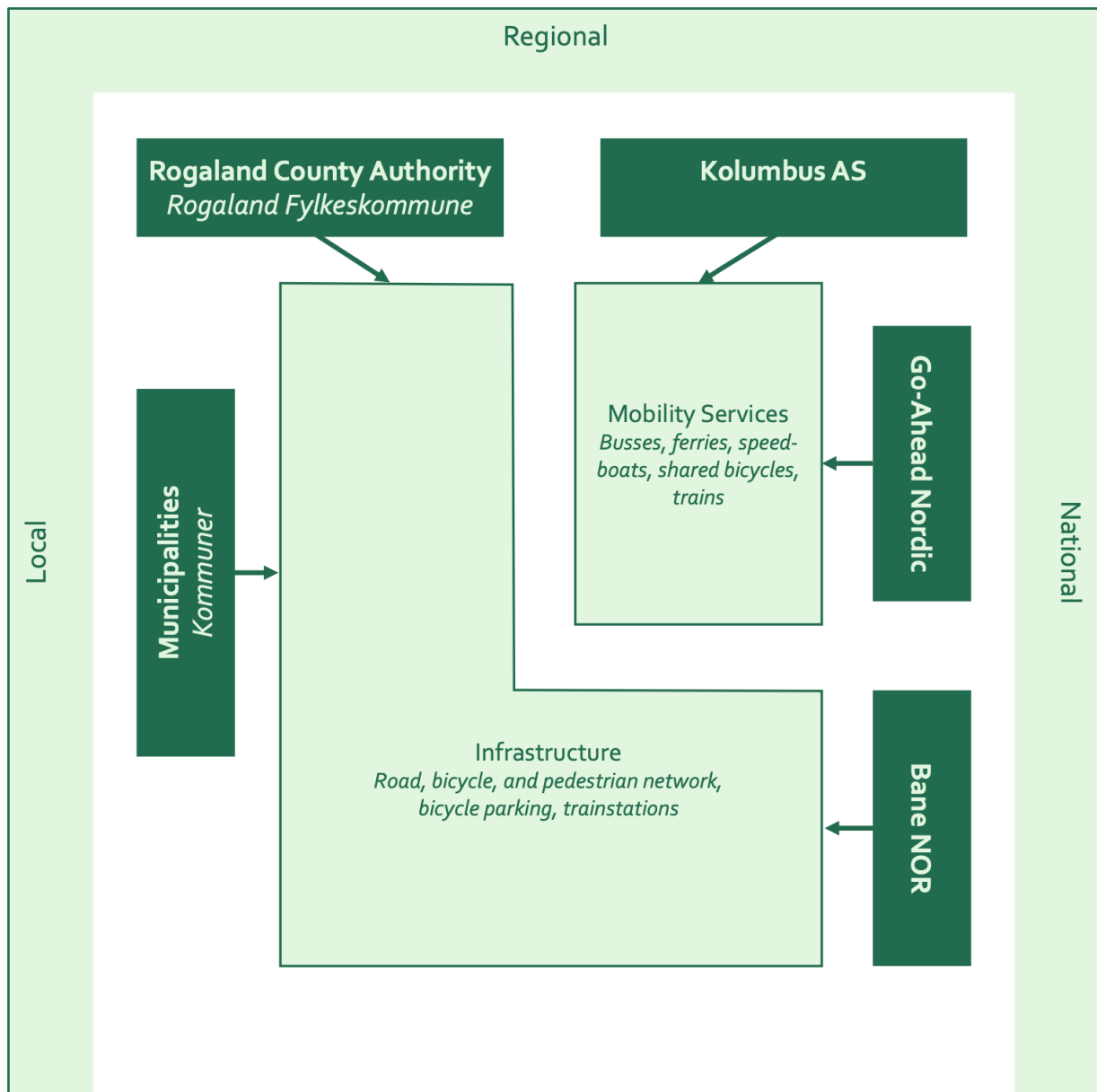


Figure 2 Main Actors within Public Mobility & Bicycle Parking in Rogaland

1.3.3 Policy and Measures

As previously pointed out, the central policy objectives underlying regional and local public transportation and bicycle infrastructure development are the zero-growth objective and national goals for modal shares for cycling (20% in cities, 8% nationally). On a national level, one measure has been the *byvekstavtaler* (hereafter urban growth agreements) that constitute a project-based model for planning and financing infrastructures and are supposed to help facilitate a modal shift towards green and sustainable forms of transportation. Five such urban

growth agreements have been signed between the state and respective county authorities, as well as municipalities, in Norway's five metropolitan regions, Oslo, Bergen, Trondheim, Tromsø, and in 2020 North-Jæren. Dubbed as *Bymiljøpakken* and with a financial underbelly of about 29 billion NOK¹, the agreement determines a broad bandwidth of measures for reaching the zero-growth objective, among which the development of the Jæren line with its stations in North-Jæren and concrete projects surrounding cycling (Den Norske Regjeringen 2020).

One key measure for reducing car traffic was the reformation of road-tolls, organised in rings on important routes into the centres of Stavanger and Sandnes in 2018. Initially, car drivers had to pay 22 NOK and 44 NOK during rush-hour for passing road toll stations. Crucially however, this applied only to fossil-fuelled cars, and drivers of e-vehicles only payed a reduced amount. A recent study critiqued this, finding that this design of taxing car-drivers has largely proved ineffective at shifting modal shares towards sustainable transportation modes, but merely lead to tripling usage of e-vehicles (Brosvik Bayer 2022). Today, prices have been adapted, but e-vehicles are still discounted by about 25%.

An important incentive-based measure is the *Hjem-Jobb-Hjem* scheme in North-Jæren. Here, public institutions collaborate with local employers to encourage the use of bicycles and public transportation among work commuters. Employers can, in exchange for a monthly subscription, have a charging station for the local *bysykkkel* installed at their offices and their employees gain, among other things, access to a discounted public transportation ticket, free access to the *bysykkkel*, and a cheap leasing scheme for e-bicycles. An evaluation of the *Hjem-Jobb-Hjem* scheme published in 2019 finds that the number of car-commutes among surveyed workers at participating firms decreased by 15%, extrapolated in total numbers this could mean a reduction in one million annual car trips (Müller-Eie et al. 2019), proving its effectiveness at changing commuter behaviour.

Zooming in on bicycle parking as a measure, many different actors have paid attention to bicycle parking facilities when devising their transportation policy. This has been done in

¹ In 2020-NOK, and as negotiated in the 2020 ratified agreement. According to the annual budget of 2024, the total amount of investments is about 39 billion 2023-NOK (*Bymiljøpakken* 2024)

various ways. Some have for example compiled different guides and principles for designing and facilitating bicycle parking. Others have gone further and paid strategic attention to the matter of bicycle parking. *Stavanger kommune* (hereafter Stavanger municipality) for example recently released its municipal masterplan and its attached land-use part (nor. *kommuneplanens arealdel*), that also featured a comprehensive mobility and transportation strategy. Bicycle parking was both included in the municipalities cycling - and parking strategies under reference to the municipality's guide, and regulation and norms for bicycle parking, making it a required consideration for the development of residential areas, public spaces (Stavanger kommune 2023). Similarly, Sandnes municipality includes both quantitative and qualitative norms to bicycle parking at destinations, mobility hubs and residential areas in its masterplan from 2023 (Sandnes kommune 2023). In addition to Stavanger municipality's guide to bicycle parking, Kolumbus AS has also released their own guide to bicycle parking. In fact, there are many public organisations that have come forward with their guides to bicycle parking. *Statens Vegvesen* (hereafter Norwegian Public Roads Authority), Future Built, and a bandwidth of municipalities have come forward with their manuals on bicycle parking.

2. Analytical framework

In the following section an analytical framework for the evaluation of the results of the fieldwork is assembled that is largely based on two pillars. Firstly, social practice theory is presented in the context of mobility studies and then gradually expanded by the introduction of notions of cycling culture and mobility design to sharpen it for the later examination of bicycle parking. Secondly, the inclusion of collaborative-organisational theory is to help illuminate organisational dynamics influencing the facilitation of bicycle parking.

2.1 Mobilities and Social Practice Theory

Mobility, meaning the transportation of people, goods, and information, has historically always played an important role in the human experience. However, today, because of its unprecedented volume and reach, the importance of mobility is arguably greater than ever before and forms a shaping component of economic, political, and social life (Urry 2009).

Despite the omnipresence of movement and mobility throughout human history, URRY argues, it has been long under-considered within social sciences until the “mobility turn” (ibid.), and the emergence of the “new mobilities paradigm” in the 2000s (Sheller & Urry 2016). The “new mobilities paradigm” has provided the social sciences with a distinct new lens coming with its own methods, theories, questions, and solutions. This new lens examines the role of movement within social institutions, meaning the abstract formalisation of human needs, within social practices, and within the different modes of transportations and their respective complexities. It also questions existing practices and narratives surrounding mobility and allows new arguments in the ethical discourse of e.g., mobility equity or sustainability (ibid.).

The theoretical backbone of the paradigm is a combination of complexity theory, socio-technical transitions theory and social practice theory (ibid.). Firstly, Complexity theory builds on the understanding of transportation and mobility as a system. Mobility systems are structured by immobile material systems and immobile platform and organised around the process of moving people, goods, or information. They enable repetitive actions at a predictable outcome with a minimalised cognitive effort by the individual and exist in adaptive and co-evolving relationships to each other (Urry 2009). Complexity theory assumes that the social world is constituted of emergent, dynamic, processual, and unpredictable *complex adaptive systems* and suggests that, although these systems are stabilised (through e.g., surrounding social institutions) they are still susceptible to change if tipping points are reached (Sheller & Urry 2016). Secondly, socio-technical transitions theory examines the emergence of innovation, integration, and adaptation into existing socio-technical systems, such as mobility systems. Three central insights the theory offers are that system changes are fundamentally social activities. Further, that the implementation of technical innovation does not bring change alone, but needs accompanying changes in policy, user practices, infrastructure and industry structure, and symbolic meanings. And lastly, that therefore innovation alone may not lead to overall systematic change (ibid.). Finally, “‘social practice theory’ (hereafter SPT) focuses on key elements of social practices – materialities [sic], meanings and competences – as well as the interconnectedness between them. A focus on mobilities emphasizes that there is an unstable and ever-changing interrelation of places, persons, technologies, and natures connected through performances and practices” (ibid., 13)

KENT stratifies practice theory into three constitutive dynamics. Firstly, the mentioned conceptualisation of the elements of materials (e.g. objects, infrastructures, the body itself), meanings (e.g. ends, tasks, purposes, beliefs, and emotions), and competences (e.g. understanding, skills, and practical knowledge). These elements are set into relation, linked, and integrated with one another when a practice is carried out. They can shape each other and have the potential to change both spatially and over time. Equally elements can lose their link and disintegrate when other elements change (ibid. 2022; Shove et al. 2012; see Figure 3). The second assumption is that elements of practices are often related with other practices, as “links are made and broken not only between the elements that constitute a single practice [..], but also between the multiple practices of which similar elements are a part [...]” (ibid. 2012, n.d.). Similarly, entire social practices can also be relevant and influence on other practices, which has been dubbed the *bundling of practices* (Kent 2022). An example given by KENT of how a tightly scheduled lifestyle with children and car usage, shows how practices of driving and commuting relate to the practice of parenting in a conditioning fashion (2022). Thirdly, building on the understanding of social practices as entities and people as carriers of social practices (Shove et al. 2012), recruitment and defection of practitioners by social practices are a central aspect of “[...] how some practices become more deeply anchored and embedded in society while others disappear” (ibid.). For this it is important to acknowledge, that not everyone can be recruited as practitioner. Time constraints, bodily- or economic conditions and other factors can restrain someone from becoming the carrier of a practice. Also, certain practices can be so predominant, that they are inscribed into material elements, such as in SHOVE ET AL.’s of daily showering in the West, where most modern bathrooms have been designed without bathtubs (ibid.). By learning, sharing, and performing a practice, recruits step into the paths of previous and older practitioners, thereby reproducing and transforming a practice. Thus, practices need to continuously find new recruits to persist. If they fail to do so or practitioners defect, the practice will succumb. But as SHOVE ET AL. point out, recruitment and defection should not be seen as two sides of the same coin, as mass recruitment to one practice does not necessitate the defection from others (ibid.).

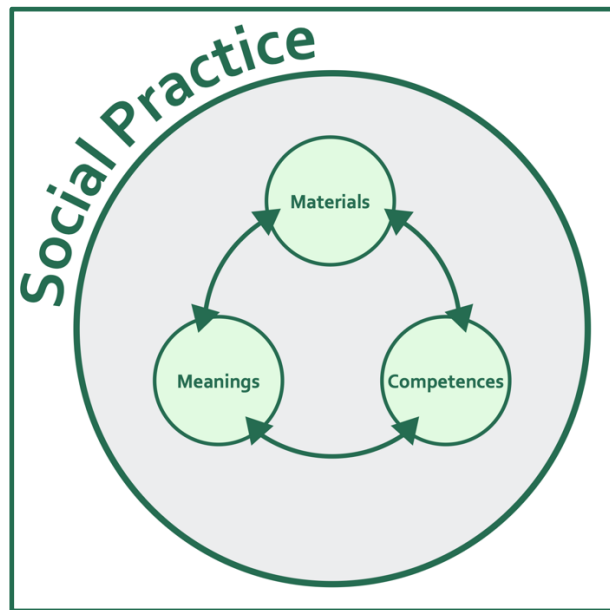


Figure 3 Constitutive Elements of a Social Practice and their Interrelations after Shove et al. 2012

Within transport and mobilities research social practice theory has been the avant-garde of exploring new gateways to a decarbonisation and green transitioning of modern mobility systems, as it accommodates for collective social practices influenced by the wider environment as well as individual decision-making processes (Kent 2022). It therefore expands upon previous utilitarian approaches, that attempted to model users' mobility decisions solely through a cost benefit evaluation, disregarding “symbolic and emotional factors in day-to-day trans- port decisions [or] for habitual decisions” (ibid., 223). SPT, on the other hand, has proven effective at revealing and ordering the complexities of transport practices. Furthermore, “[...] through examinations of recruitment and defection that the practice approach is able to incorporate the subjectivities and corporeal foci characteristic of a cultural approach, further enabling transcendence of the false dichotomy between structure and agent” (Kent 2022, 226).

SPT has previously been used to explore cycling by several researchers (ibid.) While the theory has been widely deemed effective at examining the elements and their respective interrelations constituting the practice, promoting the understanding of cycling as a practice is well embedded with other practices and systems (Spotswood et al. 2015; Larsen 2017b; Buck & Nurse 2022). However, there are some limitations to the integration of surrounding practices in a SPT framework. BUCK & NURSE find it to be difficult to integrate bordering practices that impact

cycling, as a hypothetical example: aggressive car driving behaviour, into the SPT framework of materials, competences and meanings (2022). Previous research has identified different elements of cycling as a social practice, such as bikes, equipment, and infrastructure, but also weather, topography, and the bodies of the cyclists themselves as material elements. There are also competences such as bodily fitness, steering and navigational skills, as well as knowledge about the local traffic system. Lastly, cycling is attached to both positive and negative meanings, as dangerous, but also as a source of freedom. LARSEN summarises that: Cycling is a contradictory and contested practice that people associate with different meanings (2017b, 878)

Bicycle parking can be identified as one material component of cycling as a social practice. One could argue that parking your bicycle is an act as simple as unlocking and starting a car. But it can also be hypothesised that bicycle parking is a much more important task that involves emotional and affective capacities, as bikes are more susceptible to theft, degradation and vandalism. Therefore, examining bicycle parking through an STP lens can give important insights into how bicycle parking relates to other elements of cycling as a social practice and inform the analysis of factors impacting the use of bicycle parking.

2.2 Cycling Culture

Culture is a complex study object. As FÖRNÄS points out, the term culture is used in almost every context, as “[t]he concept of culture is central not just to cultural studies or cultural research but to modern and late modern societies at large” (2017,2). Defining culture as a concept is difficult, and here FÖRNÄS’ initial explanation is drawn upon:

Culture is the social construction, articulation, and reception of meaning. It is the lived and creative experience for individuals *and* a body of artefacts, symbols, texts and objects. Culture involves enactment and representation. It embraces art and art discourse, the symbolic world of meanings, the commodified output of the cultural industries as well as the spontaneous or enacted, organized or unorganized cultural expressions of everyday life, including social relations. It is constitutive of both collective and individual identity (ibid,2).

Although this initial definition gives some information on what culture encompasses but does not clearly define where culture is located in relation to individuals and groups. But there are different approaches to understanding culture as something that exists either in- or outside of individuals. This is an important debate, especially with the auto-ethnographic fieldwork later, because when over-interpreting culture as something outside of individuals, there is a “danger of presenting culture in a form of a lifeless, rigid mannequin—exaggerated, oversimplified, inflexible, and simply artificial—without reflecting real people associated with it or in a form of a self-propelled entity independent of people” (Chang 2008, 19 f.). On the other hand:

The view of culture inside people’s mind helps people see themselves as active agents of culture. At the same time, when the role of individuals is excessively elevated in culture-making, this perspective is in danger of neglecting the collectivistic nature of “culture” (ibid., 21).

The term culture has also been used in the context of cycling policy. Politicians, planners, and activists have frequently pointed out the existence, importance, or lack of cycling culture, but most of the time the actual meaning of it is left ambiguous. As an example, in Stavanger’s recent transport and mobility strategy, cycling culture is advanced through an organised institutional and infrastructure effort, as well as higher bicycle-journey- numbers overall, with the goal that: “The bicycle should be included as an integrated part of city life and street space, and contribute to good cycling culture” (Stavanger kommune 2024, 85; translation by the author). While this appears to be a very localised interpretation of what cycling culture is, other researchers have pointed out that “[...] national Dutch and Danish cycling cultures are retold and articulated as genuine national characteristics [...]” (Carstensen & Ebert 2012,52).

As culture is such a wide and evasive term, researchers have often narrowed its definition to make it approachable as a study subject. One possibility is to understand culture as cognitive structures. “These cognitive structures include systems of values, attitudes, and beliefs [...], assumptions, meanings, [...], preferences, [...], and interpretations. In addition, they may include standards of behavior or unconscious processes [...]” (Faulkner et al. 2006, p.33). According to TALMY cognitive structures are innate to individual people, who have acquired said systems over a lifetime of exposure and learning from others. The cognitive structures inform both the production and comprehension of cultural patterns by the individual itself and others. Lastly

these structures direct the individual “[...]in the performance of behavioural practices in accordance with the cultural structure that it has acquired. In the case of comprehension, the system guides the individual in the perception and interpretation of ongoing cultural manifestations by others, also in accordance with the cultural structure that it has acquired” (Talmy 1995, 81). Cognitive cultural structures are not to be understood as fixed, but they can change over time, through reproduction and observed reproduction practices of others. This also implies, that they exist in variety (ibid.).

Expanding SPT with a cognitive cultural theory can help illuminate and comprehend elements pertaining to the meanings section of SHOVE’s conventionalisation of social practice theory. Additionally, viewing elements such as values, attitudes, and beliefs as cultural components, helps shape the understanding of cycling culture as something that is acquired by individuals through instruction and exposure from others, something that has potential to change, but crucially also as something that impacts behavioural output.

2.3 Mobility Design Approach to Bicycle Parking

To build a stronger understanding of the material components identified through STP and illuminate the way designed artifacts have the potential to influence and change social practices, aspects of design theory are drawn upon. The inclusion of design theory can be dubbed the ‘practical turn’ to URRY’s ‘mobility turn’, and it is primarily concerned with “how everyday life mobilities are enabled (and disabled) by designed materialities” (Jensen et al. 2016, 27). This builds on JENSEN’s understanding of mobilities as “[...] carefully and meticulously designed, planned and ‘staged’ (from above [through e.g. planners and politicians]). However, they are equally importantly acted out, performed, and lived as people are ‘staging themselves’ (from below [by the users])” (Jensen 2013, 4). The designed objects or artifacts can be described as to combine three main functions. 1) Practically, it fulfils a utilitarian purpose and “addresses the physiological need of the user” (Blitz & Lanzendorf 2020, 2). 2) Aesthetically, the object is supposed to evoke “judgements on its attractiveness or beauty, triggering positive or negative feelings of pleasure or unpleasantness” (ibid., 2). 3) Emblematically, the object is to communicate its functions through its design (ibid.). These functions are addressed through decisions made by the designer by ‘inscribing’ a subjective understanding of purpose and proper use in an object through its physical design (Larsen 2017a).

JENSEN ET AL. draw from the concept of affordances to describe the relation between users and the designed environment, and what type of behaviour and performance it en- or disables (2016). In summary, the notion of mobility affordances inquires “how the specific relation between the moving body and its material environment opens up (or narrows down) to particular modes of mobilities, different speeds, trajectories etc.” (Jensen 2013, 120). Therefore, affordances can also be interpreted in terms of what potential use an object, conditioned by its design, can offer to practitioners. During analysis, the inclusion of this approach allows “to highlight the performative effects of materialities in mobile situations without losing sight of how humans also play essential roles in the performance of mobilities” (Jensen et al. 2016, 30).

Before the background of the ‘practical turn’, Danish cycling researcher LARSEN applies the idea of a systematic-relational approach to bicycle parking design to understand cyclists’ parking practices and behaviour (2017a). According to the assumption, that “[m]obility [is] a *designed* accomplishment; made possible by engineers, planners, and politicians, designed artifacts (e.g. bikes and cars), infrastructures (e.g. roads, airports), and laws, norms, and political controversies” (ibid., 56), he identifies bicycle parking as designed objects, that are staged from the above. This designed bicycle parking offers certain affordances, that users may or may not make use of. Ultimately, LARSEN hypothesizes, that “[m]obility designs work because of their intentional connections with other designs”, or do not work as intended when designs connect poorly (ibid., 57).

2.4 Collaborative-Organisational Approach to Bicycle Parking

As pointed out in the introduction, there are many different actors and organisations involved in the facilitation of bicycle parking and making of mobility in North-Jæren *en gros*. For building an analytical understanding of how these different actors work along and together network and collaborative theory is applied. Arguably, this falls into a broader development in the West, as “[p]lanning is increasingly exercised in a fragmented governance system consisting of numerous policy networks that stretch across public and private boundaries [...] and across levels of public decision making [...]” (Sehested 2009, 247), with a subsequent heightened demand for collaborative work between different fields and actors. The necessity of collaboration has also been acknowledged for the planning of public transportation, as “better

collaboration is needed in order to deliver measures and policies that will help make public transport more efficient” (Herja et al. 2016, 545). Collaboration between actors can have a variety of benefits, most importantly it can enable “sophisticated forms of collective learning and problem solving” (Ansell & Gash 2008, 561)

From a theoretical perspective, there is, however, a wide array of different definitions of what constitutes as collaboration among organisations and collaborative governance. Stricter definitions require, for example, a formalised forum where both state and non-state actors meet to exchange (Ansell & Gash 2008). Further, collaboration implies participation of the different actors, but as ARNSTEIN suggests, there are in fact qualitative differences to the degree of participation, ranging from manipulation, over informing and consultation to partnership and decision-making power (Arnstein 2019). For this thesis, collaboration is defined in an open fashion. All steps an organisation working with public transportation on the Jæren Line in an effort towards facilitating bicycle parking that involve working with other organisations are viewed as collaborative. Thus, the definition of HRELJA ET AL. of collaboration, as “the attempt to overcome problems by collective action and to change a situation in which the parties would otherwise act independently into a situation where they act together to achieve shared objectives” (2016, 542), is utilised.

According to Hrelja et al., collaboration works because of successful dialog between the different parties. Dialog “[.] is critical for building trust, mutual respect and understanding, involvement in the process, and for breaking stereotypical conceptions and other barriers that prevent the exploitation of joint benefits” (ibid., 547) Dialog is also crucial for creating a shared understanding of the problem and what possible routes for addressing it are (ibid.). This echoes the three most important contingencies to collaborative efforts identified by ANSELL & GASH: time, trust and interdependence, as organisational collaborations need time to develop trust and interdependencies to generate successes (2008).

Such a collaborative approach has been applied in the context of bicycle parking in a case study on intermodality and bicycle parking in Copenhagen. The study supports the notion that organisational fragmentation “[...] can create challenges for multimodal transportation integration” (Cannon et al. 2024, 72), finding that station bicycle parking in Copenhagen “[...] falls between organisational responsibilities and governance levels, funding negotiations hinder

collaborative processes, and tension exists between cyclist satisfaction and railway passenger growth goals” (ibid., 72).

Including aspects of organisation-collaboration theory to the analytical framework, will help illuminate factors of the different organisations’ work with bicycle parking and how this work may or may not intersect in the form of collaborative efforts, and how different organisations work affects the facilitation of bicycle parking at stations on the ground.

3. Bicycle Parking and Intermodal Travel in Empirical Research

This section serves as a literature review over both what built forms of bicycle parking there are, how bicycle parking is relevant for the integration of train and bicycle, and what existing research identifies as important qualities for bicycle parking. Lastly, bicycle parking and important qualities for its success are conceptualized following the notion of the bike-train as a distinct, intermodal form of transportation. In the context of this thesis, this section forms the basis for the assessment of the stations and bicycle parking facilities in case areas.

3.1 Built Forms of Bicycle Parking Facilities

As LARSEN points out, while car parking, most of the time, is easily designed by putting up road signs or doing a paint job on the street surface, bicycle parking design is more complex, because bicycle’s need to be propped up, stabilised, and usually moored or locked securely (Larsen 2017a). As a result of this, there is a huge variety of different forms of bicycle parking facilities that urban planners and designers commonly rely on for facilitating bicycle parking infrastructure. Typically, parking solutions range from open-air parking or roofed bicycle parking, over more secure bicycle cages or lockers to the most developed form of bicycle parking, the bicycle station (Pucher & Buehler 2012; Hamnett 2015). Layout, design, and location of those parking solutions can vary, but they normally, as a baseline, offer bicycle racks to potentially parking cyclists. Bicycle racks exist in many different forms (see Appendix A). By design they can allow for the locking of either the wheel, the frame, or both to the bicycle

rack, thus providing better security from theft. There are also two-tier bicycle racks that, supported by hydraulics or springs, allow for a more space efficient use of parking space as bicycles can be stored elevated on top of each other. It has, however, been pointed out that two-tier bicycle racks can be fiddley to operate. Further, the choice of bicycle rack has an impact on maintenance costs (Hamnett 2015.).

While open-air and roofed bicycle parking are accessible and open for usage to anyone, cages, lockers, and bicycle stations are usually secured behind individual keycodes, locks, a subscription system, and/or a manned service desk. HAMNETT points out that while bicycle cages are more cost effective, space efficient and provide a degree of passive surveillance, bicycle lockers provide a higher level of property security, but are less space efficient and more expensive (2015), additionally they are difficult to aesthetically fit in with the surrounding urban form (Czowalla et al. 2017). Bike stations, according to PUCHER & BUEHLER, “[...] are the most secure and most advanced form of bicycle parking at public transportation stations” (2012, 169), providing a personal attendant, as well as additional services such as bicycle repairs and -rentals, sanitation, and lockers for personal belongings (ibid.).

Another mode of bicycle parking that can be observed, is informal- or fly parking, when bicycles are parked at locations not intended for bicycle parking. BUEHLER ET AL. point out two possible explanations for informal parking. Either there is too little adequate bicycle parking provided, or informal parking has been normalised through continued fly parking (2021). Further, a study conducted in Canada indicates that fly-parked bicycles are particularly vulnerable to theft compared to those parked at formal parking sites (Van Lierop et al. 2015).

Common variations of bicycle parking infrastructure can be summarised in the following (see Figure 4)

Type of Bicycle Parking	Accessibility	Possible Surveillance Systems	Characteristics	Advantages / Disadvantages presented in literature
Fly-Parking	Public Access	None, Public, or Video Surveillance	Possible protection from weather, possible surveillance, possible removal by authorities.	- High risk of theft (van Lierop et al. 2015)
Open-Air Bicycle Parking			Bicycle racks, no protection from weather, possible video surveillance, usually free.	
Roofed Bicycle Parking			Bicycle racks, some protection from weather, usually free.	
Bicycle Cages	Limited Access	None, Public, or Video Surveillance	Bicycle racks, some protection from weather, shared among a group of users, usually paid.	
Bicycle Rooms			Bicycle racks, indoors, protection from weather, shared among a group of users, usually paid.	
Bicycle Lockers	Individual Access	None, Public, or Video Surveillance	Protection from weather, usually paid, can also be placed in bicycle rooms, cages, or stations.	+ Very high degree of security of property (Hamnett 2015; Van Lierop et al. 2015) - Difficult to fit into urban form (Czowalla et al. 2017)
Bicycle Stations	Controlled Access by Staff	Staffed or video surveillance	Bicycle racks, protection from weather, protection through manned service desk, additional bicycle related services, usually paid.	- Higher costs because of staff and maintenance (Pucher & Buehler 2012)

Figure 4 Bicycle Parking in Public Spaces, Synthesised Typology, based on: Pucher & Buehler 2012; Czowalla et al. 2017; Herheim 2020.

Another part of bicycle parking that is important is locking (Larsen 2017a). There are three types of bicycle locks that are commonly used. The key operated O-lock is attached to the bicycle frame and blocks the back wheel of the bicycle and is the least secure method of locking

a bicycle, thus not allowing a connection with the bicycle rack (ibid.). The chain-lock, on the other hand, allows for a flexible locking of both bicycle frame and wheel to an object. The chain can be made of actual metal chain or steel wire and is easily cut by bolt cutters. Lastly, the U-lock, although it cannot be applied as flexibly as the chain-lock, provides good security as it is made out of steel, and is therefore one of the safest methods of locking a bicycle (ibid.; see Figure 5)

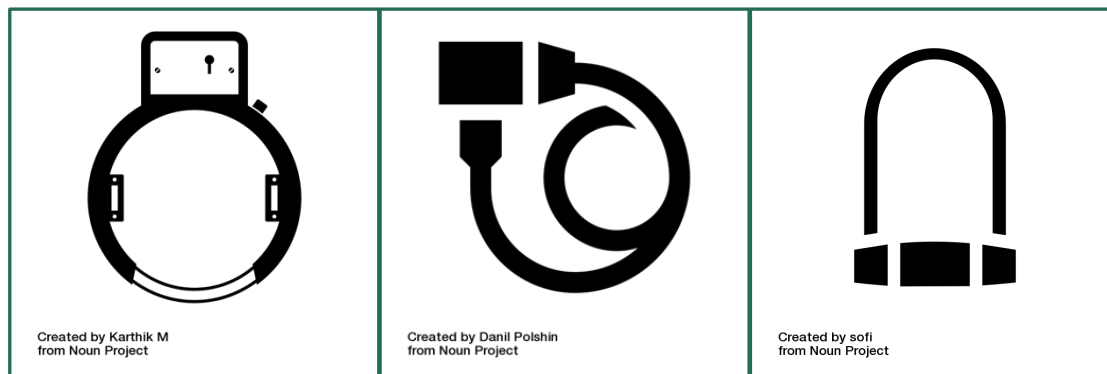


Figure 5 Image Gallery of Different Bicycle Locks; from left to right: O-Lock by Karthik M., Chain Lock by Danil Polshin, U-Lock by sofi. Full accreditations in the bibliography.

3.2 Bike-Train Intermodality and Bicycle Parking

As highlighted in the introduction, intermodality has been put forward as a sustainable solution for personal transportation. Indeed, such a transport system is often put forward as a measure to relieve car dependency, particularly in areas characterised by urban sprawl (Weliwitiya et al. 2019), and associated benefits are the reduction in climate gas emissions, pollution, and traffic congestion (Kosmidis & Müller-Eie 2024; Weliwitiya et al. 2019). Furthermore, socio-demographic effects of an integrated bicycle-train transport system can be an increased transport equity and better workplace accessibility across socio-demographic borders (Kosmidis & Müller-Eie 2024). Additionally, “[a] key observation on the bicycle–train combination is that many of the characteristics of its two subsystems provide for strong synergy when combined in a single trip chain. This synergy generates an integrated transport system that is both fast (because of the train) and flexible (because of the bicycle), for short and for long distances, with increased adaptability to individual demand, urban densities and regional conditions of trip origins and destination locations (Kager et al. 2016, 217). This symbiotic potential is widely recognised within research (Pucher & Buehler 2009; Pucher & Buehler

2012; Kosmidis & Müller-Eie 2024; Kager & Harms 2017). It has to be critically remarked that, as KOSMIDIS & MÜLLER-EIDE point out in their article, that more than half of all European research conducted on the topic of bike-train transportation has been conducted in The Netherlands, with a well-developed bicycle culture and public transportation system (2024), where already 10 years ago 47% of all daily train users accessed the station by bicycle (Kager et al. 2016).

Building on the fact “[...]the combined performance (rather than stand-alone performances) of the interacting components of a transport mode in terms of travel time, cost, comfort and general utility for an O[rigin]–D[estination] relation determines its attractiveness and use compared to alternative transport modes” (ibid. 209), KAGER ET AL. develop their conceptualisation of the bike-train transportation system as a distinct transport mode (see Figure 6). KAGER ET AL. base their argumentation on the assumption of an individual utilitarian calculus by users on their choice of transportation mode. However, habitual, symbolic or emotional factors, as they are recognised in SPT, may also impact individual choice of mode of transport. The bike-train concept is split into different segments of the access travel from trip origin to access station, the stay at the access station, the main travel by train or other fast traveling means of public transportation, arrival at the egress station, and then finally the travel between egress station and destination.

	Access Travel	Access Station	Main Travel	Egress Station	Egress Travel	
Origin	Origin Stop -> Feeder Services -> Facilities & Transfer Locations -> Access stop.		Train service(s), facilities and transfer location		Egress Stop -> Feeder Services -> Facilities & Transfer Locations -> Destination stop.	Destination
	Bicycle Park -> Bicycle Infrastructure ->				Bicycle Park, Bicycle from Train -> Bicycle	

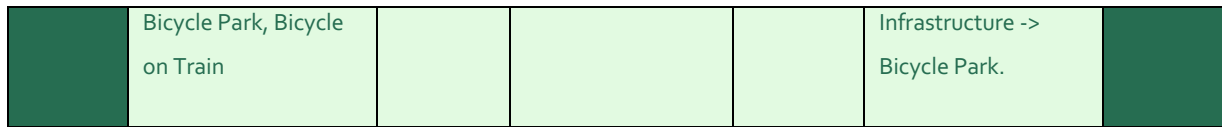


Figure 6 Segmentation of the Bike-Train Concept (Kager et al. 2016)

There are many factors, correlates, and measures that influence the usage as well as scale of integration of a bike-train transportation system. Those vary from individual's trip characteristics and contexts, surrounding urban form and built environment at stations, existing bicycle network and bicycle rental schemes, socio-demographic contexts, and competitiveness of public transportation and bicycle with other modes of transportation. Another important factor is the quality of the station with its provided facilities, which includes bicycle parking facilities. Adequate bicycle parking can have a positive effect on the likelihood of cycling to stations (Kosmidis & Müller-Eie 2024), inadequate bicycle storage, however, is perceived as an important factor keeping people from using bicycle-train transportation (Cheng & Liu 2012). As a side note, it is important to note that studies have shown that cyclists overall prefer to take their bikes on the train rather than leaving it parked at the station (Kosmidis & Müller-Eie 2024).

Further, it is important to note that parking needs and behaviour may vary between access to egress stations (Egan et al. 2023). Travel surveys on bike-train users from The Netherlands revealed that the modal share of cyclists to the access (or home) station is three times higher than at the egress stations (Jonkeren & Kager 2021). This indicates a higher need a supply of day parking at access stations, as most bike-train work commuters leave and return the same day (Herheim 2020). Additionally, the permanently parked second bicycles at egress stations may need safer parking options for overnight stays. At the same time, second bicycles may become an issue as they post higher pressure on parking capacities, due to their extended parking times (Jokeren & Kager 2021).

Mobility and urban planners can encounter several challenges when facilitating for greater usage of the bike-train. As, according to KAGER ET AL., the bike-train should be considered as one transportation mode, it also enters competition with other mobility practices, such as the driving, but also walking and cycling. In a high-density urban environment, it is therefore

possible, that measures to improve cycling can make the bicycle more attractive than the bike-train (2016).

The reading on intermodality has established that the integration of bicycle and public transit is a complex endeavour promising many benefits to urban and transport development. Adequate bicycle parking is one of many factors influencing the potential user's choice of the bicycle-train transport mode. This equally allows the assumption that the occupancy of bicycle parking at station is co-dependent on the other factors, explained above, that influence the usage of bicycle-train transport mode.

3.3 Bicycle Parking Attractivity and Usage in Research

3.3.1 Security and Protection

Security is a central concern for designing bicycle parking and cyclists' parking behaviour. A parked bicycle is vulnerable to theft and significantly more likely to be stolen than a car or motorcycle. For potential bicycle thieves: "[...] bicycles are attractive objects. They are widely available, easy to steal, use, and resell, and difficult to track. The probability of being arrested for stealing a bicycle is much lower than the probability of being arrested for perpetrating other crimes" (Chen et al. 2018). At the same time, several studies point out that bicycle theft is a key deterrence to potential cyclists (Larsen 2017a; Chen et al. 2018) and influences cyclists' parking behaviour (ibid; Heinen & Buehler 2019)

LARSEN describes bicycle theft as a social issue, as societal conditions, such as homelessness, addiction induced crime and youth boredom, create the need for theft. At the same time there are also people, who, unknowingly or knowingly, buy stolen bicycles in an often-blooming second-hand market, making bicycle theft a viable enterprise. His verdict is therefore that bicycle theft cannot be simply designed away (2017a). Despite of this, physical design, location of bicycle parking, as well as locking behaviour, are significant factors. They can objectively influence the number of bicycle thefts (Chen et al. 2018), as well as improve cyclists' subjective perception of a parking location and subsequently cycling and parking behaviour (Cheng & Liu 2012).

Inadequate parking supply at public transportation hubs can also impact the wider parking and cycling practices and culture, as cases in Copenhagen and The Netherlands have shown. There parked bicycles are at constant threat of damages and theft, thus leading to the wide usage of

low-quality, disposable bicycles by a large part of the cycling population to minimise costs in case of theft or damages (Larsen 2017a, Molin & Maat 2015). LARSEN finds that many riders of low-cost bicycles have indeed a “[...] pragmatic and detached relationships with their bikes[.]” (2017a, 65), which also occasionally leads to their abandonment. These ‘orphaned bicycles’ then accumulate at bicycle parking locations, not seldom at transportation hubs. This directly impacts the availability of parking spots, as racks are blocked by orphaned bicycles, (Molin & Maat 2015).

While it is consensus among scholars that protected bicycle parking is generally preferred by users (Heinen & Buehler 2019), there are nuances to the preferences relating to security (Egan et al. 2023). One such nuance is formulated by ABRIS ET AL., who find in their observational study on bicycle parking at public transportation hubs in New South Wales, Australia, that cyclists at stations with high patronage prefer to park in close proximity to station entrances in well visible parking locations. At stations with low patronage, on the other hand, they are willing to take longer walking distances to the station entrances to utilise more secure parking options, such as bicycle lockers (2016). This finding, that users are willing to accept longer walking distances for security, is complemented by a Dutch hypothetical user study, revealing that a certain segment of bike-train commuters would walk longer distances for paid, safer parking (Molin & Maat 2015). Indeed, ABRIS ET AL., as well as other studies, highlight the importance of natural public surveillance, building on Jane Jacobs’ concept of “Eyes on the street”, for making bicycle parking more secure from bicycle theft and more attractive to potential users (2016; Chen et al. 2018). Similarly, CHEN ET AL. also find that strategic placement of bicycle parking at places with high pedestrian and bicycle transit can be a way of reducing bicycle theft (2018).

3.3.2 Connectivity & Proximity

It is important to acknowledge that bicycle parking is just one intervention in a complex system of infrastructures. Arguably, one intervention’s effectiveness is also co-dependent on the other interventions in places surrounding it (Pucher et al. 2010). As KOSMIDIS & MÜLLER EIE point out, the typical catchment area of a station for cyclists lays between one and five kilometres

(2024) but it can be theorised that the catchment area may extend or shrink given the quality and quantity of the local bicycle infrastructure network, as well as the predominant topography. Good connectivity to the local bicycle network, and visibility and signage (Cheng & Liu 2012), as well as a safe cycling route (Ravensbergen et al. 2018) are also factors that surface as in as to be perceived as important factors for potential intermodal cyclists. As a policy response, RAVENSBERGEN ET AL. propose efforts to develop a safe and connected bicycle network at access stations to lower barriers for bike-train commuters and potential cyclists (2018).

The last meter between bicycle parking and entering the station is also of great concern. While it is general consensus within research that bicycle parking is best placed near station entrances (Heinen & Buehler 2019), there are nuances to the importance of the proximity of bicycle parking to the station. One nuance, already discussed in the above, is ABRIS ET AL.'s finding, that cyclists are, under special circumstances, willing to trade short walking distance for higher security (2016).

3.3.3 Meeting User Needs

User oriented research on bike-train commuters in Taiwan by CHEN & LIU (2012) and RAVENSBERGEN ET AL. (2018) in Canada revealed that there are several additional factors and barriers experienced or perceived by those who evaluate becoming bike-train commuters and those who already are. Among potential users in RAVENSBERGEN ET AL.'s survey found that while lack of access to secure parking was a barrier, the most cited reason for not taking the bicycle to a public transportation hub was the fear of loss of appearance, and fear of sweating on the train (2018). This is supported by the finding in CHEN & LIU (2018), that availability of sanitation facilities at stations was a major concern among their sample group of cyclists.

3.3.4 Trip Contexts and Demographics

Additionally, researchers point out the importance of understanding the local contexts of parking solutions and that varying user groups might have different parking needs that might impact bicycle parking preferences and behaviour (Buehler et al. 2021). One way of examining

local potential parking needs, is by looking at the destinations. Parking needs at schools and day-care institutions, as an example, could be met by providing size adapted bicycle parking for smaller bicycles (Hamnett 2015). Another important cornerstone for estimating parking needs are parking durations. At shorter parking durations, e.g. at grocery stores, less secure but more convenient bicycle parking may be appropriate, while at longer durations the need for security becomes more pressing (Herheim 2020). These findings are also relevant for estimating parking demand at public transport stations, as diverse trip contexts of bike-train users may cause a varied demand for bicycle parking. At access stations with many work commuters, bicycles may be parked for eight hours during daytime, while egress stations parking times may be longer and overnight during weekends.

While trip context and parking duration are generally acknowledged as important factors for parking behaviour and demand, recent research suggests that parking needs at stations might also be linked to bike-train user's inherent bicycle parking preferences. Before the background of overcrowded bicycle parking in Delft, The Netherlands, and the discussion of introducing paid bicycle parking to decrease parking pressure, a hypothetical user survey among bike-train users at the main station, finds that while about 20% of bike-train commuters would pay and walk longer distances in exchange for secure bicycle parking, about 25% of bike train commuters are not inclined to walk longer, let alone pay, for secure bicycle parking. Other bike-train commuters have been classed as either "price-sensitive" or "walking-time-sensitive". Wherein the former would use paid bicycle-parking as long as the price is right, accepting possible longer walking times, while the latter are not willing to compromise on walking distances, meaning that when walking times got too long, they would switch the mode of transportation (Molin & Maat 2015). Based on their study, MOLIN & MAAT conclude that there is heterogeneity within bicycle parking preferences, meaning that there is a variety of different bicycle parking preference profiles among users.

A similar case study was conducted several years later in Dún Laoghaire-Rathdown County just south of Dublin, Ireland. The difference in prominence in cycling between cases is significant, as the Netherlands have high modal shares of cyclists and bike-train users, while in Dún Laoghaire-Rathdown County the modal share for cyclists is as low as 3,4 % in 2019 (Egan et al. 2022). EGAN ET AL., as well find that there are different distinct bicycle parking preference profiles (ibid.), statistically proving diverse bicycle parking preferences in low-cycling

contexts. Crucially the study also finds that only some of the preference groups would cycle to stations more, if there was a better provision of safe bicycle parking (ibid.).

FOURNIER ET AL., in their Montréal-based study, connect the finding of heterogenous bicycle parking preferences with the existence of different sets of cyclist typologies and “[...] hypothesized [sic] that different types of cyclists would have different bicycle parking preferences” (2023, 1283). While the study, however, indicated that the prioritisation of important components for bicycle parking at different locations (home, work, metro stations, train stations) were the same across all types of cyclists (free of parking fees, proximity to destination, and secure accessibility), the overall interest in secure bicycle parking at different locations varied to some degree from cyclist type to cyclist type (ibid.).

In summary, the existence of heterogenous bicycle parking preference groups allows for two insights. First, this indicates that more high-quality parking is not in every cyclist’s interests. Secondly, in practice, it is important to provide a varied and diverse parking offer to accommodate for different parking preferences.

3.4 Model of Factors for Attractive Bicycle Parking at Stations

The previous reading of literature and conceptualisations by other researchers on factors and built qualities impacting the attractiveness of the bike-train, has highlighted the importance of a wide arrange of those. In order to organise those factors, KARGER ET AL. conceptualisation of the bike-train as one transportation mode, set up of different segments and the assumption that all of its segments’ attractiveness impacts the overall attractiveness of the bike-train (2016), can be of help.

One central component of interest for the attractiveness of the bike-train in this study is the bicycle parking at stations. As alluded to above, one of the most important factors for making attractive bicycle parking, to both active and potential users, appears to be security from theft, weather, vandalism and damages. Good security and perception thereof can be provided, according to literature, through design choices, such as appropriate locking opportunities or installing CCTV cameras, but also through its location within good public eye. Proximity to station entrances and platforms appears to be a noteworthy factor, while fees for bicycle parking generally

demotivate usage of bicycle parking facilities. The existence of different bicycle parking preference typologies suggests the importance of a varied bicycle parking offer as some groups might be alienated from using the bike-train entirely, if their demand for free bicycle parking is not met.

For the way between origin and station or station and destination, connectivity is an important factor. Visibility and safety of the local bicycle infrastructure are important to create good connectivity between local bicycle network, bicycle parking and station. At stations and during the train travel, comfort is an important factor. Comfort refers to meeting special needs of bike train users, such as the need to keep a professional appearance or maintain or repair the bicycle, or the possibility to take their bicycle on the train. Those needs can be accommodated by providing drinking fountains, mirrors or self-operated bicycle repair stations, or in more complex cases giving access to showers and changing rooms.

It is important to note that this framework does not allow for an hierarchical understanding of factors. Additionally, it is suggested, that factors must be understood in the relative context to the local situation. As an example, under given circumstances, parking cyclists may be willing to sacrifice proximity (Abris et al. 2016) or shoulder parking fees (Molin & Maat 2015) for security. This falls in line with KILSTI-HALS' finding that there is no definite answer to what the most important factors for good bicycle parking are (2022). In summary, important factors for the attractivity of the bike train can be modelled and visualised as in Figure 7.

Segmentation of Bike-Trian	Origin	Access Travel	Access Station	Train Travel	Egress Station	Egress Travel	Destination
Important factors for attractiveness			<i>Bicycle Parking: Security</i>		<i>Bicycle Parking: Security</i>		
			<i>Proximity Cost</i>		<i>Proximity Cost</i>		
			<i>Variety</i>		<i>Variety</i>		
		<i>Facilitates at the train and station and train: Comfort</i>					
	<i>Bicycle network: Connectivity, Safety & Visibility</i>				<i>Bicycle network: Connectivity & Visibility</i>		

Figure 7 Important factors for the attractiveness of bicycle parking and the bike-train building on Kager et al..

4. Methodology & Research Design

In the following section the overall research design, choice of cases and methods applied are explained in detail.

4.1 Overall Research Design

The research questions are to be addressed through a qualitative, abductive and exploratory research design. Unlike quantitative research, where phenomena are examined in isolation to find generalisable results through the elimination of subjectivity (Flick 2014), in quantitative research it is acknowledged that “[m]ost phenomena cannot be explained in isolation [as] a result of the complexity in reality” (ibid., 37). Rather, qualitative research is “[.]interested in subjective meaning or the social production of issues, events or practices [...]” (ibid.,628). Given the complexity of the research subject of cycling and commuting behaviour bicycle parking is embedded in, a qualitative research design can help highlight local dynamics and conditions. The qualitative character of the thesis’ research design is primarily reflected in the choice of methodology for data collection and employing an abductive approach.

Choosing an abductive research design implies “that rather than setting all preconceived theoretical ideas aside during the research project, researchers should enter the field with the deepest and broadest theoretical base possible and develop their theoretical repertoires throughout the research process” (Timmermans & Tavory 2012, 180). Meaning that here, various preconceived theoretical perspectives and the results of a scoping literature review surrounding bicycle parking practices are set into relation with the results of fieldwork with different case areas and findings from expert interviews. The advantage of working abductively over the application of grounded theory is, that pitfalls such as re-discovering well explored domains are avoided (ibid.), as well as that existing theoretical notions on bicycle parking can be expanded upon.

The research design is exploratory in nature as a largely underexplored research field is openly approached with a broad methodology and theoretical notions in order to make new, theorising statements and uncover novel complexities and issues (Swedberg 2020).

The research process has been conducted in two phases. The first phase has consisted of tabletop research, that has been ground laying for both the development of an analytical framework based and the assemblage of a scoping literature review. Contextualising the research project with theoretical concepts of social practice theory, design theory, notions of culture, and organisational-collaborative theory, as an analytical framework, aided the analysis of the data gathered during fieldwork, but also builds an understanding of the theoretical connection between bicycle infrastructure and cycling practices overall. The scoping literature review, on the other hand, has a more applied character. The literature review created an overview over the existing findings on criteria and factors impacting the attractiveness of the bike-train as a mode of transport. This knowledge was operationalised during fieldwork and informed the qualitative mapping and observations.

The second phase of the research process was the execution of the fieldwork, which was comprised of several methodological components. As a first step, the built environment surrounding the stations and bicycle hotels were assessed and mapped. Then over an extended period of about three weeks auto-ethnographic fieldwork was conducted to emerge into local cycling practices and use and experience local stations and bicycle parking infrastructures. At this point, observations, and spontaneous interviews with users of bicycle parking infrastructure were conducted. Lastly, a series of expert interviews with different actors in intermodality and bicycle planning and -parking can give some important insights into additional information.

The choice for cases to work with is informed by substantial criteria, meaning that specific features of the individual locations are decisive for their adaptation (Flick 2014). But it is also informed my practical concerns of the auto-ethnographic fieldwork, mainly if a routinized bike-train commute could potentially make use of the stations bicycle parking. One key consideration were the size and the occupancy rates based on sold subscriptions of bicycle hotels under the assumption that they give an indication of the popularity of bicycle parking and cycling to the respective stations (see Figure 8). This is to have both examples of more and less used bicycle hotels in the case selection. Another criterion is related to the population density surrounding these stations. While the stations and bicycle hotels between Stavanger and Sandnes are all located within connected densely populated urban tissue, stations south of North-Jæren are mostly situated in or adjacent to smaller townships surrounded by agricultural land-use. Taking a rural station into the case selection can help fill gaps in research as most

studies and research on bicycle parking were conducted in urban areas (Heinen & Buehler 2019). Based on these factors, the stations Stavanger S, Gausel and Bryne were chosen as illustrative cases.

Station	Bicycle Parking Spots at the Bicycle Hotel	Average Occupancy (Jan-Nov 2023; Based on subscriptions)
Bryne	46	132%
Egersund	36	85%
Gandal	-	-
Gausel	90	11%
Klepp	52	27%
Mariero	-	-
Sandnes	70	58%
Stavanger S	42	130%
Øksnavadporten	-	-

Figure 8 Table: Bicycle hotels along the Jærbanen, Bicycle parking spots, and average occupancy (Parking subscriptions/parking spots). Based on numbers by Bane NOR (Bane NOR 2022).

4.2 Mapping of Case Areas

The choice of mapping as a method is inspired by systematic approaches by KAGER ET AL., highlighting the importance of a holistic understanding of an intermodal journey by bike-train set up in different segments, with different criteria impacting attractivity pertaining to them. The qualitative mapping therefore is to unveil an initial outlook on how some of the criteria are met in case areas. Furthermore, with regards to the auto-ethnographic fieldwork conducted after, the mapping helped generate awareness and familiarity for the new environments.

The mapping conducted covered quality and occupancy of bicycle parking and surrounding cycling infrastructure at the case areas. To develop a vocabulary and distinctions for accessing bicycle parking the mapping have been informed by the synthesised typology for bicycle parking in public spaces (see Figure 4, 24). The mapping, in addition to the documentation of built characteristics of bicycle parking, also aimed at collecting data on usage by counting bicycle parking occupation at different observation days. Although this does not immediately allow to comment on important factors impacting the attractiveness of the bicycle parking in question, it helps to give an indication of what bicycle parking is frequently used by cyclists. Further, the literature review highlighted, that different services also are important for increasing stations' attractiveness to cyclists, therefore those are also mapped if found in station vicinity. All this was combined in an observation and mapping guide (See Appendix B) to inform the data-collection.

The primary mode of data collections were personal visits of stations and bicycle hotels and documentation through Arc GIS Fieldmaps, photos, and fieldnotes. Before this, base-maps were created using publicly available data from Geo-Norge and OpenStreetMap, that on the one hand aid the visualisation, and on the other hand help get an overview over the existing bicycle infrastructure surrounding the stations. Mapping took place between the 1st and 19th of April, but data on the occupation of bicycle parking was only taken on days without any strong weathers. This was to accommodate for the fact that, although modal splits in North-Jæren are less affected by wind and rain than in other cities, weather is an important factor on daily cyclists (Böcker et al. 2019). This is also reflected in the sales of bicycle hotel subscriptions, which typically go down by a third during winter months (Røhl et al. 2018). Further, occupation of bicycle parking at stations was counted at least twice, once between 8-10 o'clock and once between 16-18 o'clock to cover possible fluctuations due to commuter cycles.

From a theoretical perspective the activity of mapping is highly complex as “[i]t is a practice of drawing relations together in and through movement, of moderating our everyday lives between what Doreen Massey describes as the fixity of representation and the openness of space” (Wilmott 2020, 9). This hints at the epistemological tension behind maps, as it is an attempt to condense multidimensional, everchanging data into a usually fixed two-dimensional representation, always making them a simplification. This is a relevant limitation and is addressed through the way data is analysed and presented. Results of the mapping and

subsequent analysis are presented in the form of the station profiles comprising of illustrative maps visualised in Arc GIS pro, and text closely describing the different qualities of bicycle parking and station characteristics, as well as highlighting those that stand out in comparison to the other stations.

4.3 Auto-ethnography and mobility

The auto-ethnographic component of the fieldwork takes an important role in the research design. In short, auto-ethnography as a method allows the researcher to obtain knowledge through data collection during personal immersion and participation in a specific practice or culture. It shares, as CHANG describes, methodological processes such as systematic data collection and the analysis and interpretation of it to achieve cultural understanding with other ethnographic methodologies (2008). However, “[a]utoethnographers [sic] use personal experiences as primary data. The richness of autobiographical narratives and [.]insights is valued and intentionally integrated in the research process and product [...]. [I]ndividual stories are framed in the context of the bigger story, a story of the society, to make the autoethnography ethnographic” (ibid., 49).

Auto-ethnographic methodology has been applied in a mobility context before to research cycling both as a sport and a daily form of commuting. This has been presented as the methodological adaptation of the “sensory turn” within mobility studies, highlighting changing embodied, affective and emotional components that are constitutive of cycling practices and culture (Larsen 2014). LARSEN argues, that to “[...] to research cycling through ethnographic participation one needs to be on the move, to study it as it takes place in situ – on the street and in the city, as and when it is performed” (2014,60). As argued in the above, bicycle parking as an activity is embedded in the social practice of cycling. An auto-ethnographic methodology, by emerging and participating in local practices of cycling, parking, and commuting as a researcher, can help uncover covert relations between materials, meanings, and skills building on SPT and shine light upon, those embodied, affective and emotional components referred to by LARSEN.

For the successful application of the autoethnography as a method,”[...] autoethnographers [sic] are expected to treat their autobiographical data with critical, analytical, and interpretive

eyes to detect cultural undertones of what is recalled, observed, and told. At the end of a thorough self-examination in its cultural context, autoethnographers [sic] hope to gain a cultural understanding of self and others directly and indirectly connected to self” (Chang 2008, 49). In short, the auto-ethnographers must ground their personal experiences in the local contexts to avoid an excessive focus on their subjective experiences and to be able to make analytical ethnographic statements, as both culture and social practice are shared within a group and not isolated within individuals. In practical terms avoiding such a pitfall can be done by conducting ethnographic observations, walk-, or ride-along interviews and documenting those through for example field notes, video- or audio recordings, journaling, and/or photos.

In practice, the fieldwork on bicycle parking and bicycle hotels in North-Jæren is conducted through routinised intermodal commutes. To avoid pitfalls, such as the overreliance on memory or the overemphasising the narration of personal experience of cultural analysis (Chang 2008), observations and in-situ interviews were conducted and documented through photos, journals, and audio-recordings. On a personal level, the conducting of fieldwork required a change of habit, as during the work with the thesis I lived in 10-minutes walking distance from the city’s library, where I spent most workdays reading and writing for my thesis, making a bicycle-train commute virtually unnecessary. Over the period of three weeks, I commuted to Sandnes and Bryne’s municipal libraries for my daily study halls instead, using variations of bicycle-train. That this is type of commuting behaviour is a pre-determined choice, rather than organic, has consequent implications on the scope of the knowledge that can be gained. For example, the personal choice of transport mode is not based on an independent decision-making process but prescribed by the study design, thus making it more difficult to examine personal rationales for choosing the bicycle-train.

4.3.1 Participant Observations

During the fieldwork, a set of observations, mostly focusing on but not limited to bicycle parking at stations, are conducted. Observations incorporate subjective embodied experiences such as hearing, seeing, feeling and smelling. FLICK proposes a methodological approach to participatory observations structured into three stages. Firstly, the descriptive phase of general observations, that serves as an introductory phase of the researcher to the field. This is followed by the second phase of focused observations, that more closely observe relevant processes and

practices surrounding the research question. Lastly, resulting findings are followed up in a third phase of selective observations for further investigation (Flick 2014). The advantage of conducting participant observations embedded in auto-ethnographic fieldwork is that the researcher's deepened involvement and integration into existing processes. In the context of this thesis, the integration into the field is further aided by the mapping of stations conducted beforehand.

In practice, participant observations have been conducted procedurally during auto-ethnography and were documented by photo or through fieldnotes. Although the auto-ethnographic fieldwork targets the entirety of the commute, the participant observations are focused on bicycle parking practices and infrastructure at stations to sharpen the research on those specific aspects.

4.3.2 In-Situ ethnographic Interviews

In-situ ride- or walk-along interviews have been used as a method to research different phenomena in a mobility context to learn from native practitioners while both researcher and native are in the field. To give an example in a cycling context, LARSEN uses ride-along interviews with strangers to collect data on cycling practices in different cities (2014). Through these interviews data is collected through a combination of participant observations and conversations, tapping into respondents affective and practical knowledge about a practice (Kamarudin et al. 2022).

In-situ interviews were conducted during the auto-ethnographic fieldwork to gain further insights into how people use and perceive bicycle parking and related infrastructure at stations. Whenever possible those interviews were audio-recorded with the consent of the interviewee, but as these interviews are short and spontaneous, most documentation was done through audio-notes taken shortly after the interview.

4.3.3 Analysis

As CHANG points out: "Data collection and interpretation are at the crux of autoethnography [sic]. What you search for in the mass of data is indicators that can explain how your life

experiences are culturally, not just personally, meaningful and how your experiences can be compared with others in society” (Chang 2008, 137). To uncover these experiences an analytical strategy is applied that organises the data collected according to themes pertaining to the analytical framework of the thesis.

The goal of the analysis of autoethnographic data “is seek to produce aesthetic and evocative thick descriptions of personal and interpersonal experience”, that are often presented in popular-style, almost belletrist texts (Ellis et al. 2011, no page). However, given the scope of this research project the results of the ethnographic fieldwork are presented in an analytical rather than evocative form (Ngunjiri 2010), focussing on presenting findings relevant to the thesis’ research interests.

4.4 Expert interviews

To gain an insight in the institutional dynamics behind the design and facilitation of bicycle parking at stations along the Jæren Line, but also to exploratively uncover possible challenges and innovations, a series of semi-structured expert interviews were conducted. Done well, expert interviews can be a useful way of collecting data on, for example, individual-, group-, or institutional expertise, work, or procedures. This requires a careful selection of interview partners, as well as the prepared and good execution of interviews (Flick 2014).

To achieve this, potential interviewees were recruited because of their position in a relevant institution and/or work experience with bicycle parking in the case areas, either as a researcher or as a practitioner in the field. This targeted recruitment happened partially building on contact information given by an initial contact person, and through targeted research on relevant experts. To help lead the conversation during the semi-structured interviews a thematic interview guide comprising some of the essential research interests was drafted (see Appendix C). Building on this general thematic guide, more specific interview guides were compiled in preparation for the individual interviews.

The interviews were scheduled up to three weeks ahead of time and were conducted between the 5th and 19th of April 2024. To ensure a that respondent has ample time to prepare for the interview and the ability to intervene if questions were beyond their expertise, an interview

guide with thematic questions and procedural information, alongside an information- and consent form on the handling of personal data, were sent to the respondent in due time before the interview. All interviews were done in person with the exception of two which were conducted online, and all respondents had the choice to choose between English or Norwegian as the language of the interview. As a researcher, whose mother language is not Norwegian, but speaks the language at a certified B2 level, conducting an interview in a foreign language may cause some communication issues. This was addressed through an open communication with interviewees in case of comprehension issues.

For easier documentation and processing, the expert interviews were audio-recorded and automatically transcribed. Further, respondents have been anonymised by the allocation of an informant code. Out of all the experts contacted, seven participated in an expert interview. This covers some of the important actors for the facilitation of bicycle parking along the Jæren Line. However, there were no interviews with experts from the municipalities. This is a relevant limitation to the data collected for later analysis.

To explore the data from the interviews in relation to the thesis' research interests a thematic analysis is conducted. "Thematic analysis is a method for identifying, analysing and patterns(themes) within data" and is a flexible way of analysing qualitative data regardless of methodological or theoretical background (Braun & Clarke 2003, 79). BRAUN & CLARKE propose an approach to thematic analysis, which is conducted in different steps where codes and themes are extracted from the data set and are evolved through continuous work with the data. Unlike codes, which mark precise features of the data, themes are broader and ought to "capture[.] something important in relation to the research question and represent some level of patterned response or meaning in the data set." (ibid., 82). Transcription and coding have been done in the language that the interview has been held in. For the presentation of individual quotes in the results section, individual passages have been translated by the author.

4.5 Ethical Consideration

During the writing and fieldwork for this master's thesis several ethical concerns surfaced concerning the protection of participants in this research project and independence of research. Those are to be addressed in this section in reflection with "Guidelines for Research Ethics in

the Social Sciences and the Humanities” published by The National Committee for Research Ethics in the Social Sciences and the Humanities (hereafter NESH).

For the expert interviews conducted, several participants were recruited from public organisations and NGO’s. To document their voluntary, informed, and unambiguous consent to participate in the study as well as to inform them of their rights for the processing of personal data, participants were sent an information and consent form ahead of the interview. Further, a certain time of the interviews was dedicated to informing the interviewee about the context of the study and their role as a participant. Further, in accordance with the ethical guidelines by NESH, steps were taken to guarantee participants their anonymity and personal data is being handled confidentially. To ensure this, collected data was only stored and processed with UiT approved data processors (NESH 2022). Additionally, the thesis’ data management plan has been assessed and approved by *Sikt*’s data protection services.

5. Results and Analysis

In this section the results from the data collection and analysis are being presented and discussed. The section is structured method by method, starting with the presentation of the results of the qualitative mapping of the case areas followed by the results from the auto-ethnographic fieldwork. This section is concluded with the analysis of the expert interviews.

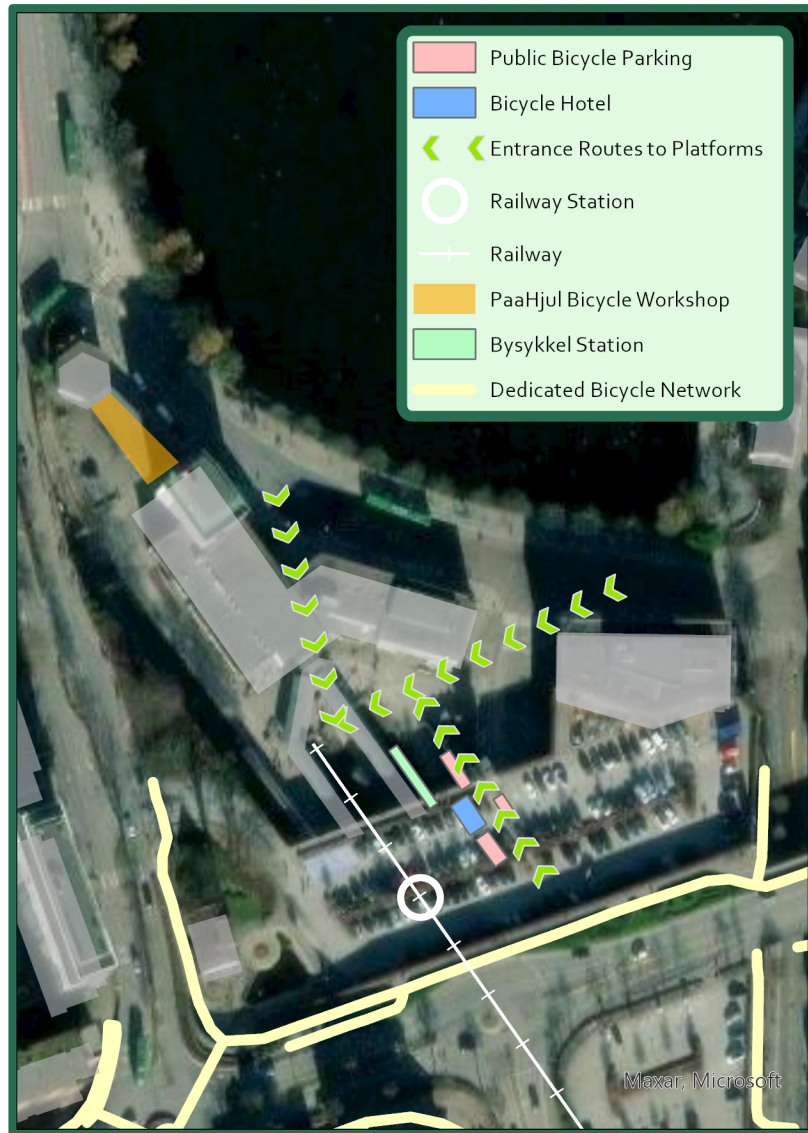
5.1 Qualitative Mapping of Bicycle Parking at selected Stations

Based on the data collection at stations (see Appendix D) aided by the mapping guide, three descriptive station profiles have been developed. To help visualise the overall layout of the stations data has been used to create illustrative maps.

5.1.1 Stavanger S

Stavanger S is located near the historic old town of Stavanger and features several convenience stores on its premises or in its immediate surroundings. While the station house and the platform are at the same level as the city lake, parts of the platforms, mobility hub, and bicycle parking are covered by a parking lot that is forming a dominating superstructure to most of the station. Next to the station house there is also a bicycle repair shop, *PaaHjul*, operated by the philanthropic organisation Church City Mission (nor. *Kirkens Bymisjon*).

The public bicycle parking, for the most part, is located underneath this superstructure and the staircase leading up to the parking lot. It is thereby close to the natural entry ways to the station (see Map 3). There is a contingent of roofed bicycle parking with a contingent of public racks (see Appendix A) that offer parking to about 34 bicycles. During visits there abandoned bicycle parts locked to one of the racks. Notably, there a sign in the form of a bicycle wheel by the Norwegian Automobile Federation (nor. *Norsk Automobil-Forbund*, hereafter NAF) chained in a visible position. It marks the area as exposed to bicycle theft, with a QR-link to NAF's mapping of bicycle theft in Norway.



Map 3 Stavanger S, overview map

Adjacent to the public parking, there is Stavanger’s bicycle hotel which offers a diverse set of bicycle racks specifically designed for different types of bicycles, including charging ports for e-bikes and lockers for gear, which require an individual external lock. There are several CCTV cameras at the hotel, one of them visibly broken hanging from the wall. The sliding door to the hotel opens upon request via Bane NOR’s parking app, giving good clearance also to larger sized bicycles, and the door can be again opened via a button on the inside when exiting. Some of the bicycles parked in the hotel bore signs of abandonment, such as deflated wheels, and were marked with tags for removal. Further behind the bicycle hotel, there are also twelve run-

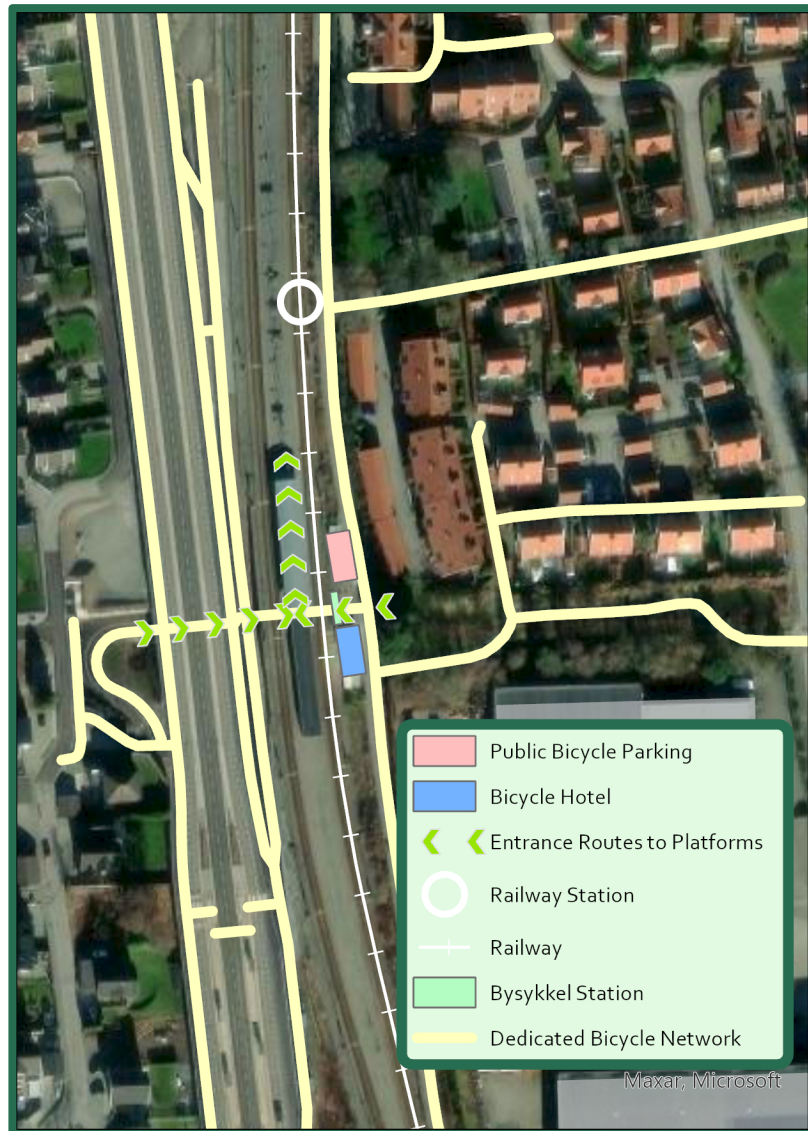
down bicycle lockers, that were out of order and to be replaced by the municipality. A small set of open-air bicycle parking is also located at the top of the staircase offering locking for about six bicycles, that were however frequently occupied by e-scooters rather than bicycles. Further, there were people using privately operated garages at the very back of the station covered by the parking lock to store their bicycles.

In terms of connectivity to the immediate cycling network, there is no dedicated cycling infrastructure to the station's bicycle parking. Approaching from the north, cyclists have to either share the road with the many busses frequenting the many bus stops in front of the station, or cycle on the pavement that is usually crowded by pedestrians waiting at the many stops (see Map 3). To the south, behind the elevated parking lot, there is separated cycling infrastructure connecting to the cities bicycle network. To reach it, while avoiding the busy bus roads in front of the station, requires cyclists to take the bicycle on an elevator or carry it up the stairway with an unfinished bicycle ramp. Once at the station however, bicycles are easy to transport on the platform.

5.1.2 Gausel

Gausel Station, located between the centres of Stavanger and Sandnes in a residential area, is not equipped with a station house. Parallel to the west of the station runs the county road 44 (nor. *Fylkesveg 44*), that was recently developed as a bus-express-way. The Gausel bus stop is located 50 meters from the stations west-side entrance, that is designed as an underpass. The east-side entrance immediately emerges into residential land-use.

Public bicycle parking is located only at the east-side entrance to the station. On the southern side of the station's entrance there is a bicycle hotel, designed as a bicycle cage, with an app-controlled sliding door as at Stavanger S, and a set of two-tier bicycle racks, offering spots for 96 bicycles. On the right of the entrance, there is a contingent of 50 public bicycle racks, covered by a roof with lights. Notably, on all observation days, bicycle parking at Gausel station was only occupied by a handful of bicycles.



Map 4 Gausel station, overview map

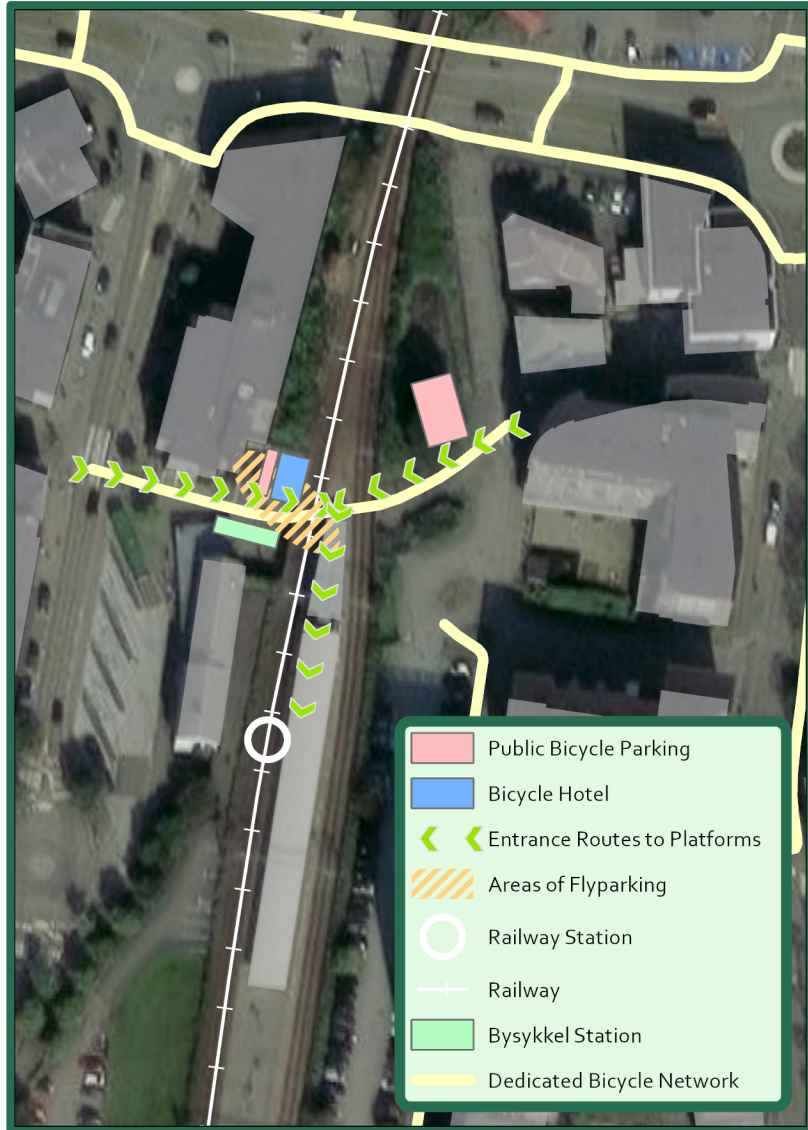
Gausel station is well connected to the bicycle network in its immediate surroundings (see Map 4). Five meters from the east-side entrance, the municipal cycling route *Gandsfjordruta* passes parallelly to the station. The *Gandsfjordruta* connects Stavanger with Sandnes along a North-South axis along the scenic waterline of the Gandsfjord and is designed as a combined cycling and pedestrian way, completely separated from automobile traffic. On the west-side entrance, Gausel station connects to the municipal cycling route *Hinnaruta*, that is forming a parallel route to the *Gandsfjordruta*. The *Hinnaruta*, however, is a cycling path painted on both sides of the county road 44, where cyclists commute on the same road as cars with speed limits

largely regulated at 40 km/h. Both cycling routes connect to Stavanger and Sandnes, as well as Forus. The connection between the west-side entrance and underpass of the station, bus stop, *Hinnaruta*, as well as the residential areas to both sides is established through a spaciouly designed and decorated underpass dedicated to pedestrians and cyclists only. Station entrance, county road underpass, bus stops, and the platforms of the station are well connected through ramps and lift, that offer ample space for comfortable usage for cyclists on bike with enough room for passings.

5.1.3 Bryne

Bryne station is located within 200-meter proximity to the town's centre. On the west side of the station, adjacent to the entrance to the platforms, there is a small station house equipped with a convenience store and a waiting room for passengers. There is also a bus station in front of said house, making the station a local mobility hub. The entrance of the station also serves as an underpass connecting with the area to the east of the station, where the Jæren Forum business park is located.

Public bicycle parking is located in the immediate surroundings to both sides of the entrance. To the eastern side there is a contingent of open-air, publicus bicycles racks for about 50 bicycles. On the western side, immediately across one of the entrances to the station hall, there is a bicycle hotel, containing two-tier bicycle racks offering spots to 64 bicycles. This bicycle hotel also features the previously described app operated sliding door. Next to the bicycle hotel, there is another set of two-tier bicycle racks for 48 bicycles. The area surrounding the western bicycle parking, but also under the underpass of the station, was occupied by fly-parked bicycles (see Map 5.). Even though observed fly-parked bicycles stayed clear of pedestrian and cyclists' routes, they did impair the access to the upper tiers of the open two-tier bicycle parking.



Map 5 Bryne station, overview map

Similarly to Gausel station, the underpass and entrance of the station serve both as a pedestrian and cycling way. It offers access to the platforms, located perpendicular to the underpass via a stairway, lift and a ramp that is wide enough to give enough space to two cyclists pushing their bicycles side by side. However, on the western side, the station does not connect to any immediate dedicated bicycle infrastructure. On the eastern side it connects to a pedestrian zone and calmer residential streets.

5.1.4 Summary

To summarise the findings of the qualitative mapping, all bicycle parking at stations is located in close proximity to platforms and generally easy to access. In terms of built quality, Stavanger's bicycle hotel and public bicycle parking, with their diverse types of racks and roofed bicycle parking, are of highest quality by comparison. However, Bryne station, where bicycle parking has been proportionally to the spots available the most occupied during visits, the built quality, particularly of public bicycle parking, is the lowest with no roofed contingents of bicycle parking. The existence of fly-parking could therefore indicate that bicycle parking demand exceeds the availability of adequate bicycle parking.

At all stations there were some abandoned bicycles or bicycle parts left in public bicycle parking or -hotels, but, except for Bryne, not at an amount that they significantly reduce accessibility and availability of bicycle parking. Looking at factors surrounding connectivity and how the stations bicycle parking links with the surrounding bicycle network, Stavanger S is characterised by the fragmented access paths for cyclists, while Gausel has clear and well-built connections with the local bicycle network.

Ultimately, it can be said that the stations mapped have differing qualities from the perspective of a bike-train commuter. Higher quality of some bicycle parking and stations, however, did not translate into higher occupancy of respective parking during data collection.

5.2 Auto-Ethnographic Fieldwork

In the following section the results of the auto-ethnographic fieldwork are presented following a thematic organisation into materials, competences and meanings inspired by the categorisation of elements in social practice theory. This organisation according to the elements of SPT is, however, only to give an overall structure to the analysis and does not delineate clearly between elements. In a last summative sub-chapter, relations between different elements are highlighted.

Fieldwork was conducted over the course of several weeks in April 2024, during which bike-train transportation was used for commuting on a daily basis. Data from fieldnotes, observations and six in-situ interviews with local cyclists forms the basis of the following analysis.

5.2.1 Materials

During the fieldwork, several bicycle parking at different stations were visited and used. To get to those, parts of the local bicycle network, particularly the *Gandsfjordsruta*, were frequented. Here a cyclist in casual clothes and on mechanical bicycles stuck out, as most cyclists during rush hour commute at greater speeds on racing- or e-bikes, usually dressed in sportive garment, yellow jackets and helmets. This observation falls in line with the general trend for increased use of e-bikes in North-Jæren, as quantitatively proven by BJØRNARÅ ET AL. (2023). At stations, however, bicycles ranged from run-down mechanical city bikes and old mountain bikes to new and modern e- and racing bikes parked at various locations. Noticeably, more expensive-looking bicycles were more predominantly, but by no means exclusively, parked in bicycle hotels. Indeed, at stations with a higher number of parked bicycles, such as Stavanger and Bryne station, there was a heterogenous mix of more and less expensive bicycles parked at all parking locations, or even fly parked in the case of Bryne. Also, many of the parked bicycles had helmets locked to them, but often times helmets were also just loosely attached to its handlebar (see Figure 9). This is interesting as most bicycles are locked with chain locks, rather than U- or O-locks that afford easy locking of helmets.



Figure 9 Image gallery over the use of bicycle helmets. Left: Bicycle helmet loosely attached to the handle. Right: Helmet stored in the bicycle's basket

At various locations, the designed elements at parking locations impacted, how much and in what fashion infrastructure was used by cyclists. One such case, where designed elements did not correspond with user practices, were the two-tier bicycle racks located in- and outside of the bicycle hotel at Bryne station. Ideally, according to the product description, a two-tier bicycle rack offers a space efficient bicycle parking solution. Users can either park their bicycle comfortably on the lower tier, or pull out the rail of the second tier, which then folds down, allowing the user to lift the bicycle onto the rail and push the rail back in. As a last step the user can lock the bicycle onto the welded frames of the bicycle rack (Euroskilt AS, n.d).

However, as could be observed at the location in Bryne, neither in the bicycle hotel nor the open-air parking right next to it, have the upper tiers of the two-tier bicycle racks been used to any large extend. At the same time, the fly-parked bicycles surrounding the rack placed outside made it difficult to pull out the upper tier and turn the bicycle to lift it horizontally on to the

rail. Further, it can be hypothesised that this operation is even more difficult if the bicycle to be lifted is a heavy e-bike. Looking more closely at the rails of the bicycle racks, it appears that their diameter is too narrow to accommodate for wider tires of mountain bikes (see Figure 10, top-left & bottom-right), which are commonly used by bike-train commuters, making them sit unstably on the railing. Lastly, at a relatively full bicycle rack it becomes difficult to reach around the parked bicycle to lock the bicycle's frame, front wheel, and rack together to achieve the highest possible security. Accordingly, many users resorted to just locking their rear wheels to the rack's frame, or just locking it without attaching it to any super structure (see Figure 10, bottom-right.). This indicates, that despite the two-tier bicycle rack's design intentions, there is a mismatch between the designed elements inscriptions and the materials commonly used by practitioners. This results in only a partial usage of the two-tier bicycle rack, making the two-tier function virtually irrelevant, but also suboptimal locking of bicycles, leaving bicycles locked less safe. Applying KILSTI-HALS' rule of thumb that bicycle parking is not well done if it is not taken into use, even though there is demand for parking (2022), indicates, in the case of Bryne station, that two-tier bicycle parking are not good solutions for the existing parking needs.



Figure 10 Image gallery on two-tier bicycle Parking. Top-left: Bicycle tires too wide for the railing. Top-right: Bicycle parked from the opposing side. Bottom-left: Scarcely used upper tier. Bottom-right: Inadequate locking possibilities for parked bicycles.

Unlike the two-tier bicycle rack, other rack types have shown to fit better with cycling practices of bike-train commuters. Installed most at the stations visited and mapped was the publicus rack. Consisting of an arched steel frame that is bent at the top, racks were either mounted on steel plates screwed to a concrete foundation or installed with the help of individual foundations. The racks are either assembled to be used from one side, or from both sides (see Figure 11).

During use and observations, these bicycle racks stood out because of their variety they can be used to park different types of bicycles. The space under the arched frame both offered enough space and height to allow for mountain bikes and others bicycles with wider wheels to parked in a stable fashion. Generally, users have parked the front wheel in the frame of the bicycle rack where it was moored through both bicycle- and rack frame. Particularly in crowded parking situations, however, several instances of parked bicycles were observed, where cyclists parked their bicycle rear wheel first, so that the bicycle's handlebar steered clear of the other bicycles' (see Figure 11, bottom-left). However, the rack did not allow for adequate locking for supersized bicycles, for example when a stroller was attached to a bicycle (see Figure 11, bottom-right). At certain instances mismatches between different materials can cause intended users to park elsewhere. In the case of the publicus rack, a bicycle lock needs to be flexible enough and the chain long enough, otherwise bicycles may not be able to be locked optimally, through bicycle frame, front wheel, and rack. In some instances, this led to bikes being fly-parked just next to publicus racks to lock them by the frame, at the expense of the parked bicycle's stability (see Figure 11, bottom-right).



Figure 11 Image gallery of public bicycle racks. Top-left: Parked bicycle with stroller attached. Top-right: Bicycles exclusively parked under roof. Bottom-left: Bicycles parked both forwards and backwards. Bottom-right: Bicycle parked outside of rack.

5.2.2 Meanings

One aspect that was especially highlighted during casual interviews with other cyclists at bicycle parking facilities, is the role bicycle theft takes for cyclists who commute to stations. Many expressed a laconic attitude towards the safety and security of their bicycle. One informant and user of the bicycle hotel recounted that he had been a victim of bicycle theft and that accessories to the bicycle (such as side mirrors) had been stolen from the bicycle hotel several times. He did not feel that he had received any help from either Bane NOR or the police in resolving the thefts, despite having actively pursued the matter. Because the informant was unwilling to give up on cycling, he took matters into his own hands, and had intentionally degraded his expensive bicycle by applying paint and duct tape, in an effort to make it less attractive to thieves and prevent theft this way. The informant expressed that he had given up on receiving any help on the matter of theft from any public organisation and was waiting for functioning bicycle boxes as an alternative parking option, in hopes for more safety for his bicycle and accessories.

This is, no doubt, an extreme example of a dedicated bike-train commuter, who had acquired reflexive awareness about his bicycle parking needs. But nonetheless, it illustrates quite clearly what harmful effects bicycle theft has on the victims of it, as is illustrated by MOEN & FOSSE:

The bicycle owner remains with the loss and disappointment and other feelings, which can be anger, rage, stress, sadness or loss. Further, these feelings can, in the end, lead to fear, anxiety and mistrust towards society and police, which itself can become a reason to not want to use the bicycle again, because one does not to relive this unpleasant experience. And, because one has not the trust that it will not happen again (Moen & Fosse 2015, 90; translated by the author)

In fact, all informants stressed that they were aware of the possibility of bicycle theft when leaving their bicycle parked at a station, and some developed distinct behavioural adaptations in response. Another informant highlighted that by using a low-quality bicycle the informant assumes to lower the risk of bicycle theft and the economic damage in case of it. Therefore, the informant saw no personal need for using the available bicycle hotel.

The data-analysis suggests that the existence of the common threat of bicycle theft is a shared knowledge among bike-train users. They either experience it themselves, second-hand experience it when someone's bicycle is stolen in their social surroundings or they are made aware of it through remnants of theft at parking locations, such as destroyed bicycle locks and single bicycle wheels or -frames, or through signs warning of it put up by NAF.

5.2.3 Competences

During the fieldwork, several competences were revealed that were relevant in the context of bicycle parking. In fact, some of those competences may relate to the built design of bicycle parking at stations. As an example, while e-bikes generally elevated some of the requirements to bodily fitness when used for cycling, their weight requires, depending on the design of the station- and bicycle parking, a certain degree of strength when placing and manoeuvring the e-bike. In cramped parking conditions a heavy bicycle may need to be lifted or manoeuvred. Similarly, cycling to a station with low connectivity such as Stavanger, requires a certain degree of prowess and navigational skill, when sharing the streets with busses and pedestrians.

Before the background of the threat of bicycle theft, participatory interviews with informants revealed that cyclists, who park their bicycles at stations have developed a reflexive awareness of their own bicycle parking needs, what available parking options cover them best and what ways there are to increase their parked bicycle's safety. One informant and e-cyclist, for example, who normally cycles all the way to work, but sometimes uses the bike-train combination as well, has started taking out the e-bikes battery and carries it in a backpack during the day. This competence, to be able to optimise the protection of parked bicycles, is also reflected in the aforementioned adapted use of infrastructures that do not offer optimal locking, to increase safety of parked bicycle (see Figure 10, top- right)

Based on observations at Bryne station, where there is no contingent of under roof bicycle parking except for the bicycle hotel, users sporadically developed adaptive behaviour and brought their own bike caps or, more frequently, put plastic bags over the parked bicycles saddle to prevent them from exposure to rain (see Figure 12). This is something that was not observed at other stations, where there was a contingent of roofed bicycle parking.



Figure 12 Image gallery of adaptive behaviour. Use of caps and plastic bags to protect saddles from rain

5.2.4 Cycling Practices in North Jæren & Bicycle Parking in Case Areas

The analysis of data collected during the auto-ethnographic lays the foundation for qualitative statements about cycling as a practice around case areas, and nuances and relations to bicycle parking. Reflecting on findings by LARSEN's investigation of cycling practices in Copenhagen, it can be said that unlike in Copenhagen, where bicycles are usually cheap and people refrain from using specialised equipment (2017b), in North-Jæren there is a predominance of racing-, mountain-, and e-bikes, as well as the wide use of supporting equipment (helmets, vests, sports gear) among cyclists. This also allows the hypothesis that cycling, at large, is not only understood as a means of commuting, but also viewed as a sportive exercise. However, based on the observation of the mix of more less expensive bicycles at stations, it is theorised that bike-train commuters use less expensive, more expandable hardware, due to the awareness of bicycle theft, as it “[i]t requires nerves of steel to leave a much loved and cared-for bike where

[..] theft [is] an omnipresent risk” (Larsen 2017a, 64). This is a nuance to the mainstream cycling practice observed.

Overall, the data suggests that bicycle parking infrastructure and design at stations have a reciprocal relation with other elements through usage by bike-train commuters. Their design influences how they are used by practitioners, shaping to a degree meanings, competences, and materials, while those elements also impact how bicycle parking is used by practitioners. Thus, making bicycle parking an important element to the practice, highlighting its important role it should take for planners trying to promote cycling and bike-train usage.

5.3 Expert Interviews

In the following section the results of the expert interviews are presented. Although the interviews were explorative in nature and informants had different professional backgrounds and worked at different institutions, several reoccurring themes emerged from the data collected during analysis. The findings are therefore discussed in a thematic organisation.

To safeguard the informants’ anonymity, their names have been coded to only allow an association with the organisation (see Figure 13).

Institution	Informant Code
Bane NOR	BN1
	BN2
	BN3
	BN4
Kolumbus AS	KL1
Universitetet i Stavanger	UiS1
PaaHjul	PH1

Figure 13 Informant Codes for Expert Interviews

5.3.1 Bicycle Parking as a Measure and Changing Commuting Behaviour

During the expert interviews, the conversation surrounding bicycle parking often went beyond the built design and lead into a more general discussion of bicycle parking as a measure to increase intermodal travel and bike-train commutes along the Jæren Line. During the interviews, it became clear that bicycle parking is understood and recognised as one of many measures for facilitating for more intermodal travel. At the same time, individual organisations have only access to a limited number of these existing measures. In a wholistic perspective, those measures need to be coordinated well as one informant hypothesises:

UiS1: For example, the bus and the train can be both competitors, but they can also collaborate as a mode. So, it's a tricky situation. If you promote bicycle and bicycle parking, then you might take people away from public transfer [...] You have to have a common agenda on how to do this integration in order to get people out of the car and not just make them change between different [sustainable] modes.

Overall, the interviews suggest that there are two limitations to the effectivity of bicycle parking as a measure for increasing cycling numbers. One relates to bicycle theft and the safety bicycle parking provides to parked bicycles. Bicycle theft as a reoccurring barrier for people to pick up cycling to stations is something that was echoed both in the data collected during the interviews, but also corresponds to the findings of autoethnographic fieldwork:

KL1: We know that at stations, at least at Time station, that there are unbelievably many who do not cycle, because their bicycle has been stolen. And if they do cycle, they are not using their e-cycle or their good bicycle. They take the bad, unsafe bicycle, because if that is stolen, it is not a big crisis. It is an evil circle that we are in when it comes to cycling to stations.

The tools that the different institutions have for preventing bicycle theft at bicycle parking are mostly limited to different design solutions for built parking facilities. But when it comes to actual cases of bicycle theft, the organisations responsible for the facilitation of bicycle parking stand in the background, as one informant highlights.

BN1: The police don't have the capacity. This is a problem in society in general that it is so little prioritised to solve such cases [of bicycle theft] [...]. We know that our customer service receives a deal of inquiries about this. The reporting of it happens between the private individual and the police, and we don't report stolen bicycles, but we can provide photographic evidence. But even when there is photographic evidence, and it is delivered to the police. The police have already ... the case is already closed. So, it is a structural issue.

The second limitation relates to matters of communication. All informants highlight that there is a bandwidth of measures that were already in place, including bicycle parking infrastructures and the introduction of new mobilities, to make the bike-train an attractive alternative to commuting by car. To make potential users aware of this, informants emphasise the role of communication. There are conventional ways of reaching people, as has been the case with PaaHjul, when they started advertising their bicycle parking to the public:

PH1: The challenge is to get the information out. Long and wide enough. And on platforms that reach people. And then there's also what we call the jungle telephone, meaning that people talk to each other about it. We used social media and the social media of local businesses in Stavanger. So, there is a reminder at those places as well.

Similar steps were taken by Bane NOR, which recently released promotional advertisement videos for commuting by train instead of the car. On a more strategic level, one informant notes, that communication can be a difficult task:

KL1: It is one thing to do the physical facilitation on the stations. But what is missing entirely is how do we communicate this with the inhabitants. That you can cycle from Storhaug or Våland. Cycle down, park at one of these many alternative parking spots and travel on. [...] We have to go in and change people's habits and how they think about cycling.

These two findings highlight different aspects of the role bicycle parking takes within cycling as a practice, that at the same time can be viewed as limitations to how bicycle parking as a physical measure at stations can encourage cycling to stations.

5.3.2 Bicycle Parking and -Hotel Design

The second theme that emerged during the analysis of the data was pertaining to the physical design of bicycle parking and -hotels. One central aspect, that was frequently problematised, is the bicycle's safety at parking locations and what can be done to increase the safety of parked bicycles against theft.

One finding is, that at bicycle hotels, CCTV cameras and app-operated door offer only limited protection against bicycle theft, as thief's do not view it as an obstacle, and that this has been broadly acknowledged as a fact among different organisations. Further, as highlighted above the police do not utilise incriminating evidence produced by CCTV (see Chpt. 5.3.1). Indeed, this knowledge has been a driving factor behind the design of Norway's first and, so far, only staffed bicycle parking at PaaHjul in the centre of Stavanger.

PH1: So when you have bicycle cages [like the bicycle hotel], you can have guards that go around. But it is not protected entirely. If there's a camera, we see, the bicycle thief doesn't care about that. So therefore, we landed at the conclusion during our work with the municipality, that we have to have it [the bicycle parking] indoors.

Further noting that:

PH1: [...] I believe this is the best solution. Staffed, indoors bicycle parking. Because ... the bicycle is parked safely, dry and not exposed to weather, wind, rust and degradation.

Despite having extended opening hours, PaaHjul's staffed bicycle parking is primarily designed to be short-term parking for cyclists visiting Stavanger's city centre. And has not been used nor designed to be integrated into Stavanger stations bicycle parking portfolio. All though PaaHjul has only been opened in November 2023, the manned parking has attracted cyclists as clients, and there have been changes in people's behaviour, as more people come to the city centre with their expensive bicycles.

Another point concerning the physical design of the bicycle hotels, that also relates to the bicycle hotels' security overall, is pricing. Per today, a subscription to one bicycle hotel costs 50 NOK a month, which can be purchased through an app. This has been pointed out can also be a loophole in the bicycle hotels security as one informant deliberated:

BN1: There is no doubt that you can easily get into a bicycle hotel if you really want to. Either you pay the 50-crown bill, or you sneak in when someone else is entering.

At the same time, it is acknowledged by informants that the price of bicycle parking is also a factor to its attractiveness, as in the lower the price the more attractive it becomes, and that the price evokes expectations the customer has towards the quality and safety of the bicycle parking. Meaning, the higher the price the better the bicycle hotel ought to be. As a matter of fact, on a communication level, Bane NOR has taken steps to manage expectations of customers by lowering the emphasis on safety in their marketing of the bicycle hotels.

Also, in response to the security issues of the bicycle hotels several different organisations have sought to test out and place bicycle boxes at stations to offer safer bicycle parking solutions to e-cyclists.

KL1: [...] And what we see more and more now is, that the e-bikes need a little different bicycle parking solution than a bicycle hotel. We see that e-cyclists experience the hotels as quite insecure and as a cake stand for bicycle thieves [...]. So, we have looked at other solutions concerning bicycle boxes, which are less space efficient but better than empty bicycle hotels.

5.3.3 Organisational Foci, Overlaps, and Gaps

Another theme that stood out from the interviews are organisational focuses, gaps and overlaps when it comes to the development of stations and facilitation of intermodality and bicycle parking. Indeed, there has been collaboration between organisations on for example the strategic work with the “concretisation of the parking strategy along the Jæren Line” or the facilitation of *Bysykket* hubs at stations, which has been highlighted as successful collaborations by several informants. Generally, there is a broad set of possible tools and measures in place to promote intermodality, some of which were highlighted right now, however, different organisations focus on different sets of them and take different roles. For example, informant KL1 explicitly explains Kolumbus’ defined role in the development bicycle parking:

KL1: [See it this way] Kolumbus does not own the busses itself, even though they look like it. We are a facilitator, so we like to do pilot-projects and do projects with proprietors and developers to produce good solutions.

Bane NOR is arguably the most important organisation when it comes to station design as they are the proprietor of most of the area surrounding stations, owning, and maintaining most of the bicycle hotels. This puts Bane NOR in a comparatively powerful position, as it was discussed with informants BN1 and BN2:

BN2: We often have a lot of land [...]. We have space for the station house, bicycle, and parking and so on. But many places we also have connections where we can build everything from flats to hotels and such. We have quite a lot of power to influence what a city centre or station looks like. [BN1:] [...] And then we become a part of negotiations with the municipal wishes and needs. And suddenly there are also a lot of internal negotiations. Like: Do they have enough car parking.”

Organisational fragmentation can result in be different goals and standards, that may collide with others as several informants point out. This can impact what bicycle parking solutions are discussed and ultimately facilitated, as one informant highlights:

BN1: And when we talk about bicycle parking ... There are many requirements. Not from our side, but maybe by municipalities have requirements for the number of bicycle parking spots, rather than their quality. So, it's like: We need a bicycle hotel. But then it's also: Why do we need a bicycle hotel here then? Is it the bicycle hotel strategically right?

The example by the informant shows how concrete policies and standards may cause issues for the facilitation of adequate bicycle parking. But problems may also relate to unformulated processes and discourses forming an organisational culture, that impact the position certain issues take on the agenda.

BN1: It can be that our organisation is a bit more car centric. That there is a bit more focus on securing areas to the car. It's not a fight, but I believe there are some other organisations that have gotten a bit further in thinking green traveling, sustainable

journeys - what can we call it – coordination of land-use and transportation on a higher level, than maybe our organisation.

In addition to differences in goals and standards, and organisational jurisdictions and tasks, an organisations size and power in relation to possible collaboration partners

KL1: Bane NOR has its own station developers, its own agendas, goals and regulations and you have to deal with them. So, you have to fit into this framework. [...]. Bane NOR has contracts with advertisement firms and the taxi industry and everything, so I understand that there are many considerations to take, but it would be nice to have a formalised way of working with [bicycle parking at stations].

Concretely looking at bicycle parking, there appears to be no formalised cooperation with solidified channels of communication on bicycle parking along the Jæren Line. The installation of bicycle hotels and bicycle boxes at stations is expensive and elaborate as one informant describes:

BN3: The establishment of bicycle houses [as in bicycle hotels] is quite expensive. There is electricity above the tracks of course, but the bicycle houses [sic] need their own access to the grid [...]. So there has to be some excavations and setting up power. This has also been the case with the *bysykkkel* charging stations. But we managed this very well along the Jæren Line.

There is formalised collaboration on cycling within the framework of urban growth agreement for North-Jæren in the form of the subject group on cycling (nor. *sykkelfaggruppe*). According to the statutes of the *Bymiljøpakken* ought to develop projects for reaching the zero-growth objective and share knowledge and competences on the subject matter. Notably, neither Bane NOR nor the Norwegian Railway Directorate were involved in either the subject group on cycling or the subject group on public transportation (Leknes et al. 2020). The platform could be used as a channel to facilitate and finance bicycle parking; however, this aspect has been somewhat neglected:

KL1: Now, I am also sitting in the subject group on cycling. All municipalities in North-Jæren, the Norwegian Public Roads Authority and [Rogaland] County Authority are represented. There we administrate 2 billion NOK that are being used for the facilitation

of bicycle infrastructure. Bicycle parking represents one of the smaller measures. And when it comes to subsidising and cost coverage, it often falls between chairs.

There has been station specific collaboration for the construction of a bicycle hotel. At Gandal station, Kolumbus has financed, designed, and acquired the station's bicycle hotel. Other times, the County Authority has stepped in and financed and ordered parts of the bicycle parking infrastructure. Generally, informants from different organisations point out that when there was need for financing of bicycle parking and -hotels, those needs were met. But this fragmented form of financing and ordering bicycle hotels and -parking can have negative implications for the quality of the parking overall. At Gandal station for example Kolumbus bought a hinged, Kolumbus-green glass door, that proved to be impractical to users and easily broken in case of vandalism, which later had to be replaced with Bane NOR's standard solution, a sliding-door made from perforated steel plates. Another such example could be the installation of lower quality two-tier bicycle racks, such as in Gausel or Bryne, where the space could have been used more efficiently with higher quality bicycle parking.

Another aspect to this fragmented way of financing is that the urban growth agreement has a clearly defined area of investment contained to North-Jæren, but the Jæren Line transports passengers from all over South-Rogaland to destinations in North-Jæren.

KL1: But outside of North-Jæren it is a different game for us when it comes to financing. But we think [bicycle parking] is important and we do have some resources for mobility outside of North-Jæren. There we often work together with the municipalities to see what measures we can take at stations. And that is [the facilitation of] *bysykkkel* most of the time.

6. Final Discussion and Conclusion

This thesis has taken an open and explorative approach to examining bicycle parking. It has been examined as a localised, designed object, explored how it relates to existing cycling practices, and how it is worked with on an organisational level. In this chapter findings of research are summarised and presented to answer the different research questions. Lastly, bicycle parking is characterised as a measure for increasing cycling along the Jæren Line.

6.1 Summary of Findings

Looking at the important built qualities needed for the integration of transport modes and how they are represented at the examined stations, it can be said that the expanded bike-train concept conceived in this thesis gives a holistic overview over the different important factors that impact usage of bicycle parking at stations. In summary, literature points towards that bicycle parking infrastructure at stations should be accessible and conveniently located in proximity to entrances and platforms. Further, the available parking infrastructure should be diverse in its design, and protect against theft vandalism, and meteorological conditions. The stations overall should allow for good connectivity to the surrounding bicycle network, and both trains and stations should offer facilities to meet cyclists' needs. At all case areas there have been steps taken to facilitate for bike-train intermodality, however with some nuances and variations in quality from station to station. One finding from the mapping was that in the case areas, the quality of the bicycle parking and station design, did not linearly correspond to the occupancy of parking facilities. Particularly Bryne station stood out as a station where parking demand exceeded available parking.

Including social practice theory as an analytical lens has proven useful in finding a reciprocal relationship between bicycle parking as designed objects and other elements of the practice of cycling. In the light of the threat of bicycle theft, bicycle parking facilities in case areas do not offer adequate protection against theft and a bicycle parked at a station, even in supposedly safer bicycle hotels. This is reflected in the negative meaning attached to parked bicycles, as a parked bicycle is, in almost at all circumstances, perceived as in danger of being stolen, and that cyclists cannot expect any assistance in case of theft.

In response to this perceived threat, those who use the bike-train as a transportation mode along the Jæren Line have adapted to the bicycle parking situation and prevalence of bicycle theft. This also allows some distinctions from mainstream cycling practices. Bike-train commuters are more prone to use and park lower-quality, deteriorated bicycles to minimise potential damages, a visible difference in the materials used compared with the more expensive bicycles used by 'normal' commuting cyclists. In terms of competences, parking cyclists carefully consider existing parking options for their bicycles. Further, at stations they also adapt their parking behaviour to compensate for lacking infrastructures, when they do not offer adequate protection against rain, or proper mooring to the bicycle's frame.

Findings have shown that there is collaboration between different actors and organisations when it comes to the facilitation of intermodality. However, there is no distinct forum for issues pertaining to intermodality along the length Jæren Line. Actors and organisations have their respective roles, jurisdictions, and operational foci, which can form barriers to the facilitation of bicycle parking. At certain locations a fragmented process of financing and acquisition has, for example, lead to suboptimal parking solutions.

All in all, it has become clear that bicycle theft and its associated issues are a persistent challenge to those who need to park their bicycle at stations to use the bike-train. Arguably, this also poses a major deterrence for those who potentially could travel intermodally but are not willing or able to buy into this travel mode under the threat of losing this investment in case of theft.

In retrospective, the methodological approach of combining mapping, autoethnographic fieldwork and expert interviews has been effective at revealing and problematising complexities of bicycle parking design and connections between it and cycling practices. Especially in-situ participatory interviews with cyclists have been helpful for collecting data that go beyond material components of local practices. But this type of interview has been difficult to facilitate as bike-train commuters are difficult to identify, unless they are cycling, and usually quick to disappear from the station once they have unlocked their bicycle. More in-depth conversation with local cyclists would have allowed for a more diverse and expansive data basis for exploring wider cycling practices.

6.2 Informing Current and Future Practice

Bicycle hotels are a consistent part of the different stations' design and parking offer. Some design aspects that have been critically highlighted, such as too narrow, obstructing doors (Røhl et al. 2018), have been resolved through the introduction of a standardised sliding door in case areas. However, the interior design of bicycle hotels is varied in quality and are comprised of different bicycle types of racks. Two-tier bicycle racks appear to be a suboptimal solution here, as they do not offer effective bicycle parking. Furthermore, bicycle hotels, despite various steps to increase security, do not offer effective safe bicycle parking, and those who fall victim of bicycle theft are left as helpless as if they had parked their bicycle elsewhere.

A core design decision of the bicycle hotels is the 50 NOK monthly subscription fee to gain access to the bicycle parking facilities. Despite the affordable pricing, paid safe bicycle parking can be problematised from a transport justice perspective. According to GÖSSLING “Conceptually, ‘transport injustices’ can be identified within three dimensions: exposure to traffic risks and pollutants, distribution of space, and the valuation of time” (Gössling 2016, 2). Groups cycling the most in Norway are youth and students, people with no higher education, and immigrants (Ellis 2020), those groups are also those most exposed to bicycle theft (Løvgren et al. 2023). Generally, those are demographic groups associated both with less disposable income, thus, by charging for safer bicycle parking is less available to those who need it most.

Also, from a design perspective, tying the entrance to the bicycle hotel to an easily available subscription opens the door to potential bicycle thieves, who can circumnavigate the hotels' extra protection by paying 50 NOK. CCTV does not prove helpful in the prevention of theft or for the prosecution of it. Given these complex challenges, what could be future steps to improve development of bicycle hotels and bicycle parking at the Jæren Line on the ground?

It is crucial that under the understanding of bicycle theft as a complex social issue, theft cannot be designed away (Larsen 2017a). However, to improve the security against bicycle theft bicycle hotels and alleviate some of the negative experiences of the victims of bicycle theft, one possible step could be to develop the opening mechanism via app into a personalised key card. This way the identity of bicycle thieves can be retrieved from a door's log and CCTV images can serve as evidence, easing investigative efforts by providing the police with both name and evidence in case of theft. At the same time, a key card solution would also make it

possible to make a bicycle hotel free of charge without removing the implicit safety feature of the door. For this to be an effective improvement it would be necessary for police to start investigating cases of bicycle theft, as the “certainty of punishment than that of the severity of punishment” for deterring crime (Nagin 2013, 199). At the same time, a sincere organisational response to cases of bicycle theft may alleviate some of the negative effects individual victims experience. To achieve this different actors and advocacy groups could collaborate on a joint effort to put the issue on the police’s agenda.

With regards to other bicycle parking solutions, currently both Kolumbus and Stavanger municipality are investigating bicycle boxes as safe parking solutions provided by private contractors. Stavanger municipality is equipping some railway stations in its jurisdiction with new bicycle boxes offering a contingent of 12 boxes to cyclists, thereby expanding the existing parking supply of public parking and bicycle hotel. Bicycle boxes have been recommended for station design at several points (Røhl et al. 2018). Indeed, bicycle boxes may be a fitting addition to the current parking supply, particularly because they offer safer storage to the bicycle, but also to additional material frequently used by local cyclists, therefore complement existing cycling practices.

The silver bullet against bicycle theft at public parking appears to be manned bicycle parking. PaaHjul’s manned bicycle parking, originating from a collaboration between PaaHjul, Stavanger municipality and the local business sector, is currently in the piloting phase, but already shows promising results and reception by locals. However, this parking offer has not been integrated into the region’s public transportation system. International inspiration could come from Germany, where in the state of North-Rhine-Westphalia almost 100 manned bicycle stations have been established that, in addition to guarded bicycle parking, offer additional services such as repair, bicycle washing, or bicycle rentals (Czowalla et al. 2016). Indeed, PaaHjul, that operates a repair shop, bike rental, and more, already brings these competences to the table and already operates a bicycle repair shop only meters from the station. Depending on the results of the pilot project with manned bicycle parking, a collaborative project to integrate manned bicycle parking into the region’s public transportation system could significantly improve the available parking options at Stavanger S and make intermodal commuting with expensive bicycles affordable.

Overall, facilitation of bicycle parking and station design in an intermodal context cross both geographical and organisational borders and jurisdictions. Existing localised measures and subsidy schemes, such as the urban growth agreements do not correspond well to the Jæren Line's role as a regional mobility link. By emphasising cooperation among actors across the axis of the Jæren Line, for example by building a platform for this network of actors, gaps in the e.g. the financing of bicycle parking or acquisition, can be closed.

Looking at the role bicycle parking takes for intermodal practices from a SPT perspective, by providing adequate, high-quality bicycle parking and reducing bicycle theft, other elements constitutive of cycling practices can potentially be influenced. In terms of materials, it could become more affordable to commuters to use more expensive bikes and equipment, and meanings, such as the common perception of parked bicycles can be normalised.

6.3 Bicycle Parking as a Measure

All things considered, based on the results of this research project, how can bicycle parking serve as a measure for increasing cycling along the Jæren Line?

Findings suggest that there are certain limitations to how effective bicycle parking can be at mobilising for more bike-train commuting. Looking at bicycle parking as infrastructures, on the one hand, it functions in a network of infrastructures and as PULCHER ET AL. argue, one infrastructure intervention's effectiveness is impacted by quality and coherence of surrounding infrastructure interventions (2010). This is also reflected in KAGET ET AL.'s conceptualisation of the bike-train, that assumes that the overall attractiveness of the bike-train with all its segments, ultimately makes it a viable transport mode to its users (2016). On the other hand, bicycle parking infrastructures are designed objects that must live up to meet user needs and preferences. Some of these have been traced in academic literature, but one outcome of this thesis suggests that those needs and preferences are also rooted in local cycling practices.

This can also be paraphrased in terms of design-theory. Cycling to stations becomes more affordable to (potential) cyclists by providing attractive bicycle parking. Attractive bicycle parking offers secure and convenient parking and mooring to the broad variety of different cyclists. What kind of behaviour bicycle parking can afford is conditioned by surrounding

cycling practices, the built qualities of the designed bicycle parking, and the affordances of wider infrastructure landscape surrounding the bicycle parking.

From a SPT-standpoint, bicycle parking forms only one component of a wider interrelated set of components. Building adequate bicycle parking is an important step towards recruiting more practitioners to the practice, but there is no straight forward connection between better parking infrastructure and changed attitudes and subsequent more cycling. This is also accurately reflected by one of the informants:

KL1: But something that is completely missing is how do we communicate this with the citizens? That you can cycle from Storhaug or Våland. Cycle down [to the station], park safely at one of the many safe parking facilities, and then travel on [by train] [...]. Because I think it is one thing to facilitate as well as we can, but we have to do as we do with *Hjemm-Jobb-Hjemm*. We have to go in and change people's habits, and how they think in regard to cycling. So, to actually meet people with information, is very important I believe.

This also emphasises the question how bicycle parking infrastructures can be integrated into other measures that more directly aim at changing people's traffic behaviour for future research and practice.

All in all, this suggests that bicycle parking is to be understood as one important part of the physical part of facilitation for bike-train intermodality. Its effectivity derives from the affordances it offers to both potential and actual cyclists, and because it has shaping potential of cycling practices overall. Therefore, bicycle parking should not come as an afterthought in the planning of stations, rather great care should be paid to the design and quality of it, so parking solutions synergise with existing cycling practices.

6.4 Concluding Remarks

In March 2024, the Norwegian Ministry of Transport and Communication (nor. *Samferdselsdepartementet*) released the renewed National Transport Plan 2025-2036, in which it continued both the zero-growth objective and objectives for national cycling shares as their

self-prescribed ambitious overarching transportation goals. At the same time the difficulty of changing transportation behaviour is acknowledged:

Despite the significant prioritisation of bicycle infrastructure in the urban growth agreements, over the last years have cycling shares, all in all, remained unchanged. This can be attributed to that it takes time before investments affect travel habits. At the same time is the effect of the measures going to vary according to local conditions as demographics, geography, topography, weather, housing- and labour market and cycling culture. Further expansion of cycling infrastructure, year-around maintenance for cycling and pedestrian ways, combined with stronger restrictive measures against car traffic and more densification will be important for increasing cycling shares in the future (SFD 2024, 47; translation by the author).

This reinvigoration of current transportation policy and recognition of delays and difficulty in facilitation changes in commuting practices through infrastructure measures may come as a relief to many transportation planners and cycling advocates, who's infrastructure projects have been subject to public scrutiny for assumed in effectivity. All in all, this thesis has contributed to this argument by demonstrating the complexity of the relation between built infrastructure measures and commuting patterns through the example of bicycle parking.

Further, this project has illuminated a widely under considered aspect of cycling research and highlighted the important role bicycle parking and bicycle theft take in shaping cycling practices, and the subsequent implications for bicycle parking as a measure. The outcome of this project therefore also supports LARSEN's statement "[...] that the truly great and sustainable cycling city has not only safe roads, many bicycle lanes, and cyclists – it also has low levels of bike theft, good bikes, well-maintained bikes, and plenty of adequate, secure parking that affords fly-parking throughout the city" (2017a).

References

Bibliography

- Anon. 2024. 'Over Fem Millioner Passasjerer Har Reist Med Populære Jærbanen i Fjor'. *Tog24*. Retrieved 22 February 2024 (<https://www.tog24.no/over-fem-millioner-passasjerer-har-reist-med-populaere-jaerbanen-i-fjor/>).
- Ansell, Chris, and Alison Gash. 2008. 'Collaborative Governance in Theory and Practice'. *Journal of Public Administration Research and Theory* 18(4):543–71. doi: <https://doi.org/10.1093/jopart/mum032>.
- Arbis, David, Taha Hossein Rashidi, Vinayak V. Dixit, and Upali Vandebona. 2016. 'Analysis and Planning of Bicycle Parking for Public Transport Stations'. *Journal of Sustainable Transportation* 10(6):495–504. doi: <https://doi.org/10.1080/15568318.2015.1010668>.
- Bane NOR. 2022. 'Flere Av Sykkelhoteller Står Tomme'. *NTB Kommunikasjon*. Retrieved 27 November 2023 (<https://kommunikasjon.ntb.no/pressemelding/17937561/flere-sykkelhotell-star-tomme?publisherId=11953034>).
- Bjørnará, Helga Birgit, Einar Leknes, Ray Pritchard, and Stian Brosvik Bayer. 2023. *Reisevaner Og Holdninger. En Befolkningsundersøkelse Om Reisevaner Og Holdninger Til Redusert Bilbruk Blant Yrkesaktive i Utvalgte Bydeler På Nord-Jæren, i Bergen Og i Trondheim*. 8–2023. Trondheim, NO: NORCE Helse og Samfunn.
- Böcker, Lars, Tanu Priya Uteng, Chengxi Liu, and Martin Dijst. 2019. 'Weather and Daily Mobility in International Perspective: A Cross-Comparison of Dutch, Norwegian and Swedish City Regions'. *Transportation Research Part D-Transport and Environment* 77:491–505.
- Brosvik Bayer, Stian. 2022. *Bomringenes Effekter På Mobilitetsmønsteret. En Komparativ Studie Av Hvordan Bomringene i Bergen, Trondheim Og På Nord-Jæren Påvirket Mobilitetsmønsteret Fra 2013 Til 2019*. RAPPORT 24-2022. Stavanger: NORCE Helse og Samfun.

- Buck, Malachy, and Alexander Nurse. 2023. 'Cycling in an "Ordinary City": A Practice Theory Approach to Support a Modal Shift'. *International Journal of Sustainable Transportation* 17(1):65–76. doi: [10.1080/15568318.2021.1983674](https://doi.org/10.1080/15568318.2021.1983674).
- Buehler, Ralph, Eva Heinen, and Kazuo Nakamura. 2021. 'Bicycle Parking'. in *Cycling for Sustainable Cities*, edited by R. Buehler and J. Pucher. Cambridge, Massachusetts: MIT Press.
- Bymiljøpakken. 2024. 'Årsbudsjett 2024'.
- Cannon, Russell, Chunli Zhao, and Lena Winslott Hiselius. 2024. 'Barriers to Better Bicycle Parking for Promoting Intermodal Journeys: An Inter-Organisational Collaboration Perspective'. *Transport Policy* 145:65–73. doi: <https://doi.org/10.1016/j.tranpol.2023.10.007>.
- Chang, Heewon. 2008. *Autoethnography as Method*. London, UK, New York, Us: Routledge.
- Chen, Peng, Qian Liu, and Feiyang Sun. 2018. 'Bicycle Parking Security and Built Environments'. *Transportation Research Part D* 62:169–78. doi: <https://doi.org/10.1016/j.trd.2018.02.020>.
- Cheng, Yung-Hsiang, and Kuo-Chu Liu. 2012. 'Evaluating Bicycle-Transit Users' Perceptions of Intermodal Inconvenience'. *Transportation Research Part A-Policy and Practice* 46:1690–1706. doi: <http://dx.doi.org/10.1016/j.tra.2012.10.013>.
- Christiansen, Petter, and Jan Usterud Hanssen. 2014. *Innfartsparkering- Undersøkelse Av Bruk Og Brukere*. 1367/2014. Oslo: Transportøkonomisk Institutt.
- Czowalla, Lucas, Dahlia Busch, Andrea Fromberg, Peter Gwiasda, Mathias Wilde, and Martin Lanzendorf. 2017. *Neuere Entwicklungen Zur Integration von Fahrrad Und Öffentlichem Verkehr in Deutschland: Überblick Zum Stand Des Wissens Und Der Praxis*. 15. Frankfurt am Main: Goethe Universität Frankfurt am Main.
- Dahl, Marte, Henning Stockstad, Frida Andersson, and Jonas Lagerqvist. 2023. *Studie i Bruk Av Elsykler*. Trondheim: Statens Vegvesen.

- Den Norske Regjeringen. 2020. 'Byvekstavtale Mellom Kommunene Stavanger, Sandnes, Sola Og Randaberg, Rogalandfylkeskommune Og Staten v/Samferdselsdepartementet Og Kommunal-Og Moderniseringsdepartementet'.
- Egan, Robert, Connor Mark Dowling, and Brian Caulfield. 2022. 'Planning for Diverse Cycling Practices: A Cycle-Parking Type Preference Typology'. *Case Studies on Transport Policy* 10:1930–44. doi: <https://doi.org/10.1016/j.cstp.2022.08.007>.
- Egan, Robert, Connor Mark Dowling, and Brian Caulfield. 2023. 'Exploring the Elements of Effective Public Cycle Parking: A Literature Review'. *Journal of Urban Mobility* 3. doi: <https://doi.org/10.1016/j.urbmob.2023.100046>.
- Ellis, Carolyn, Tony E. Adams, and Arthur P. Bochner. 2010. 'Autoethnography: An Overview'. *Forum Qualitative Sozialforschung* 12(1).
- Ellis, Igunn. 2020. 'Faktorer Som Påvirker Sykling'. *Tiltak.No*. Retrieved 15 May 2024 (<https://www.tiltak.no/0-overordnede-virkemidler/0-4-kunnskap-og-verktoey-som-hjelpemidler/faktorer-pavirker-sykling/>).
- European Commission. 1997. 'COM(97) 243 Final—Intermodality and Intermodal Freight Transport in the European Union'.
- Euroskilt AS. n.d. 'Produktblad .Easylift Premium Sykkelstativ'.
- Faulkner, Sandra L., John R. Baldwin, Sheryl L. Lindsey, and Michael L. Hecht. 2006. 'Layers of Meaning: An Analysis of Definitions of Culture'. Pp. 27–52 in *Redefining Culture : Perspectives Across the Disciplines, Lea's Communication Series*, edited by J. R. Baldwin, S. L. Faulkner, M. L. Hecht, and S. L. Lindsey. Mahwah, USA & London, UK: Lawrence Erlbaum Associates Publishing.
- Finans Norge. n.d. 'Sykkelyveri'. *Finans Norge*. Retrieved 29 January 2024 (<https://www.finansnorge.no/tema/statistikk-og-analyse/forsikring/sykkelyveri/>).
- Fjeldstad, Trine-Marie, and Vetle Hallås. 2020. *Jærbanen. Konkretisering Av Mobilitets- Og Pakeringsstrategien*. Oslo: Bane NOR.

- Flick, Uwe. 2014. *An Introduction to Qualitative Research*. 5th ed. London: SAGE publications.
- Fornäs, Johan. 2017. *Defending Culture. Conceptual Foundations and Contemporary Debate*. Cham, CH: Palgrave MacMillain.
- Fournier, Juliette, Mathilde Van Liefferinge, Léa Ravensbergen, James DeWeese, and Ahmed M. El-Geneidy. 2023. 'Evaluating the Need for Secured Bicycle Parking across Cyclist Typologies'. *International Journal of Sustainable Transportation* 17(12):1278–86. doi: <https://doi.org/10.1080/15568318.2023.2166438>.
- Garrard, Jan, Chris Rissel, and Adrian Bauman. 2012. 'Health Benefits of Cycling'. Pp. 31–56 in *City Cycling*, edited by J. Pucher and R. Buehler. Cambridge, Massachusetts: MIT Press.
- Gjensidige. 2023. 'Advarer Syklistene Mot Tyverier – Svært Få Oppklares'. *Gjensidige*. Retrieved 29 January 2024 (<https://www.gjensidige.no/godtforberedt/content/slik-gjor-du-det-troblete-for-sykkeltynen>).
- Gössling, Stefan. 2016. 'Urban Transport Justice'. *Journal of Transport Geography* 54:1–9. doi: <https://doi.org/10.1016/j.jtrangeo.2016.05.002>.
- Hamnett, Hilary. 2015. 'Skilling Landscape Architects and Urban Designers for Design of Bicycle Parking and Network Facilities'. Pp. 357–406 in *Cycling Futures*, edited by J. Bonham and M. Johnson. Adelaide, AUS: University of Adelaide Press.
- Heinen, Eva, and Ralph Buehler. 2019. 'Bicycle Parking: A Systematic Review of Scientific Literature on Parking Behaviour, Parking Preferences, and Their Influence on Cycling and Travel Behaviour'. *Transport Reviews* 39(5):630–56. doi: [10.1080/01441647.2019.1590477](https://doi.org/10.1080/01441647.2019.1590477).
- Herheim, Hege. 2020. *Sykkelparkering*. 408. Oslo, NO: Statens Vegvesen.
- Hrelja, Robert, Frederik Pettersson, and Stig Westerdahl. 2016. 'The Qualities Needed for a Successful Collaboration: A Contribution to the Conceptual Understanding of

- Collaboration for Efficient Public Transport'. *Sustainability* 8:542–57. doi: [10.3390/su8060542](https://doi.org/10.3390/su8060542).
- Jensen, Ole B. 2013. *Staging Mobilities*. Oxon, UK & New York, USA: Routledge.
- Jensen, Ole B., Ditte Bendix Lanng, and Simon Wind. 2016. 'Mobilities Design – towards a Research Agenda for Applied Mobilities Research'. *Applied Mobilities* 1:26–42. doi: <https://doi.org/10.1080/23800127.2016.1147782>.
- Jonkeren, Olaf, and Roland Kager. 2021. 'Bicycle Parking at Train Stations in the Netherlands: Travellers' Behaviour and Policy Options'. *Research in Transportation Business & Management* 40:100581. doi: <https://doi.org/10.1016/j.rtbm.2020.100581>.
- Kager, R., Luca Bertolini, and M. te Brömmelstroet. 2016. 'Characterisation of and Reflections on the Synergy of Bicycles and Public Transport'. *Transportation Research Part A-Policy and Practice* 85:208–19. doi: [10.1016/j.tra.2016.01.015](https://doi.org/10.1016/j.tra.2016.01.015).
- Kager, Roland, and Lucas Harms. 2017. 'Synergies from Improved Cycling-Transit Integration: Towards an Integrated Urban Mobility System'. Tokyo.
- Kamarudin, Hikmah, Aida Fazlin Bakri, and Nurulhusna Qamaruz Zaman. 2022. 'Identifying Physical Barriers through a Real-Life Experience with Mobility Difficulties City Travelers: A Go-along Interview Method'. *IOP Conference Series: Earth and Environmental Science* 1067.
- Kent, Jennifer L. 2022. 'The Use of Practice Theory in Transport Research'. *Transport Reviews* 42(2):222–44. doi: [10.1080/01441647.2021.1961918](https://doi.org/10.1080/01441647.2021.1961918).
- Kilsti-Hals, Mathias. 2022. 'Hva Er God Sykkelparkering? - En Studie Av Kvalitet i Sykkelparkering Ved Kollektivknutepunkter'. Master's thesis, NMBU Norges miljø- og biovitenskapelig universitet, Ås.
- Klima- og miljødepartementet. 2012. 'Meld. St. 21 (2011-2012) Norwegian Climate Policy (Summary)'.
- Kolumbus AS. 2023. 'Årsrapport 2022'.

Kolumbus AS. n.d. 'Kolumbus' Strategi 2022-2026'.

Kosmidis, Ioannis, and Daniela Müller-Eie. 2024. 'The Synergy of Bicycles and Public Transport: A Systematic Literature Review'. *Transport Reviews* 44(1):34–68. doi: <https://doi.org/10.1080/01441647.2023.2222911>.

Larsen, Jonas. 2014. '(Auto)Ethnography and Cycling'. *International Journal of Social Research Methodology* 17(1):59–71. doi: [10.1080/13645579.2014.854015](https://doi.org/10.1080/13645579.2014.854015).

Larsen, Jonas. 2017a. 'Bicycle Parking and Locking: Ethnography of Designs and Practices'. *Mobilities* 12(1):53–75. doi: <https://doi.org/10.1080/17450101.2014.993534>.

Larsen, Jonas. 2017b. 'The Making of a Pro-Cycling City: Social Practices and Bicycle Mobilities'. *Environment and Planning A. Economy and Space* 49(4):876–92. doi: [10.1177/0308518X16682732](https://doi.org/10.1177/0308518X16682732).

Leknes, Einar, Andreas Nordang, and Ray Pritchard. 2020. *Sammenligning Av Bymiljøpakken På Nord-Jæren Og Miljøpakken i Trondheim. Komparative Studier Nord-Jæren Og Trondheim Av Bymiljøpakker Og Mobilitet*. RAPPORT 15–2020. Stavanger: NORCE Samfunnsforskning.

Løvgren, Mette, Øivind Skjervheim, Asle Høgestøl, Andreas Kotsadam, Vegar Bjørnshagen, Christer Hyggen, and Stian Lid. 2023. *Nasjonal Trygghetsundersøkelse 2022*. 14/23. Oslo, NO: Veldferdsforskningsinstituttet NOVA, OsloMet.

Massink, Roel, Mark Zuidgeest, Jaap Rijnsburger, Olga L. Sarmiento, and Martin van Maarseveen. 2011. 'The Climate Value of Cycling'. *Natural Resources Forum* 35(2):100–111. doi: <https://doi-org.ep.fjernadgang.kb.dk/10.1111/j.1477-8947.2011.01345.x>.

Molin, Eric, and Kees Maat. 2015. 'Bicycle Parking Demand at Railway Stations: Capturing Price-Walking Trade Offs'. *Research in Transportation Economics* 53:3–12. doi: [http://dx.doi.org/10.1016/j.retrec.2015.10.014](https://dx.doi.org/10.1016/j.retrec.2015.10.014).

Müller-Eie, Daniela, Stian Brosvik Bayer, and Einar Leknes. 2019. *Evaluering Av Mobilitetstiltaket «hjemjobbhjem»*. *Teori, Gjennomføring Og Effekt*. RAPPORT 22-2019. Stavanger: NORCE Samfunnsforskning.

- Politidirektoratet, and Riksadvokaten. 2021. 'Straffesaksbehandlingen 2021'.
- Politidirektoratet and Riksadvokaten. 2022. 'Straffesaksbehandlingen 2022'.
- Opedal, Julie, Hege Skar, Peder Røsand, Roar Teige, Reidar Dischler, and Ole Brauteset. 2022. 'Nøkkeltallsrapport 2022. Nasjonal Reisevanundersøkelse'.
- Pazzini, Margherita, Claudio Lantieri, Annalisa Zoli, Andrea Simone, and Hocine Imine. 2023. 'Evaluation of Railway Station Infrastructure to Facilitate Bike–Train Intermodality'. *Sustainability* 15:3525.
- Pritchard, Ray, and Robin Lovelace. 2022. *Sykkelpotensial Og Bysykler. En Beregning Av Potensialet for Økt Hverdagssykling Og Evaluering Av Bysykkellordningene På Nord-Jæren, i Trondheim Og i Bergen*. RAPPORT 14-2022. Stavanger: NORCE Helse og Samfunn.
- Pucher, John, and Ralph Buehler. 2012. 'Integration of Cycling with Public Transportation'. Pp. 157–81 in *City Cycling*, edited by J. Pucher and R. Buehler. Cambridge, Massachusetts: MIT Press.
- Pucher, John, Jennifer Dill, and Susan Handy. 2010. 'Infrastructure, Programs, and Policies to Increase Bicycling: An International Review'. *Preventive Medicine* 50:106–25. doi: [10.1016/j.ypmed.2009.07.028](https://doi.org/10.1016/j.ypmed.2009.07.028).
- Ravensbergen, Léa, Ron Buliung, Meghan Mendonca, and Naren Garg. 2018. 'Biking to Ride: Investigating the Challenges and Barriers to Integrating Cycling with Regional Rail Transit'. *Transportation Research Record* 2672(8):374–83.
- Rogaland Fylkeskomme. 2021. 'Samferdselsstrategi for Rogaland 2022-2033'.
- Røhl, Andreas, Anita Dirix, Louise V. Kielgast, and Christian G. Bruun. 2018. *Evaluering Av Sykkelhotell & Sykkelparkering Ved Togstasjonen*. Gehl.
- Samferdselsdepartement (SFD). 2013. 'Meld. St. 26. (2012-2013) Nasjonaltransportplan 2014-2023'.

- Samferdselsdepartement (SFD). 2024. 'Meld. St. 14 (2023-2024) Nasjonal Transportplan 2025-2036'.
- Sandnes Kommune. 2023. 'Kommuneplan for Sandnes 2023-2038. Bestemmelser Og Retningslinjer'.
- Sehested, Karina. 2009. 'Urban Planners as Network Managers and Metagovernors'. *Planning Theory & Practice* 10(2):245–63. doi: <https://doi.org/10.1080/14649350902884516>.
- Sheller, Mimi, and John Urry. 2016. 'Mobilizing the New Mobilities Paradigm'. *Applied Mobilities* 1(1):10.25. doi: [10.1080/23800127.2016.1151216](https://doi.org/10.1080/23800127.2016.1151216).
- Shove, Elizabeth, Mika Pantzar, and Matt Watson. 2012. *The Dynamics of Social Practice. Everyday Life and How It Changes*. London, UK: SAGE publications.
- Spotswood, Fiona, Tim Chatterton, Alan Tapp, and David Williams. 2015. 'Analysis Cycling as a Social Practice: An Empirical Grounding for Behaviour Change'. *Transportation Research Part F* 29:22–33. doi: <http://dx.doi.org/10.1016/j.trf.2014.12.001>.
- Stavanger Kommune. 2023. 'Kommuneplanens Arealdel 2023-2040. Transport Og Mobilitet'.
- Swedberg, Richard. 2020. 'Exploratory Research'. Pp. 17–41 in *The Production of Knowledge. Enhancing Progress in Social Science*. Vol. 2, *Strategies for Social Inquiry*, edited by C. Elman, J. Gerring, and J. Mahoney. Cambridge, UK: Cambridge University Press.
- Talmy, Leonard. 1995. 'The Cognitive Culture System'. *The Monist* 78(1):80–114.
- The National Committee for Research Ethics in the Social Sciences and the Humanities. 2019. 'Guidelines for Research Ethics in the Social Sciences and the Humanities'. (5).
- United Nations. 2022. 'Res/76/255 Integration of Mainstream Bicycling into Public Transportation Systems for Sustainable Development'.
- Urry, John. 2009. 'Mobilities and Social Theory'. Pp. 477–95 in *The New Blackwell Companion to Social Theory*. Vol. 5, edited by B. S. Turner. Chichester, UK: Blackwell Publishing Ltd.

- Van der Spek, Stefan Christiaan, and Noor Scheltema. 2015. 'The Importance of Bicycle Parking Management'. *Research in Transportation Business & Management* 15:39–49. doi: <http://dx.doi.org/10.1016/j.rtbm.2015.03.001>.
- Van Lierop, Dea, Michael Grimsrud, and Ahmed M. El-Geneidy. 2015. 'Breaking into Bicycle Theft: Insights from Montreal, Canada'. *International Journal of Sustainable Transportation* 9(7):490–501. doi: <https://doi.org/10.1080/15568318.2013.811332>.
- Weliwitiya, Hesara, Geoffrey Rose, and Marilyn Johnson. 2019. 'Bicycle Train Intermodality: Effects of Demography, Station Characteristics and the Built Environment'. *Journal of Transport Geography* 74:395–404. doi: <https://doi.org/10.1016/j.jtrangeo.2018.12.016>.

Images and photos

O-lock: bicycle lock by Karthik M., <https://thenounproject.com/icon/bicycle-lock-107649/>. (CC BY 3.0)

U-lock: bicycle lock by sofi, <https://thenounproject.com/icon/bicycle-lock-1651735/>. (CC BY 3.0)

Chain-lock: bicycle lock by Danil Polshin, <https://thenounproject.com/icon/bicycle-lock-5021741/>. (CC BY 3.0)

Datasets & Maps

- Bane NOR. 2019. 'Jernbane - Banenettverk'. [GeoDataset]. GeoNorge.no, <https://register.geonorge.no/register/versjoner/produktspesifikasjoner/bane-nor/jernbane-banenettverk>.
- Flanders Marine Institute. 2018. 'IHO Sea Areas, Version 3'. [GeoDataset]. Geononde.iwolearn.org, <https://doi.org/10.14284/323>
- Kartverket. 2019. 'Elveg 2.0'. [GeoDataset]. GeoNorge.no, <https://kartkatalog.geonorge.no/metadata/elveg-20/77944f7e-3d75-4f6d-ac04-c528cc72e8f6>.
- Kartverket. 2024. 'Norske Fylker Og Kommuner Illustrasjonsdata 2024 (Klippet Etter Kyst)'. [GeoDataset]. GeoNorge.no, <https://kartkatalog.geonorge.no/metadata/norske-fylker-og-kommuner-illustrasjonsdata-2024-klippet-etter-kyst/a9c64d66-f484-4a8f-a7b4-723fdaa578d3>.
- OpenStreetMap. 2024. [GeoDataset]. Openstreetmap.org, <https://www.openstreetmap.org/copyright/en>
- Statistisk sentralbyrå. 2023. 'Befolkning På Rutenett 250 m'. [GeoDataset]. GeoNorge.no, <https://kartkatalog.geonorge.no/metadata/befolkning-paa-rutenett-250-m/0c0ad0ce-55e8-4d73-9c12-0eb0e2454acb>.

Appendices

Appendix A.: Commonly found bicycle rack types at stations along the Jæren Line

1. Publicus Bicycle Rack



The publicus bicycle rack is possibly the most commonly used in Norway (Kilsti-Hals 2022), and the predominant type of rack in case areas. It offers locking to bicycles through either the front- or rear wheel, as well as through the bike's frame. It can be used by different types of bicycles with varying widths of tires. Depending on lock and bicycle design, Further advantages are that this type of bicycle rack is space efficient and durable (Herheim 2020).

Image 1 Publicus Stativ at Stavanger S. Photo by the author.

2. Two-Tier Bicycle Rack

Another form of bicycle parking rack found at stations along the Jæren Line are two-tier bicycle racks. According to its designers, users can either park their bicycle comfortably on the lower tier level, or pull out the rail of the second tier, which then folds down, allowing the user to lift the bicycle onto the rail and push the rail back in. The rack keeps the bicycle propped up when parked. Bicycles can then be locked to the welded frames of the bicycle rack (Euroskilt AS, n.d). Another advantage is that two-tier bicycle racks offer twice the number of spots on a given area (Herheim 2020).



Image 2 Two-tier bicycle rack at Bryne station. Photo by the author.

3. Floor Mooring



In the bicycle hotel at Stavanger S there is a small contingent of moorings installed specifically dedicated to supersized bikes and cargo bicycles. Floor moorings do not keep the bicycle propped up, but they leave more room for manoeuvring and positioning of the bicycle. Depending on the bicycle locks size and flexibility, frame and wheels can be locked to the mooring.

Image 3 Floor mooring at Stavanger S. Photo by the author.

4. A-Rack

A-Racks are often used as public bicycle parking. They offer mooring to two bicycles which can be flexibly locked to both sides of the rack's frame, which offers support to keep the parked bicycle upright at the same time. This also makes the A-rack usable for a great variety of different bicycles (Herheim 2020).



Image 4 A-rack in Stavanger. Photo by the author.

Appendix B. Mapping Guide

Bicycle Parking			
Bicycle Parking Type	Open Air Bicycle Parking	Qualities of the Bicycle Parking	Lockability of wheel, body or both?
			Type of bicycle rack?
	Roofed Parking		Quantity of spots?
			Occupancy?
	Bicycle Hotels / Stations		Availability of extra bicycle related services? (Bicycle repair services, self-service repair hubs, e-bicycle charging)
			Proximity to platforms and entrance ways?
			Security measures: CCTV, manned, visibility (eyes on the street)?
	Bicycle Boxes		Types of bicycles parked?
			Visibility & Signs?
	Fly Parking		Pricing?
Visibility & Signs? Of the hotels or how to obtain the cards			

Bicycle Friendly Stations	
Bicycle accessibility	Elevators, ramps, wheel ramps
	Shared bicycles or Bysykkel?
Bicycle commuter services	Showers?
	Toilets?
	Mirrors?
	Drinking fountain?
Bicycle related services	Bicycle repair station?
	Bicycle self-service repair station?

Train	
Accessibility	Price?
	Bicycle Racks?
	Access to train?
Bicycle commuter services	Toilets?
	Mirrors?
	Drinking fountain?

Appendix C. Thematic guide for expert interviews

Theme	Questions?
Background <i>Bakgrunn</i>	How long have you been working with the institution? <i>Hvor lenge har du jobbet ved denne institusjonen?</i>
	For how long have you been working with bicycle parking? <i>Hvor lenge har du jobbet med sykkelparkering?</i>
	What role does bicycle parking play within your work? Meaning: <ul style="list-style-type: none"> - is bicycle parking your main responsibility? - Do you have any special focus tasks you particularly work within the context of bicycle parking?) <i>Hvilken rolle spiller sykkelparkering i arbeidet ditt?</i> <i>Det vil si:</i> <ul style="list-style-type: none"> - <i>Er sykkelparkering hovedansvaret ditt?</i> - <i>Har du noen spesielle hovedoppgaver i arbeidet med sykkelparkering?</i>
Design and facilitation of bicycle parking <i>Design og utforming av sykkelparkering</i>	What were the guiding design considerations for existing bicycle parking at stations? <i>Hva var de sentrale design beslutninger for eksisterende sykkelparkering?</i>
	Have designs been standardized? <i>Har design og fysisk utforming av sykkelparkering blitt standardisert?</i>
	Are there plans to uniformly develop bicycle parking at stations? <i>Finnes det planer å utvikle sykkelparkering ved stasjoner som følger universelle utformingsprinsipper?</i>
Cooperation with other institutions <i>Samarbeid med andre institusjoner</i>	Are you collaborating with other public or private institutions for the facilitation of bicycle parking? <i>Samarbeider dere med andre offentlige eller private institusjoner i sammenheng med sykkelparkering?</i>
	How far has this collaboration developed? <i>Hvor utviklet er kollaborasjon mellom partnerne?</i>
	Do you feel, that the matter of bicycle parking is prioritized in the collaboration? <i>Føler du, at sykkelparkering er prioritert innen samarbeid?</i>

Appendix D. Station profiles from field work

Station Profile Stavanger S.

Bicycle Parking underneath the stairs		
Roofed Parking	Lockability of wheel, body or both? Type of bicycle rack?	Publicus Racks , some racing bikes parked outside the rack.
	Quantity of spots?	34
	Occupancy (Morning/Evening rush)?	5/10
	Availability of extra bicycle related services? (Bicycle repair services, self-service repair hubs, e-bicycle charging)	None
	Proximity to platforms and entrance ways	Immediate
	Security measures: CCTV, manned, visibility (eyes on the street)?	Possibly Eyes on the street by people on the platforms and in the Café
	Typical type of bicycle?	Normal/Mountain bikes, one or two race bikes and e bikes
	Visibility & Signs?	NAF sign warning of bicycle theft
	Pricing?	Free
	Visibility & Signs? Of the hotels or how to optain the cards	None

Bicycle Parking: Bicylce Hotel		
Bicycle Hotel	Lockability of wheel, body or both? Type of bicycle rack?	A variety of different bicycle racks (U-racks; heavy bicycle racks)

		All bicycles parked formally in racks.
	Quantity of spots?	About 34
	Occupancy (Morning/Evening rush?)	13/10
	Availability of extra bicycle related services? (Bicycle repair services, self-service repair hubs, e-bicycle charging)	Charging spots and lockers
	Proximity to platforms and entrance ways	Immediate
	Security measures: CCTV, manned, visibility (eyes on the street)?	CCTV's one of them possibly broken
	Typical type of bicycle?	e-bikes/Mountain bikes // visibly expensive
	Visibility & Signs?	Explanatory signs outside
	Pricing?	50 kr
	Visibility & Signs? Of the hotels or how to obtain the cards	Yes

Bicycle Parking: Boxes behind the hotel		
Bicycle Boxes (Out of Order)	Lockability of wheel, body or both?	Box
	Type of bicycle rack?	
	Quantity of spots?	12
	Occupancy (Morning/Evening rush?)	-
	Availability of extra bicycle related services? (Bicycle repair services, self-service repair hubs, e-bicycle charging)	-
	Proximity to platforms and entrance ways	Immediate

	Security measures: CCTV, manned, visibility (eyes on the street)?	-
	Typical type of bicycle?	-
	Visibility & Signs?	-
	Pricing?	20 kr a day
	Visibility & Signs? Of the hotels or how to obtain the cards	-

Bicycle Parking at the top of the stairs		
Open-Air	Lockability of wheel, body or both?	A shaped
	Type of bicycle rack?	
	Quantity of spots?	6
	Occupancy (Morning/Evening rush?	1/0
	Availability of extra bicycle related services? (Bicycle repair services, self-service repair hubs, e-bicycle charging)	None
	Proximity to platforms and entrance ways	Immediate
	Security measures: CCTV, manned, visibility (eyes on the street)?	Public – maybe
	Typical type of bicycle?	Normal
	Visibility & Signs?	-
	Pricing?	Free
Visibility & Signs? Of the hotels or how to obtain the cards	-	

Bicycle Friendly Station And Station House		
Bicycle accessibility	Elevators, ramps, wheel ramps	Yes – lift for reaching platform; no ramps however. Cyclists do use the elevator
	Shared bicycles or Bysykkel?	Yes
Bicycle commuter services	Showers?	None
	Toilets?	Yes, for pay
	Mirrors?	None
	Drinking fountain?	None
Bicycle related services	Bicycle repair station?	Yes, PaaHjul outside the station
	Bicycle self-service repair station?	None

Station Profile Gausel

Bicycle Parking to the right of the eastern entrance		
Roofed Parking	Lockability of wheel, body or both?	Publicus Racks, the few bicycles that are there are neatly parked in the rack
	Type of bicycle rack?	
	Quantity of spots?	60
	Occupancy (Morning/Evening rush?)	4/1
	Availability of extra bicycle related services? (Bicycle repair services, self-service repair hubs, e-bicycle charging)	None
	Proximity to platforms and entrance ways	Immediate
	Security measures: CCTV, manned, visibility (eyes on the street)?	Not really any meaningful surveillance through passing cyclists.
	Typical type of bicycle?	Only normal bicycles at all observations
Visibility & Signs?	None	

Bicycle Parking to the left of the eastern entrance		
Bicycle Hotel	Lockability of wheel, body or both?	A large segment of two tier bicycle racks ; the few bicycles that are there are mostly parked at the lower tier of the rack
	Type of bicycle rack?	
	Quantity of spots?	96
	Occupancy (Morning/Evening rush?)	5/7

	Availability of extra bicycle related services? (Bicycle repair services, self-service repair hubs, e-bicycle charging)	None
	Proximity to platforms and entrance ways	Same as above
	Security measures: CCTV, manned, visibility (eyes on the street)?	One visible CCTV
	Typical type of bicycle?	On or two e-bikes, rest normal
	Visibility & Signs?	Explanatory signs outside
	Pricing?	50 kr
	Visibility & Signs? Of the hotels or how to obtain the cards	Yes

Bicycle Friendly Station – No station house		
Bicycle accessibility	Elevators, ramps, wheel ramps	Yes – the platforms are easy to reach from all sides of the station by bicycle. The ramp is spaciouly designed and offers plenty of space
	Shared bicycles or Bysykkel?	Yes
Bicycle commuter services	Showers?	None
	Toilets?	None
	Mirrors?	None
	Drinking fountain?	None
Bicycle related services	Bicycle repair station?	None
	Bicycle self-service repair station?	None

Station Profile Bryne

Bicycle Parking at the western entrance of the station		
Open-Air	Lockability of wheel, body or both? Type of bicycle rack?	Two-tier Bicylce Rack ; there are many bicycles but they aren't using the upper tier. Locking takes sometimes odd shapes. There are a free spots but the parking looks very crowded
	Quantity of spots?	48
	Occupancy (Morning/Evening rush?)	19/17
	Availability of extra bicycle related services? (Bicycle repair services, self-service repair hubs, e-bicycle charging)	None
	Proximity to platforms and entrance ways	Immediate
	Security measures: CCTV, manned, visibility (eyes on the street)?	There's the Narvesen on the other side and frequent pedestrians passing
	Typical type of bicycle?	Mix of more expensive and less expensive bicycles
	Visibility & Signs?	-
	Pricing?	Free

Bicycle Parking at the eastern entrance of the station		
Open-Air	Lockability of wheel, body or both? Type of bicycle rack?	Pubilcus bicycle rack; Bicycles are parked very densely – denser than necessary as there is more space further to the right.
	Quantity of spots?	50

	Occupancy?	51/50
	Availability of extra bicycle related services? (Bicycle repair services, self-service repair hubs, e-bicycle charging)	None
	Proximity to platforms and entrance ways	Immediate
	Security measures: CCTV, manned, visibility (eyes on the street)?	Its placed very open and well visible from all sides; but very few passing pedestrians
	Typical type of bicycle?	Mix of more expensive , but more less expensive bicycles
	Visibility & Signs?	-
	Pricing?	Free

Bicycle Parking at the western entrance of the station		
Bicycle Hotel	Lockability of wheel, body or both?	Two-tier bicycle rack; people dont use the upper tiers; rather they park around the bicycle rack
	Type of bicycle rack?	
	Quantity of spots?	64
	Occupancy (Morning/Evening rush?	19/14
	Availability of extra bicycle related services? (Bicycle repair services, self-service repair hubs, e-bicycle charging)	None
	Proximity to platforms and entrance ways	Immediate
	Security measures: CCTV, manned, visibility (eyes on the street)?	One visible CCTV; there are many pedestrians passing by, entering and leaving station and station house

	Typical type of bicycle?	e-bikes/Mountain bikes // visibly expensive
	Visibility & Signs?	Yes
	Pricing?	50 kr a month
	Visibility & Signs? Of the hotels or how to obtain the cards	Yes

Bicycle Friendly Station – Small station house		
Bicycle accessibility	Elevators, ramps, wheel ramps	Yes – the platforms are easy to reach, even by bicycle
	Shared bicycles or Bysykkel?	Yes
Bicycle commuter services	Showers?	None
	Toilets?	None
	Mirrors?	None
	Drinking fountain?	None
Bicycle related services	Bicycle repair station?	None
	Bicycle self-service repair station?	None

