Research in Transportation Business & Management 40 (2021) 100546

Contents lists available at ScienceDirect

Research in Transportation Business & Management

journal homepage: www.elsevier.com/locate/rtbm

The integration of active travel and public transport in Norwegian policy packages: A study on 'access, egress and transfer' and their positioning in two multilevel contractual agreements

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ARTICLE INFO

Keywords:
Policy packages
Access
Egress and transfer
Multilevel cooperation
Public transport

ABSTRACT

Multi-modality has become a key mantra of transport planning and yet, how people access, egress and transfer (hereafter AET) remains under-investigated. We argue that integrating active travel and public transport is an absolute essential. Multilevelpolicy packages for land-use and transport-system development in the larger Norwegian urban regions, called Urban growth agreements (hereafter UGA), provides the bouncing pad for this study. We highlight the extent to which AET can be strengthened through the UGAs. Methodologically, we apply document studies and qualitative interviews with key actors and our analysis is framed to address the following three rationales identified for policy packages: to facilitate implementation, to create synergies and to improve cooperation. While the UGAs provide opportunities to finance new, large-scale public-transport projects, being partly toll-road financed results in cuts reducing AET-qualities. Even though the UGAs provide several synergies between walking, bicycling and public transport, we identified missed opportunities related to shared mobility. Finally, AET may benefit from horizontal and vertical integration of policy actors, specially concerning multilevel cooperation on designing public transport hubs. To conclude, though there are elements in the UGAs benefiting AET, the overall lack of integration between public transport and active travel needs immediate attention to achieve multi-modality.

1. Introduction

Urban transport poses major challenges to sustainability goals and continues to remain the fastest growing source of carbon emissions in the world. According to the International Energy Agency, greenhouse-gas emissions from the transport sector are expected to increase by 120% from 2000 to 2050 (ITDP, 2015). In response, a call for a mobility shift, away from private car use and towards higher shares of walking, cycling and public transport, has been routinely mentioned and to some extent adopted at different levels of governance. However, substantial change or shift has proven difficult. Making public-transport systems seamless to use, and eventually becoming the preferred mode, is a core component for such a change to occur. In this paper, we address a well-known, but under-investigated, challenge concerning how people access, egress and make transfers when undertaking public-transport trips. We posit that a substantial increase in public-transport use can be achieved through planning for an effective and easy combination of the following three stages of a trip – access, egress and transfer (hereafter AET[1]) in multimodal journeys. The benefits of strengthening public transport through improved AET are diverse and multiple. From the climate perspective, reduced car use would likely reduce the carbon footprint, as more travellers will instead use public transport in combination with climate-friendly modes of transport. Reduced car use also holds the potential to reduce other negative externalities relating to congestion, traffic accidents, local air and noise pollution. Lastly, active travel in combination with public transport will positively affect public health in comparison to door-to-door travel in private cars.

We have adopted a case-study approach and explored *if and how* public-transport AET is integrated in the planning approaches and policy orientation of the Norwegian city regions of Oslo and Trondheim. Empirically, the main focus has been on two policy-package structures relevant for AET within these urban regions. The research question guiding this study is: *To what extent can access, egress and transfer be strengthened through multilevel urban policy packages?*

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[1] Abbreviations used in this paper: AET = Access, egress and transfer, BRT = Bus rapid transit,UGA = Urban growth agreements

https://doi.org/10.1016/j.rtbm.2020.100546
Received 15 May 2020; Received in revised form 13 August 2020; Accepted 19 August 2020
Available online 11 September 2020

Our point of departure is the understanding that there exists a competitive relationship between the different modes of transport (e.g. Strand, Næss, Tennøy, & Steinsland, 2009), which essentially implies that travellers tend to select the transport mode which they perceive to be the most attractive. Hence, a simple derivative to support sustainable-transport goals is that land use and transport systems should be developed to make walking, cycling and public-transport use attractive and simultaneously provide competitive advantages over private cars. Given that mode choice is not static and gets influenced by changes in service quality for each mode, the dynamicity of choice and its interlocking with AET, an in-depth scanning of policies is needed. Though previous studies have highlighted that use of public transport increases when services and facilities are improved (Kjørstad & Nordheim, 2005; Nordbakke & Vågane, 2007), isolated measures directed at different transport modes are usually not sufficient to affect a major modal shift in urban areas. In order to make a dent in the current car-based mobility structures, we argue for an integrated approach which can monitor and plan for the entire gamut of modes (car, public transport, bicycling, bike-sharing, *E*-scooters and walking) as one interconnected unit. This approach represents the novelty of the current study. We focus on i) strengthening the qualities of AET and ii) earmarking its non-negotiable position in discussions on multi-modality.

The current approach to urban and transport governance in Norway is heavily focussed on sustainable urban-mobility shifts. A prominent policy framing, for both land use and transport-system development at the national, regional and local level, is the so-called zero-growth goal. This goal states that all growth in person transport in the larger urban areas is to be absorbed by public transport, bicycling and walking (Ministry of Environment, 2012). It essentially means that the Norwegian urban regions cannot increase the total vehicle kilometres currently being generated by private cars. Apart from targeting reductions in carbon emissions, the zero-growth goal is designed to address urban mobility in a wider perspective, including the sector's negative externalities like local noise and air pollution, congestion and traffic accidents (Ministry of Transport, 2017).

Among the government's main tools to obtain the zero-growth goal are the multilevel policy packages addressing transport and land-use measures called urban growth agreements (hereafter UGA). These packages are based on both financing platforms and cooperation in governance networks (Tønnesen, Krogstad, & Christiansen, 2019). The UGAs currently operational in Trondheim and Oslo regions constitute the empirical cases for this study. Their operational status and the emerging debates around their implementation provide a robust foundation to study the existence, integration or lack of AET.

The paper is structured as following: Section 2 provides a brief theoretical background on the essential elements shaping access/egress, transfer and urban-transport governance. Section 3 introduces the case regions, the UGAs and their mutual reinforcements. While Section 4 presents the methodology, Section 5 delves into the results generated from the study. Section 6 discusses the essential points emerging from this study and the study is concluded in Section 7.

2. Theoretical background

The current study combines literature review from three broad thematic areas: literature on *access/egress*, *transfer* and *governance and policy-packaging*. In terms of the former two, they relate to 'on-ground' solutions facilitating a shift towards reduced car-use and a simultaneous uptake of walking, cycling and public transport. Attempts to mimic the door-to-door efficiency and flexibility of the private car through increasing seamlessness of public transport have been central in this regard. The quest to establish transport systems catering to urban-mobility needs, while simultaneously being sustainable and compatible with the development of attractive urban spaces, however remains.

While transport mode choice has been extensively studied, the multiple modes constituting a trip are often overlooked. Further, available literate on **access/egress** has primarily focussed on access, and a range of socio-economic factors have been identified to influence mode choice for access. Women have been found more likely to use bus as an access mode, while travellers under 25 are more often picked up/dropped off at the public-transport stop (Kim, Gudmundur, Ulfarsson, & Hennessy, 2007; Tran, Zhang, & Fujiwara, 2014). Loutzenheiser (1997) found walking as access mode increased with education, while Tran et al. (2014) found car use positively associated with number of children in the household. Other researchers have addressed urban characteristics. Jiang, Zegras, and Mehndiratta (2012) found an increased willingness to walk to stations when the urban environment had a specific atmosphere, e.g. being busy and interesting. A European study found that public-transport users walk up to 70% longer in pedestrian-oriented urban areas than in car-oriented areas (Hillnhütter, 2016). However, Agrawal, Schlossberg, and Irvin (2008) found aesthetic elements of the built environment to be less important route-choice factors compared to distance and security in the North American setting.

Access to public transport, and the attractiveness of different modes, is highly influenced by land-use policies. In a review of Nordic studies, Næss (2012) finds that car use decreased when residences and workplaces were centrally located. Another study found that residences located in both central city and public-transport nodes generated less car use compared to other locations in the city (Tennøy, Gundersen, Hagen, Knapskog, & Uteng, 2017).

Access-egress, commonly known as the first and last mile problem, refers to the first and last leg of a journey. For a typical public transport trip, this involves travellers getting to (access) and from (egress) bus and rail stops. It is such access and egress trips which often have been referred to as public transport's first and last mile problem (Kager & Harms, 2017), as long distances between stops typically entail increased time expenditure on foot to access the services. Hence, in public-transport planning, a central question concerns finding ideal distance between stops. To reduce time loss, the distance between stops should be as long as possible. At the same time, it must not be so long that public transport appears as unavailable, potentially leading to the loss of customers. In this balancing act, travel time for on-board travellers is constantly weighed against walking time for boarding travellers.

An important shortcoming of the access/egress literature is its limited focus on cycling. An exception is Kager and Harms (2017) emphasising the need to integrate cycling and public transport. Studying the Dutch cycling-transit, they claim that by combining these synergistic transport modes, one obtains benefits which cannot be not attributed to cycling or transit in isolation. This means that the strength of each mode can be maximised on daily travels where high-speed public transport is used for long distances and walking/cycling for flexible movement on short distances. They specifically point towards how cycling can increase the catchment area of public-transport-stops by both reducing the constraint to reach the nearest stop and increasing the number of stops, and thereby the travel options within an acceptable time budget. According to the authors (ibid), the two most important factors to improve integration between public transport and cycling are *a)* bolstering cycling and transit infrastructure (e.g. provision of bike lanes, bike route signage and bus lanes) and a cycling/public transport friendly mobility culture, and *b)* promoting bicycle rental schemes, particularly important for trips that do not start or end at home.

An emerging but still limited strand of research relates the new forms of shared mobility and micro-mobility solutions which have sprung up across all major urban areas in recent years. Shaheen and Cohen (2019) use the concept *shared micromobility* to describe the shared use of bicycles, scooters, or other low-speed modes, enabling users to have short-term access to transportation on an 'as-needed-basis'. Studying the trial and error phase of cities having introduced shared *E*-scooters, Gössling (2020) concludes that if they are to play a role in the transformation of urban transport, careful regulation is required. In terms of transport chains, Espinoza, Howard, Lane, and Van Hentenryck (2019) find a limited deployment of E-scooters in combination with public-transport.

There is a general lack of studies highlighting the role of E-scooters as access/egress and transfer modes. Studying the geographical availability across Vienna, Moran, Laa, and Emberger (2020) find extended coverage in the most central districts, and sparse coverage in the outlying areas. This echoes POLIS findings 2019, highlighting micro-mobility to be an inner-city phenomenon –.

> "We all know mass public transport is the way forward. And it's fair to ask: are these services operating where cities most need them? Micromobility operators say they're providing solutions for the first- and last-mile. But …..since when is the last mile a problem in compact city centres? The real challenge sits on the other end of the commute, in dispersed and mid- to low-density suburbs." (POLIS, 2019:19).

The second strand of literature for this paper involves **transfer**. As urban regions grow, residents are increasingly required to make transfers to reach destinations (Hine & Scott, 2000). This poses a great challenge as transfers are one of the largest burdens for public-transport users (Schakenbos, La Paix, Nijenstein, & Geurs, 2016), representing a disruption in the traveller's public-transport trip. Hence, it is a double-edged sword – on the one hand, transfer provides a range of options and a geographically extended service area for travellers, but on the other hand, it represents a cost by reducing public transport's competitiveness relative to cars which provide door-to-door service.

Further, the psychological transfer penalties are affected by a broad range of observable and unobservable factors. The main factor has been found to be transfer time which includes both walking and waiting time (Cascajo, Lopez, Herrero, & Monzon, 2019). The cost of transfer, however, is not constant. Schakenbos et al. (2016) finds variation between different trip purposes, and the lowest cost was found to be for the commuters. This is assumed to relate to their familiarity with the specific travel options at hand. Further, the perceived penalty has been found to vary both across urban areas and public-transport stops (Guo & Wilson, 2011). There are also differences related to type of transfer, with bus/rail transfers associated with a higher penalty compared to rail/rail transfers (Douglas & Jones, 2013).

Iseki and Taylor (2009) suggest three broad categories of factors contributing to transfer penalties: 1) operational factors, e.g. reliability and availability of adequate information, 2) physical environmental factors at the facilities relating to safety, security, comfort and convenience, and 3) passenger factors, e.g. familiarity with the public-transport system, and whether they are able to engage in productive activities while waiting. Hence, measures set to reduce the transfer penalties will also need to be broad. Real-time information is one measure, potentially reducing the transfer penalty. In a before-and-after study, Dziekan and Vermeulen (2006) found perceived waiting time to have decreased by 20% after the implementation of real-time information. A satisfactory level of information also increases traveller's perception of controllability (Cascajo et al., 2019), in turn increasing public-transport users' intention to use routes involving transfers (Chowdhury & Ceder, 2013). Other factors to facilitate transfer involve improving waiting conditions, e.g. in relation to shelter, seats, temperature, lighting and safety (Cascajo et al., 2019).

An important limitation of previous studies is that access/egress and transfers have mostly been studied in isolation. In reality, these challenges are highly interlinked as the choice of making a public-transport trip involves a combination of AET, e.g. the number of transfers and walking time to public-transport stations (Hillnhütter, 2016; Polydoropoulou & Ben-Akiva, 2007; Wen, Wang, & Fu, 2012). Additionally, there exists a gap in exploring the institutional settings handling these issues illustrating the relevance of policy-packages and urban contractual agreements studied in this paper.

Hence, we come to the third strand of research relevant to the AET topic – the integration of measures, strategies and policy actors involved in urban and transport governance. The Norwegian UGAs are contractual agreements between the different tiers of government involved in the development land-use and transport-systems. They also fall under the conceptual umbrella of policy packages which can be defined as '*the combination of individual policies and measures in order to achieve a certain goal*' (Filipe and Macário (2013:150). Justen, Fearnley, Givoni, and Macmillen (2014) highlight how policy packages offer a way to combine different policy measures while addressing multiple objectives.

The policy-package approach has been applied in several ways, among these are ways to understand risk in transport interventions (Ramjerdi & Fearnley, 2014) and scenario building for urban freight transport (Gatta & Marcucci, 2014). In a back-casting study, Hickman and Banister (2007) sketch 11 policy-packages and discuss their potential in fulfilling UK's goals for transport carbon reduction. Taking one step further, Soria-Lara and Banister (2017) use a similar set of policy packages to test a participatory approach. Here, the broad involvement of practitioners and policymakers in the process of policy packaging was considered to facilitate co-production of policies.

Givoni, Macmillen, Banister, & Feitelson, 2013; Givoni, 2014a, 2014b has made substantial contributions in theorising the structure and functioning of policy packages. Central in this regard is policy packages typically consisting of both primary and ancillary measures (Givoni et al., 2013; Wicki, Huber, & Bernauer, 2019). Primary measures are directly concerned with achieving the overall goals of the policy package, for example, implementation of a public-transport project to increase the attractiveness of this mode. Ancillary measures are essentially supporting measures intended to either strengthen the effect of the primary measures, to avoid collateral effects (of the primary measures) or to strengthen implementation (of the primary measures).

In Norway, the UGAs are policy packages employing economic incentives to stimulate local and regional authorities. The authorities are expected to design and implement policies and programmes in line with the national goals for land use and transport-system development (Tønnesen et al., 2019; Marsden, Kelly, & Nellthorp, 2009). Hence, it is a form of meta-governance – or the 'governance of governance' (e.g. Sørensen & Torfing, 2009). Meta-governance is often employed by the state to secure coherence in governance regimes and to provide a balance between different actors (Jessop, 2004, 2016). In Norway, the meta-governance of the UGAs is a central state activity to reach the zero-growth goal.

We present the three main objectives for establishing policy packages which subsequently provide a framework for presenting our analyses. **First**, policy-packages are employed to strengthen implementation through addressing different kinds of obstacles ranging from economic to politically sensitive issues (Givoni et al., 2013). For example, Sørensen, Isaksson, Macmillen, Åkerman, and Kressler (2014) expand on the combined use of popular and unpopular measures in policy packages facilitating its implementation. **Second**, policy packages are founded on the idea that by combining individual measures, the total sum is greater than the sum of the individual measures (Givoni et al., 2013). **Third**, policy packages are employed to strengthen cooperation between the different actors. This involves the 'governance side' of policy packages and can be related to policy integration. Here, management of cross-cutting issues transcends the boundaries of established policy fields and organisational units (Stead & Meijers, 2009).

3. Contextual descriptions

3.1. Oslo and Trondheim regions

Oslo, the European Green Capital of 2019, is Norway's capital city and its administrative-, knowledge- and finance centre. It houses 675,000 inhabitants within the municipal border, and 1,354,500 inhabitants in its functional region. Oslo is surrounded by the Viken county, and Bærum (125,500 inhabitants), the county's most populated municipality is an integral part of Oslo's functional region. From 2018 to

2019, Oslo has had 1.1% population growth, following a decade of strong growth. Nevertheless, land uptake has been low illustrating the municipality's commitment towards urban densification, and its long focus on sustainability and liveability. Norway's national travel survey of 2018 shows that the car share (driver and passenger) in Oslo was reduced from 37% in 2014 to 32% in 2018, and remains to be the lowest among Norwegian cities (National travel survey 2014 , 2018). Public transport accounts for 30%, cycling 6% and walking 31% (National travel survey, 2018).

Trondheim, the third largest Norwegian city, is located in the middle of the country (see Fig. 1). The municipality has a population of 193,500 inhabitants and 282,500 in its functional region. Stjørdal, located on the outskirts of the Trondheim region, is the largest municipality with 24,000 inhabitants. From 2017 to 2019, Trondheim had 1.4% population growth. In terms of modal split, the national travel survey shows 50% travel with car, and this share has remained unchanged from 2014 to 2018 (National travel survey, 2014, 2018). Further, the 2018-survey highlighted a modal split of 12% for public transport, 10% for cycling and 27% for walking.

3.2. The Norwegian UGAs

The national transport plan of 2013 launched the UGAs for nine larger urban areas in Norway. They were promoted as a structure to coordinate different levels of transport governance, along with monitoring the interlocking of land-use and transport-system development. By 2020, the four largest urban regions have UGA agreements comprising the urban regions of Oslo, Trondheim, Bergen and Jæren. The agreements have a duration of approximately 10 years, with renegotiation planned within the agreement period.

For the period covering 2018–2029, the state will allocate almost 7 billion Euro to the counties and municipalities with UGAs. Importantly, the state covers 62% of the investment costs for public transport infrastructure projects in the four urban areas. The remaining share is covered primarily through toll-road collection. An important difference between the two cases presented in this paper relates to the fact that Oslo's main UGA project, a new metro line, is much larger compared to Trondheim's new BRT solution (see 3.2.1).

In addition to public-transport improvements, the major projects emerging from UGAs relate to road-infrastructure and improvements for pedestrians and cyclists. Lastly, an important dimension of the UGAs is the integration of land-use and transport policy.

As mentioned, the overall goal of the UGAs is to achieve the zero-growth goal. To monitor goal achievement, a set of indicators have been developed based on travel surveys, traffic indexes and land-use indicators. The UGAs have clear specifications that funding may be held back if the parties do not fulfil their obligations. This set-up closely resembles an English performance-reward scheme, where funding could be adjusted by up to 25% by the state, depending on the quality of local plans and goal achievement (Marsden et al., 2009).

Fig. 1. Location of the Oslo and Trondheim areas.

3.2.1. The UGAs for Oslo and Trondheim regions

In 2017, Oslo and Viken county[2] signed a UGA with the state. In terms of governance structure, the partners are the state represented by Public Roads Administration, the railroad authority, and the regional level represented by Viken county, and lastly, the municipal level represented by Oslo[3] and three neighbouring municipalities. The current agreement runs for the period 2019–2029. The main economic contribution from the state covers up to 62% of the construction costs of a new metro line, the Fornebu-line. Further, the state has committed to maintaining the same level of service on state-owned railways. The UGA also involves financing of measures facilitating public transport, walking and cycling, some of which will be described later in the paper.

In 2016, Trondheim was the first Norwegian region to enter a UGA. Similar to Oslo region, it involves cooperation between the national, regional and municipal levels,. The levels are the same as contained in the previous transport policy-package, but in 2019, the UGA changed from being a single-municipality agreement to one involving four municipalities. In addition to Trondheim municipality, three neighbouring municipalities were included. The main infrastructural project in the UGA, where the state is committed to 62% of the cost, is a new bus rapid transit (BRT)-system involving substantial changes in terms of both material and organization. Further, the agreement commits to a plan for improving the railroad going east of Trondheim, involving a mix of infrastructure and service upliftment through electrification and increased frequency of trains.

One of the main drivers behind UGAs was the need to strategize funding of large public-transport infrastructure projects. Ahead of the UGA-negotiations, the national government decided that for Oslo region, a new metro line called the Fornebu metro was to be realised, while the Trondheim area will implement a BRT system.

The Fornebu metro will have seven new underground stops across the municipal border of Oslo and the neighbouring municipality of Bærum (Fig. 2). An overarching and separate department for coordinating the planning, funding and implementation of Fornebu metro line has been established within the organisational setup of Oslo municipality.

The BRT solution of Trondheim opened in august 2019 and is a complete reorganisation of the city's public transport system. The proposed system, built around three new main lines with new busses and stops (Fig. 3), is based on BRT criteria with large busses, longer distances between stops, separate lanes and transfers.

4. Methodology

This paper is based on in-depth case studies of Oslo and Trondheim regions focussing on the respective UGAs and public-transport investments made in the agreements. The methodology involved in filtering Oslo and Trondheim as case studies relied on deductive plotting of how UGAs were established in the two urban regions. Oslo and Trondheim stood out for the following reasons: firstly, both city regions were progressive in terms of willingness to enter urban contractual agreements with the state. Trondheim was the first to sign both the first variant of the UGA in 2016 and the first to go through a process of renegotiations ending with a new agreement in 2019. Oslo region signed a former variant of the UGA in 2017 and a (re)negotiated UGA in 2019. It

[2] The agreement was signed with the Akershus county, which became part of Viken county on 01.01.2020. The article thus refers to Viken county instead of Akershus.

[3] Oslo occupies a unique position in the Norwegian context, as it is both a municipality and a county.

Fig. 2. The Fornebu line. Source: Oslo municipality.

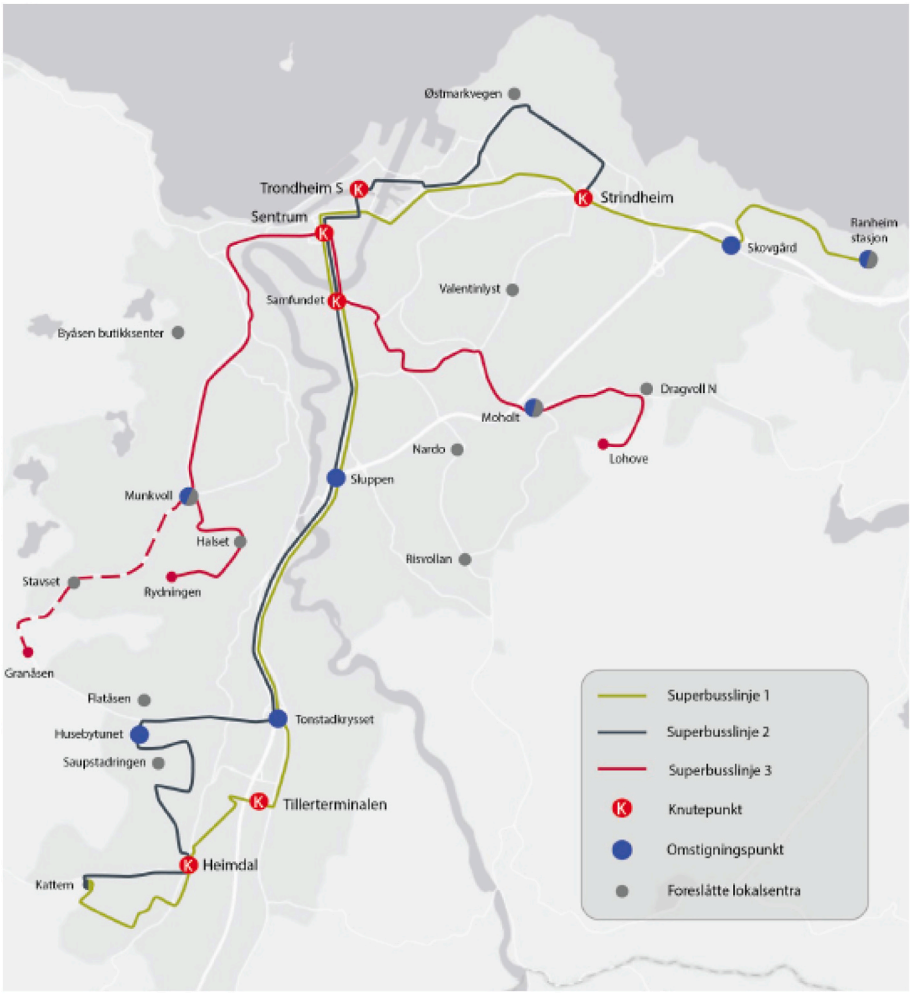

Fig. 3. The new BRT system. Source: Trondheim municipality.

was also the first and only one to sign a forerunner agreement, the so-called Urban development agreement in 2017.[4] Secondly, both regions have not only harboured high ambitions, but implemented massive changes in terms of organising and operating public transport over the last decade. Hence, both regions exemplified political support for car-use reduction strategies, a shift towards multimodal public transport (with a door-to door perspective), and active multi-level governance structures of implementation.

While being aware of how governance structures and outcomes are influenced by a range of local factors, the ambition of this paper is to offer lessons to cities in different contexts seeking to reduce urban car use. Following this argument, the case-study approach is used to cover the contextual conditions seen as relevant to what is.

being studied. As stated by Flyvbjerg (2011:301); "case studies focus on 'relation to environment', that is, context". Hence, while the processes and structures described here may have varying manifestations in different contexts, they are nevertheless thought to describe tendencies which are equally relevant in other settings. And though the context is restricted to Norwegian policy-packaging, the application and relevance of the results are wider. This can be related to Yin (1994) presenting *analytic generalisation* as a contribution of case studies.

The methods employed to explore the position of AET elements in the UGAs are based on a combination of document analyses and qualitative interviews. The document studies involved analysis of the UGA documents, governmental policy documents, municipal plans and public-transport action plans. The interviews were semi-structured, and all interviews followed the same interview guide (see Appendix 1). They were conducted between June and October 2019; 18 interviews were face-to-face and four via telephone.[5] In four interviews there were two informants present (for further description of informants see Appendix 2). A purposive sampling strategy was applied (Lynch, 2013), with emphasis placed on covering the same type of informants in both urban regions. Given contextual differences between the two cases and differences in governance structures, there are slight differences in type and number of informants. The interviewees were policy actors either directly involved in running and developeing urban mobility or involved in planning the overall land-use and transport-systems in the two regions. More precisely, the group consisted of municipal officers, county/regional authorities' representatives, road authorities' representatives, public-transport actors and representatives of new mobility solutions. The participants were guaranteed anonymity and with the permission of the informants', the interviews were recorded. All interviews were fully transcribed and analysed in NVivo (a software program for qualitative analysis). Here, the text was coded according to a set of categories defined by the researchers (see Appendix 3). These categories are not similar to the main questions in the interview guide but were instead inspired by what was seen as particularly relevant paths of exploration in the analysis phase and enabled us to reflect further on the main findings emerging from the literature review.

5. Results

In Section 2, we presented the following three rationales behind policy packages: 1) to increase the likelihood of implementation, 2) to create synergies, and 3) to improve cooperation between policy actors and agencies. In this section, these rationales have been further employed to explore, structure and present the analyses.

5.1. The UGAs and likelihood of implementation

Starting with implementation, the question is *if* and *how* the UGAs strengthen the implementation of measures facilitating AET. The Fornebu metro and the introduction of BRT in Trondheim are both massive changes in the existing public-transport services. Further, the UGAs have the potential to implement stronger land-use policies with intensified densification around public-transport nodes. In the Oslo-region's UGA, it is emphasised that the areas around the new metro stations should be densified:

> "In the municipalities constituting the urban areas and at the stations along the Fornebu metro line, there should be a high utilisation of land around the public transport junctions and stations." (Oslo-region, 2019:3).

By connecting compact land-use and transport-system development, it is posited that access and egress will be strengthened as more built up structures will be located close to the stations. This principle is by no means new - such densification strategies are also central in the regional plan for land use and transport in the Oslo area. However, through the UGAs, the state public-transport investment is directly connected to policy expectations. If expectations are not met, the agreements make it clear that they may be terminated and financing may be held back. A municipal officer explained the state expectations of compact land use at the Fornebu-metro stops as following:

> "The UGA is the most important financing source for the Fornebu metro line (…) We have an obligation in terms of land-use densification at Fornebu, and this commitment is through the UGA."

Further, (s)he explained how the UGA strengthened the implementation of the regional plan:

> "We have passed a regional land-use and transport plan, but this commitment is kind of loose. And that is where the UGA comes in and reinforces that commitment, [being a] mutually binding agreement."

Even though the UGAs are quite clear about the state expectations pertaining to compact land-use implementation at the municipal levels, the agreements bind all three levels of government (national, regional and local) to this end. For example, there is an explicit requirement in the Trondheim UGA to "*locate and relocate government-owned visitor-intensive businesses and offices to areas which support the zero-growth goal and obligations of this agreement*" (Trondheim-region, 2019:13). Hence, the obligation to concentrate development around compact nodes involves all three levels of government.

While partial state-funding makes it feasible to build the Fornebu metro line, the toll-road component of the funding plan makes the project politically sensitive. In 2019, Norway witnessed massive protests towards toll-road payment and the UGAs. In response, the Minister of transport put forward clear expectations on cost-cutting of the Fornebu-metro line.[6] High costs and the Fornebu-metro's troublesome connection to toll-road financing provide important backdrop to the proposed changes at one of the stations. The metro stop is likely to be moved from its original (planned) location to a location which entails cheaper construction costs. By doing so, the station will be moved further away from an existing railway station and thereby will no longer form a part of the envisioned compact public-transport node. Hence, the quality (and quantity) of *transfer* between railway and metro was compromised to reduce costs. This trade-off highlights that while the Fornebu metro line was brought to life through a policy package, its connection to toll-road financing is sensitive and will reduce the transfer qualities.

A heightened awareness around the sensitivity of realising new

[4] This was a smaller side-agreement, focusing on land-use policy. The Urban development agreement and part of the UGA-structure. is no longer in operation

[5] Originally, the data material for the project involved 20 interviews. This has been supplemented with three interviews from an adjoining project.

[6] News article from *Aftenposten*, published on 20.05.2020.

public-transport services financed through toll-road income is also found in Trondheim. Both the Trondheim-region UGA and the new BRT system have been framed to avoid changes or increases in the existing toll-road scheme. As stated by a municipal officer in Trondheim: *"It was a goal to avoid large, expensive projects, which would have increased the toll-road burden."*

The low cost of the Trondheim BRT is thus evident. To exemplify, the stipulated state share for BRT in Trondheim was set at 154330000 Euro (Trondheim-region, 2019). In the Jæren-region UGA (not being a case in this paper) the state share of the new BRT is 471,840,000 Euro (Jæren-region, 2019). A main difference between the two designs, reflecting the differing costs, is that the Trondheim BRT will, for a large part, not be operating on dedicated lanes to cut costs. Hence, it operates in mixed traffic and remains more vulnerable to congestion. In the following quote, a municipal officer explains the challenges related to designing the BRT functionality:

> "[It is demanding] when you kind of can never refine a concept in terms of what to develop. Constantly, professional considerations must give way to politics – you have to agree with the politicians weakening the policy. You kind of shop functionality. At one moment, there is the discussion (…); if there should be an ambition of having universally designed entrances at all stops throughout the city, but at the same time [BRT vehicles must simultaneously] drive in mixed traffic with cars."

Hence, while the desire to cut costs is understandable, ways in which this desire pans out may introduce an unfortunate combination – longer distance to stops and a system based on transfers, without simultaneously benefiting sufficiently from the potential upsides of a BRT system – separation from other traffic and thereby a reduction in delays. One municipal officer described the implementation of BRT through the UGA as a mixed bag, consisting of both opportunities and pitfalls. (S)he explained how the UGA's ambitious timeline for implementation was related to the financing system of the UGA. It resulted in an explosion of zoning plans to be handled simultaneously. While it put pressure on the municipal administration, an agreement was established to prioritise the BRT related zoning plans. However, s(he) also explained how the rapid progress resulted in a weaker knowledge base in the initial phases, particularly with regards to cost of different solutions: "*we could probably have optimised* [the BRT project] *from the start and been more up to date*". This exemplifies how initially planned stretches of dedicated BRT lanes were cut down as the high costs became clearer.

5.2. Policy packages creating synergies

Turning to the issue of synergies, we focus on *if* and *how* the UGAs created synergies to benefit the elements of AET. We highlight the potential synergetic effects of integrating walking and cycling as access and egress modes with the new metro line in Oslo and Trondheim's BRT.

Strengthening of cycling as an access mode to public-transport stops is emphasised in both Trondheim and Oslo UGAs. Though somewhat hidden and not explicit, the formulation prescribing the use of state resources for new cycling infrastructure heralds a silent AET revolution. Formulations in the two UGAs are identical and makes clear that a specific kind of state money can be used to facilitate public transport, walking and cycling "*along state roads, or walking-and cycling stretches with a state-road function*" (Trondheim UGA 2019:3, own underline). This is significant as it opens up the possibilities for state-level resources to be utilised differently than being exclusively tied to state-owned roads. A public officer at the county level in Trondheim described the tough negotiations that took place to reposition the state's initial plans:

> "Approximately 2,4 [millions NOK/215 003 Euro] was originally allocated for building an express cycling route in Trondheim. The route was planned along the state road, but there are incredibly low counts for cyclists along the state road in Trondheim. There is a reason to why it is called 'the detour road'. So, the local strategy is that we want to establish cycling like we do for the [BRT system], with main veins to some nodes."

For both Oslo and Trondheim agreements, it is made clear that the state level resources "*can be used to realise the main cycling routes and to tap the largest potential to reach the zero-growth goal within each municipality, as for example, creating supply veins towards public-transport hubs*" (Trondheim-region, 2019:3). This shift can be seen as a recognition of the importance of access/egress to public-transport stops in the urban transport system. Or, relating to Section 2, improvements of bicycling facilities are used as an ancillary measure to back up the public-transport investment (in line with Givoni et al., 2013).

Further, Trondheim municipality has a systematic approach to facilitate walking to public-transport stops through the so-called 'pedestrian shortcut project' from 2014 onwards. The project involves mapping of 400 shortcuts and improvements made to around 20 shortcuts, with 20 more in the pipeline. These shortcuts have been established to facilitate better connection between local centers with public-transport nodes, improve local access to businesses and services, and integrate land-use and public transport. A public officer in Trondheim emphasised the integration between the 'pedestrian shortcut project' and the new BRT system:

> "The shortcut project has been integrated in the [BRT work] since we started. We have a so-called walking group in Trondheim [municipality] which has analysed every station in terms of whether the effect [i.e. increased use] can be reinforced by establishing shortcuts facilitating walking to the station."

A similar approach and project to systematically strengthen walking facilities to the public-transport stops throughout the city has not been established in Oslo. However, substantial bicycle parking at the new Fornebu metro stations, particularly for the stations within the Oslo municipal border, forms an integral part of the metro plans. A municipal officer pointed to the political demand of 1000 bicycle parking spaces per metro station in Oslo being surprising and seemingly lacking underlying analysis:

> "[At two stations it was demanded that] both should have 1000 parking spaces (…) There was evidently no analysis to back this number. It was kind of 'pick a number', and 1000 is a nice and pretty high number. There were no demands on quality, except that they were supposed to be roofed."

Though not built yet, this approach might result in adopting sub-optimal solutions. Further, the same officer remarked for one of the stations:

> "The user friendliness of the solution was not emphasised. Access to the bicycle parking is [going to be] via stair roll tracks. It is not to say that it is a bad solution if it is fast to use, but many have emphasised that a better solution could have been chosen."

Fig. 4 gives an example of a stair roll track for bicycles.

In Trondheim, there is an integration between the existing cycling network and the new BRT routes, combined with provision of bicycle parking at the new BRT stations. However, the informants were acutely aware of the limited number of parking spaces being built and a lack of integrated thinking to combine cycling and public transport:

> "[W]e don't have much statistics on cycling connected to public transport. There might be a potential for improvement here; how many will actually cycle to a stop and where [in the city] is this most relevant."

Further, lack of integration with shared bicycles, or the city-bike solutions, is evident in both Trondheim and Oslo. A county representative in Trondheim described how the city-bike system functioned as a

Fig. 4. Illustrative example of a stair roll track for bicycles. Source: Svein Johan Knapskog.

supplement to public transport, instead of being integrated with it and acting as a complement to the public-transport system:

> "[W]e have a city-bike solution, but it does not function as a feeder system to the bus. It's really more like replacing the use of bus in central areas."

City-bike solutions are not described in the two UGAs, and it doesn't seem to be a central theme in planning of either the Fornebu metro in Oslo or the BRT lines in Trondheim. In Norway, there has been a single company responsible for bike sharing in the three largest cities Oslo, Trondheim and Bergen, though there are differences between the cities in terms of structures for cooperation. Most notably in Bergen, the municipality has the overall responsibility for further development of the scheme. And in this process, the bike company functions as a consultant or expert advising the municipality. In Oslo and Trondheim, the roles seem somewhat to be the opposite, with the bike company more tied to a sub-contractor function. It is to be noted that the shared-bicycle arrangements are financed through commercial advertisements in both Oslo and Trondheim, while in Bergen financing comes through ordinary municipal budget.

In the Oslo area, there is an additional regional dimension to the challenges related to city-bikes. While both Oslo and the neighbouring municipalities have relatively similar systems for city-bikes, the two systems remain separate. In functional terms, this means that a city-bike journey cannot be started in one municipality and terminated in the other. For example, in the agglomeration around the municipal border between Oslo and Bærum (at Lysaker) where the respective city-bike parking systems are spatially close, users parking on the 'wrong' side will end up paying extra. These conditions, affecting the ease of use, significantly reduce the quality of the city-bike system and its role as an access/egress-mode to public transport.

Lastly, the handling of micromobility solutions like shared *E*-scooters follows a pattern similar to the city bikes. They are neither mentioned in the two UGAs, nor emphasised by informants in the planning of Oslo's metro line and Trondheim's BRT. Given that it is only since 2019 that the shared E-scooters have emerged as a transport service in the larger Norwegian cities, we can hope that its potential as an access/egress mode will be better realised, organised and planned for, in due course. The following informant, a representative of Oslo's pubic-transport company, described the challenge of planning for access/egress in a rapidly changing transport landscape:

> "The thing is, we must consider that the world is changing. Five years ago, there was a lot of focus on shared city bikes. Now this use has substantially dropped, with the introduction of the E-scooters. So, we must always balance and look for what the customers really want, so that we do not build too much infrastructure that might become redundant."

Also, when looking at both shared city bikes and E-scooters, the arrangements stand out as city-centre oriented. For both systems, there are clear spatial limitations with access stations for city bikes being relatively centrally located, and geofencing of E-scooters allow for parking (and termination of rent) exclusively in the central parts of the city. There have been talks of expanding the city-bike arrangement and in Oslo's functional area and the region's public transport company has very recently launched a pilot project establishing suburban E-scooters. Still, both forms of micromobility, in both Oslo and Trondheim, are primarily city-centre oriented. In this way, shared micromobility is at large offered on only one leg of the trip, in the central parts, where distances are typically shorter and where travellers already have multiple public-transport options available.

5.3. The UGAs as catalysts for improved cooperation

Turning to the issue of cooperation, the question is if (and how) the UGAs strengthen cooperation between policy actors in ways that facilitate AET. Certain dimensions of UGA cooperation stand out as particularly interesting and indicate a substantial potential for strengthening AET. Firstly, a regional approach is embedded in the UGAs. Both in the Trondheim and Oslo area, the agreements have four signing municipalities – the main city joined by three adjacent municipalities. The UGAs emphasise that the municipalities have a shared responsibility towards achieving the zero-growth goal in traffic within the borders of the signing municipalities. The UGAs allocate and distribute funds accordingly to the participating municipalities. The agreements also clearly stipulate the collective need for cooperation across municipal borders, and for each municipality individually to implement policies in line with the zero-growth goal. This element of stronger regional integration was evident in an interview with an officer representing one of the adjacent municipalities of Trondheim. Here, it was noted that while the municipality was given the opportunity to respond to hearings in Trondheim's previous policy package for transport-system development, the regional integration was much stronger in the UGA:

> "The adjacent municipalities have a foundation for obtaining closer communication and there is a potential for regional thinking in a new way than before."

It is reasonable to assume that, in the longer run, regional integration may strengthen AET through a shared orientation towards developeing compact public-transport nodes, along with synchronisation of timetables and fares to promote public-transport transfer at the regional level. In Trondheim, one municipal officer credited the current UGA for strengthened synchronisation of public transport in the region.

The second way UGAs could facilitate AET through better cooperation relates to development of the public-transport nodes. More

specifically, UGAs can be employed to put state pressure for further developeing existing railway hubs. This exemplifies how the UGAs are not simply directed towards the spatial hierarchies of regional and local levels, instead the agreements are based on a shared (organisational) obligation to act in accordance with the zero-growth goal.

In the Trondheim-region UGA, addressing state responsibility in relation to developeing the railway nodes is particularly clear. It is stated that all three levels of government have a shared obligation to present spatial plans as well as plans for realising and financing of altogether five public-transport nodes by the end of 2019. Even though this ambitious deadline was not reached, the goal was obtained for three nodes by May 2020. A municipal officer from Trondheim emphasised how the UGA had not only highlighted the importance of railway services, but also strengthened dialogues across the levels of government:

> "Through the UGA, the role of the railroad in the region has been clarified (…) [There has been] a long-term focus on transit-oriented development, but the UGA has highlighted roles and responsibilities in relation to this (…) The UGA has clearly strengthened dialogues across levels and agencies."

The following informant, a politician from an adjacent municipality of Trondheim, was hopeful in terms of how the UGAs could push multilevel cooperation forward:

> "One problem is that [the state railroad authorities] have so far not done any demarcation in terms of what the station area should be. (…). [The wide station area] makes the connection to the city center worse. We don't need 4-6 tracks in the center - it should be put outside the downtown area. We expect them to deliver a track clarification before [2019] is over, as the UGA states that they should."

6. Discussion

6.1. The policy-package financing - a blessing and a curse

It is evident that the UGAs have paved way for large-scale development of public transport in the two urban regions. In the Oslo region, the UGA was particularly instrumental in pushing plans for a metro-line which had been under discussion for decades. In Trondheim, the UGA ended a long discussion on whether to develop a bus or rail-based solution as the backbone of the local public-transport system. However, the partial state financing leaves room for discussions concerning the remaining share expected to be raised by local and regional parties. As it is beyond the ordinary budgets of these parties to finance such amounts, the UGAs are inadvertently paving way for toll-road payment. As found elsewhere, the structure of financing transport policy packages influences what is considered as acceptable measures to be implemented (Tønnesen, 2015). The toll-road connection in Trondheim led to a low-cost BRT being implemented. While keeping toll-road protests at bay, this approach put forth the BRT-downsides (such as extensive transfer and longer distance to stops), without being able being able to benefit from the well-known BRT-upsides like avoidance of congestion owing to separate track.

Further, our analyses highlight that the UGAs bear significant influence on the established 'way of doing things'. One such change, likely to strengthen AET, is the emerging possibility to direct state road money, initially allocated to strengthen cycling facilities along state roads (main arteries), to instead be directed towards public-transport hubs. However, the UGA financing system also creates pitfalls for AET, as was evident in the Trondheim area, where informants described how the financing system of the UGA rushed the implementation of Trondheim's BRT providing them with a relatively weak knowledge base in the early phases.

6.2. The shared commitment of the UGAs

A central feature of the UGAs is their emphasis on shared commitment between the three levels of government. This represents a clear potential for strengthening of AET. At the horizontal level, the UGAs emphasise regional integration and coordination across municipal borders. Land-use and transport-transport system integration with compact development around public-transport hubs at a regional level may strengthen access and egress. Likewise, better regional synchronisation of public-transport fares and timetables, which seems to be related to the UGA in the Trondheim area, may reduce the burden of transfer. A regional approach to travel is necessary to facilitate the use of alternatives to private cars.

In terms of meta-governance efforts of the state, UGAs emphasis on compact land-use around the public-transport nodes is evident and is particularly strong for the Oslo's new metro line. However, commitments go both ways. This is exemplified in how the state commits to land-use along the basic postulates of the agreement, for example in relation to localising its own units (such as hospitals and police offices). The state obligation is also evident in the explicit requirements for facilitating cooperation to develop new railway hubs. The recent progress in planning of these hubs in the Trondheim area can be directly related to the UGA formulations. The shared commitment and specific descriptions of each party in the UGAs makes Rhodes's (2006) notion of *internal accountability of governance networks* relevant. Here, the differing interests among the UGA-partners would optimally act as checks and balances benefitting the public-transport system at large.

6.3. Opportunities taken and opportunities missed

The UGAs provide a crucial structure to connect the national zero-growth goal with on-ground implementation (Tønnesen et al., 2019; Bache, Reardon, Bartle, Flinders, & Marsden, 2015). In this regard, the agreements direct both land-use and transport systems in ways that can benefit AET in short and long term.

An important issue concerns the level of detailing required in the UGAs. The agreements are highly overarching in some dimensions and specific in others. On the one hand, we find that the signing partners have taken a step further linking the UGAs to other activities benefiting AET. The linking of the new BRT-system in the Trondheim area to the 'shortcut project', which highlights improved access to stops by foot, exemplifies this approach. Here, the local parties connect the UGA to external activities even though it wasn't explicitly described in the agreement. On the other hand, one challenge for AET is that it typically suffers from 'falling between chairs'. Due to a lack of mentioning the range of measures which can strengthen AET, specific inputs are missing. For example, while the need for regional coordination of parking policy is specifically described in the two UGAs, there is no mention of the need to integrate sharing solutions like the shared city-bike systems across municipal borders. In the two UGAs, the most explicit mention of access/egress is perhaps that of establishing car-based park-and-ride solutions. Further, the UGAs do not address new forms of mobility like the *E*-scooters. And while shared mobility options are offered in both cities, they are geographically limited to central city areas. This is in line with a general tendency of city-centre orientation of shared micromobility as described in Section 2 (Moran et al., 2020; POLIS, 2019), Hence, in addition to addressing micromobility (hereunder beneficial regulation) as an access/egress mode, the UGAs could additionally benefit from addressing how they could provide a solution to the access/egress problem in the suburbs. In this way, the UGAs could have acted as brokers for establishing connections with shared micromobility schemes for better spatial integration, information and solutions for payment.

In Section 2, we mentioned the combining of cycling and public transport. In line with Kager and Harms' (2017) emphasis on the need to integrate cycling and public-transport infrastructure, the UGAs seek to

improve cycling infrastructure towards the nodes. Importantly, the UGAs have made state-resources more flexible so that they can be used to strengthen access towards public-transport nodes instead of being exclusively tied to the state roads. Still, there is both scope and need for further improvement. A systematic analysis of the existing and future potential embedded in combining cycling and public transport in different parts of the city is lacking. Planning of 1000 bicycle parking spots at the new metro stops in Oslo seems to be more of a political statement than the result of systematic analysis of parking-needs at the given stations. Additionally, an informant pointed to spots where cycle parking was provided, but with suboptimal access. This is quite different from holistic schemes targeting to integrate bicycling and public transport. Still, Oslo's political will to prioritise bicycle parking at the UGA-financed metro stops illustrates a trickle-down effect. The integration between the short-cut project, seeking to improve walkability in relation to the new BRT-system, in the Trondheim area also exemplifies such an effect.

6.4. Implications for policymaking

For politicians and practitioners, the findings of this study are particularly relevant in three ways. While the study explores the context of the two Norwegian cases, the findings relate to broader issues of multilevel cooperation, making them relevant for policy makers (and researchers) covering urban policy packages in other settings. The first lesson informs us about how negotiations over urban contractual agreements can trigger and initiate new ways of cooperation and re-arranging of established structures. In relation to the UGAs, we saw that an important part of the negotiation involved new uses of state-resources, paving way for a more targeted use of these to strengthen the bicycle network. Through the UGA negotiation, and in the signed agreement itself, requirements for all three levels of government to cooperate in developing public-transport nodes was also established. Responsibilities and deadlines were herewith specified. Both, the modified allocation and uses of state resources and requirements of multilevel cooperation over public-transport nodes, are seen as beneficial for the facilitation of AET in the two city regions.

The second contribution for politicians and practitioners relates to unpacking and highlighting the potential of connecting land-use policy to large-scale transport infrastructure investments. This is a core component in the Norwegian UGAs. By establishing a requirement of compact urban development in the UGAs, the state not only provides customers to the public transport projects they co-fund, but also support climate friendly modes as access and egress modes.

The last lesson relates to the missed opportunities for AET in the UGAs. While a huge potential is inherent in the UGAs, a holistic strategy and analysis of how to facilitate AET is lacking. This includes a focus on how shared forms of micromobility could strengthen AET in the urban outskirts. There are clear benefits of organising land-use and transport-system development in policy packages. In the UGAs, they are likely to provide positive synergies and reduce negative linkages between the proposed measures. However, they could be used better to address the whole travel chain, hereby holistically addressing the first-last mile or access/egress problem at large.

Lastly, the conceptual framing of Mobility-as-a-service (MaaS) also offers interesting opportunities in relation to the access/egress dimension of public transport. While a wide range of MaaS definitions and schemes exist, the integration of various forms of transport services accessible on demand is a core characteristic. The different types of shared micromobility described in the current paper are relevant components of MaaS schemes, in line with car-sharing, on-demand bus services and taxis. However, keeping the Norwegian zero-growth goal in mind, a valid concern is if some of the MaaS solutions might lead to increased levels of urban traffic (POLIS, 2017). And it is here that an unpacking of the proposed MaaS solutions is required and the potential of modes, like bicycles, *E*-scooters, on-demand services etc., to act as feeder services or access/egress modes need to be made an integral part of the proposed MaaS solutions.

7. Conclusion

This paper addresses the well-known, yet under-investigated, challenge of how people access, egress and make transfers (abbreviated AET) in public transport. The handling of AET is seen as crucial for strengthening public transports' competitiveness vis-à-vis private cars. This in turn may reduce numerous negative externalities relating to urban car use such as carbon emissions, congestion, traffic accidents, local noise and air pollution. Through a case-study approach, we studied the integration of AET in two Norwegian policy packages targeting land-use and transport in the Trondheim and Oslo regions. These multilevel agreements, abbreviated as UGAs (urban growth agreements) were analysed in line with three perceived benefits of policy packages – *facilitation of implementation*, *creation of synergies* and *strengthening of cooperation*.

We find several examples of how the UGAs strengthen AET. They involve not only the implementation of policies and measures, but also strengthen inter-municipal and multilevel cooperation. The UGAs pave way for new public-transport services backed by national-level financing and political will. For facilitating AET through these policy packages, routes and fares can be better coordinated at a regional level, in turn strengthening transfers. Further, the UGAs hold potential for promoting compact and strong public-transport nodes across the region, strengthening access and egress. While the full effect of the UGAs can only be determined at a later point, the policy packages seem to facilitate multilevel cooperation for new development of railroad nodes. Speeding up this process and developing these nodes in compact ways clearly have AET implications. As noted in Section 2, physical environmental factors relating to comfort and convenience are crucial to reduce transfer burdens (Iseki & Taylor, 2009).

Further, requirements for all parties to avoid sprawling land-use policy are highly important for AET. The UGAs not only involve traditional meta-governance, with the state level influencing on local-level policies, but commit both ways through inserting several mechanisms of internal network accountability (Tønnesen et al., 2019). This involves ways in which varied interests of the involved parties in the UGAs act as checks and balances (cf. Rhodes, 2006).

While the UGAs provide partial financing for new public-transport projects in the two urban regions, the Fornebu metro line in the Oslo region and a BRT-system in the Trondheim region, toll-road financing to cover the remaining costs is a sensitive issue. In both empirical cases, the desire to keep toll-road costs low has influenced projects directed towards AET. Trondheim's choice of a non-expensive BRT-model highlights the dangers of implementing the downsides of BRT (extensive transfers and longer distances between public-transport stops) without sufficiently gaining on the BRT-upsides (avoiding mixed traffic due to dedicated lanes). In the Oslo area, there is a clear example of how the desire to reduce toll-road burdens compromised the originally planned compactness at one of the new metro stations, in turn reducing transfer qualities. In this way, the paper nuances the picture derived from previous studies where acceptance for toll-road payment was supported through being part of larger policy packages involving public-transport development (Norheim, Nilsen, & Frizen, 2013; Sørensen et al., 2014). Hence, while these studies found toll-road payment facilitated public transport plans, the current study has found this linkage to be more sensitive.

When comparing the two UGAs in this study, we find both similarities and differences. They share the overall institutional context of national authorities setting up multilevel cooperation over land use and transport in the UGAs. Although national authorities have opened up for local adaptations of the UGAs, streamlining these arrangements have also been emphasised. Hence, elements like overall goal, requirements for land-use policy and the strengthening of cycling infrastructure are

similar in the two UGAs. A striking difference relates to the public-transport projects, given that Oslo's metro project is much larger than Trondheim's BRT initiative. This in turn is reflected in a stronger focus on densification around the new metro stations in the Oslo region, compared to BRT stops in the Trondheim region. Further, in relation to the establishment of new cycling parking around stations, both planning and details are significantly different with Oslo seeking to establish parking for 1000 bicycles at some stations. However, in terms of connecting the UGA to previously existing transport policy packages, Trondheim has perhaps taken the largest steps. Here, a total merging of the UGA with the previous Environmental package is seen as benefiting AET, as evident in the shortcut (walking) project being integrated in planning of the new BRT system.

While the UGAs strengthen AET in several ways, there are numerous missed opportunities in the empirical cases as well. And perhaps the most important lessons for other policymakers working with AET is exploring these missed opportunities. Most notable is the lack of focus on city-bike schemes, which Kager and Harms (2017) have highlighted as critical for advancement of seamless public transport. Though both cases exemplify implementation of cycling measures, a comprehensive approach to integrate public transport and cycling for seamless travel seems to be lacking. Further, the agreements do not mention new forms of mobility like *E*-scooters. Even though the landscape of shared mobility solutions is changing rapidly, the UGAs could have mentioned these access/egress (and transfer) modes in the same way as they have emphasised the need for regional coordination of car-parking regulations. This also includes strategic thinking on how shared forms of micro mobility could strengthen public transport by providing access/egress solutions in the suburbs.

Finally, returning to the research question regarding the extent to which access, egress and transfers are strengthened through the described multilevel policy packages, we find several ways in which UGAs provide strength to AET. It benefits from the horizontal and vertical integration of policy actors in the UGAs. Further, the UGA financing provides possibilities to realise large public-transport projects and AET may benefit from how land-use and public-transport projects are integrated through compact development around nodes. While certain components in the agreements clearly benefit AET, the UGAs do not apply a careful design of primary and ancillary measures to promote non-car alternatives to facilitate door-to-door trip planning. This part is essential to exploit the full potential of the UGA policy packages to strengthen AET.

Author contributions

Anders Tønnesen: Conceptualization, Methodology, Investigation, Data Curation, Formal analysis, Lead writer of original draft, Lead writer in revision.

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Kjersti Visnes Øksenholt: Conceptualization, Methodology, Investigation, Data Curation, Formal analysis, Input given on original draft.

Acknowledgements

This paper is part of the project *Access, egress and transfer practices for designing multimodal connectivity*, shortened TRANSFER, financed by the Research Council of Norway (project number 267877/O80). We would like to thank our informants for their time and effort. Further, we are grateful for useful inputs from our colleagues in the TRANSFER project. We also appreciate the valuable suggestions of the Editor and two anonymous Reviewers.

Appendix 1

Interview guide

Introduction

- Can you describe your role in the organization?
- How do you experience the availability of public-transport stops and nodes throughout the urban area?
- What have been the focus areas in the planning of new public-transport solutions developed through the urban growth agreement?

Public transport

- How would you characterize the inhabitants' access to public transport?
- What are the key strategies of in the urban growth agreement to obtain zero growth in transport?
- What is the overall goal of the impending changes in public transport?
  - What changes are planned for in the future?
  - What is your opinion of these changes regarding passengers' access/egress and the possibility of exchanges along the way?
- How do you experience the negotiation and planning process associated with the Trondheim BRT/ the Fornebu metro so far?

Land use

- To what extent is the urban growth agreement used to strengthen land-use policy in ways that support access, egress and transfer?
- To what extent is this a new approach compared to the previously?
- What indicators do you use to measure development and goal achievement?
- To what extent are the indicators appropriate?
- What are the central discussion points associated with the indicator layout?

Access and egress to public-transport stops

- How do you work through the urban growth agreement to improve access and egress to public transport?

- o To what extent is this a new approach compared to previously?
- What data is used to analyze residents' access to bus stops?
- Which indicators do you use to measure citizens' access to public transport?
- o To what extent are the indicators appropriate?

Conditions at public-transport stops

- How do you work with improving conditions through the urban growth agreements?
- o To what extent is this a new approach compared to previously?
- What data is used to measure qualities at the stops?
- o To what extent are the indicators appropriate?

Appendix 2

Description of informants[7]

Individual interviews				
Informant type	Case	Type of interview	Relevance	Number of interviews
Public officer in Trondheim municipality	Trondheim	4 face-to-face, 1 telephone	Trondheim municipality being partner in the UGA	5
Public officer in Melhus municipality	Trondheim	1 face-to-face, 1 telephone	Melhus municipality being partner in the UGA	2
Politician in Stjørdal municipality	Trondheim	Telephone	Stjørdal municipality being partner in the UGA	1
Public officer in the county authority	Trondheim	Face-to-face	The county authority being partner in the UGA	1
Public officer in the county administration	Trondheim	Face-to-face	The county authority being partner in the UGA	1
Public officer in Oslo municipality	Oslo	Face-to-face	Oslo municipality being partner in the UGA	1
Public officer in Bærum municipality	Oslo	Face-to-face	Bærum municipality being partner in the UGA	1
Public officer in Lillestrøm municipality	Oslo	Face-to-face	Lillestrøm municipality being partner in the UGA	1
Public officer in the county administration	Oslo	Face-to-face	The county authority being partner in the UGA	1
Public officer in railroad authorities	Oslo	Face-to-face	Railroad authorities being partner in the UGA	1
Public officer in the local public transport company	Oslo	Face-to-face	Company involved in public transport planning and operation	1
Employee working within a policy package for transport infrastructure development	Oslo	Face-to-face	Structure involved in transport infrastructure development	1
State level public officer	Trondheim/ Oslo	Telephone	The state being partner in the UGA	1
Interviews involving two persons				
Two public officers in the local public transport company	Trondheim	Face-to-face	Company involved in public transport planning and operation	1
Two public officers in Malvik municipality	Trondheim	Face-to-face	Malvik municipality being partner in the UGA	1
Two public officers in Oslo municipality	Oslo		Oslo municipality being partner in the UGA	1
Two employees working in a city bike company	Trondheim/ Oslo		Company being responsible for city bikes in both Trondheim and Oslo	1

Appendix 3

Nvivo codes constructed to analyze documents and interviews

- Land use – Regional plan and regional cooperation
- Land use – Zoning plans
- Land use – Development of public-transport nodes
- Distance between public-transport stops
- Shared- and new mobility solutions
- Dilemmas
- Financing responsibilities
- AET-solutions in different parts of the urban area
- Qualities at public-transport stops intending to facilitate transfer
- Use of indicators
- Overall perspectives on AET
- Plan and implementation
- Cooperation and clarification of roles
- Measures to facilitate AET

[7] The three following interviews are related to an overlapping research project: 1 municipal officer, Trondheim, 1 municipal officer Melhus municipality, 1 politician Stjørdal municipality

References

National Travel Survey. (2018). *Nasjonal reisevaneundersøkelse 2018*. Norwegian Public Roads Administration.

Tønnesen, A. (2015). Policy packages and state engagement: Comparing car-use reduction policy in two Norwegian cities. *Journal of Transport Geography, 46*, 89–98.

Tønnesen, A., Krogstad, J. R., & Christiansen, P. (2019). National goals and tools to fulfil them – A study of opportunities and pitfalls in Norwegian metagovernance of urban mobility. *Transport Policy, 81*, 35–44.

Hillnhütter, H. (2016). *Pedestrian access to public transport*. PhD thesis. University of Stavanger no. 314.

National Travel Survey, 2014. Den nasjonale Reisevaneundersøkelsen 2013/14 – nøkkelrapport (Hjorthol, R., Engebretsen, Ø., Uteng, T.P.) Report no. 1383/2014. Institute of Transport Economics.

Agrawal, A. W., Schlossberg, M., & Irvin, K. (2008). How far, by which route and why? A spatial analysis of pedestrian preference. *Journal of Urban Design, 13*(1), 81–98. https://doi.org/10.1080/13574800701804074.

Bache, I., Reardon, L., Bartle, I., Flinders, M., & Marsden, G. (2015). Symbolic meta-policy: (not) tackling climate change in the transport sector. *Political Study, 63*(4), 830–851.

Cascajo, R., Lopez, E., Herrero, F., & Monzon, A. (2019). User perception of transfers in multimodal urban trips: A qualitative study. *International Journal of Sustainable Transportation, 13*(6), 393–406.

Chowdhury, S., & Ceder, A. (2013). A Psychological Investigation on Public-transport Users' Intention to Use Routes with Transfers. *International Journal of Transportation, 1*(1), 1–20. https://doi.org/10.14257/ijt.2013.1.1.01.

Douglas, N., & Jones, M. (2013). Estimating transfer penalties and standardised income values of time by stated preference survey. *Australian Transport Research Forum*, 1–21.

Dziekan, K., & Vermeulen, A. (2006). Psychological effects of and design preferences for real-time information displays. *Journal of Public Transportation, 9*(1), 1–19. https://doi.org/10.5038/2375-0901.9.1.1.

Espinoza, W., Howard, M., Lane, J., & Van Hentenryck, P. Shared E-scooters: Business, Pleasure, or Transit? (2019). Retrieved from https://arxiv.org/abs/1910.05807.

Filipe, L. N., & Macário, R. (2013). A first glimpse on policy packaging for implementation of BRT projects. *Research in Transportation Economics, 39*(1), 150–157. https://doi.org/10.1016/j.retrec.2012.06.008.

Flyvbjerg, B. (2011). Case study. In N. K. Denzin, & Y. S. Lincoln (Eds.), *The sage handbook of qualitative research* (4th ed., pp. 301–316). Thousand Oaks, CA: Sage.

Gatta, V., & Marcucci, E. (2014). Urban freight transport and policy changes: Improving decision makers' awareness via an agent-specific approach. *Transport Policy, 36*, 248–252. https://doi.org/10.1016/j.tranpol.2014.09.007.

Givoni, M. (2014a). Addressing transport policy challenges through policy packaging. *Transportation Research Part A, 60*, 1–8.

Givoni, M. (2014b). Re-assessing the results of the London congestion charging scheme. *Urban Studies, 49*, 1089.

Givoni, M., Macmillen, J., Banister, D., & Feitelson, E. (2013). From policy measures to policy packages. *Transport Reviews: A Transnational Transdisciplinary Journal, 33*(1), 1–20. https://doi.org/10.1080/01441647.2012.744779.

Gössling, S. (2020). Integrating E-scooters in urban transportation: Problems, policies, and the prospect of system change. *Transportation Research Part D: Transport and Environment, 79*, 102230. https://doi.org/10.1016/j.trd.2020.102230.

Guo, Z., & Wilson, N. H. M. (2011). Assessing the cost of transfer inconvenience in public transport systems: A case study of the London underground. *Transportation Research Part A: Policy and Practice, 45*(2), 91–104.

Hickman, R., & Banister, D. (2007). Looking over the horizon: Transport and reduced CO2 emissions in the UK by 2030. *Transport Policy, 14*(2007), 377–387.

Hine, J., & Scott, J. (2000). Seamless, accessible travel: Users' views of the public transport journey and interchange. *Transport Policy, 7*(3), 217–226. https://doi.org/10.1016/S0967-070X(00)00022-6.

Iseki, H., & Taylor, B. D. (2009). Not all transfers are created equal: Towards a framework relating transfer connectivity to travel behaviour. *Transport Reviews, 29*(6), 777–800. https://doi.org/10.1080/01441640902811304.

ITDP. (2015). Why transportation is critical at the Paris Climate Summit. Available at https://www.itdp.org/why-transportation-is-critical-atthe-paris-climate-summit/ accessed on 06.09.2016.

Jæren-region, UGA (2019). *Byvekstavtale mellom Rogaland fylkeskommune, Stavanger, Sandnes, Sola og Randaberg kommuner, Samferdselsdepartementet og Kommunal- og moderniseringsdepartementet 2019–2029*.

Jessop, B. (2004). Multi-level governance and multi-level metagovernance. In I. Bache, & M. Flinders (Eds.), *Multi-level Governance*. Oxford University Press.

Jessop, B. (2016). State theory. In C. Ansell, & J. Torfing (Eds.), *Handbook on theories of governance*. Edward Elgar Publishing.

Jiang, Y., Zegras, P. C., & Mehndiratta, S. (2012). Walk the line: Station context, corridor type and bus rapid transit walk access in Jinan, China. *Journal of Transport Geography, 20*(2012), 1–14.

Justen, A., Fearnley, N., Givoni, M., & Macmillen, J. (2014). A process for designing policy packaging: Ideals and realities. *Transportation Research Part A, 60*, 9–18.

Kager, R., & Harms, L. (2017). *Synergies from improved cycling-transit integration: Towards an integrated urban mobility system*. Discussion paper 17, 23. International Transport Forum.

Kim, S., Gudmundur, F., Ulfarsson, J., & Hennessy, T. (2007). Analysis of light rail rider travel behavior: Impacts of individual, built environment, and crime characteristics on transit access. *Transportation Research Part A, 41*(2007), 511–522.

Kjørstad, K. N., & Nordheim, B. (2005). *Hva tiltakspakkene for kollektivtransport har lært oss (Report no. 810/2005)*. Institute of Transport Economics.

Loutzenheiser, D. R. (1997). Pedestrian access to transit: Model of walk trips and their design and urban form determinants around Bay Area rapid transit stations. *Transportation Research Record: Journal of the Transportation Research Board, 1604*, 40–49. https://doi.org/10.3141/1604-06.

Lynch, J. F. (2013). Aligning sampling strategies with analytic goals. In L. Mosley (Ed.), *Interview research in political science*. Cornell University Press.

Marsden, G., Kelly, C. E., & Nellthorp, J. (2009). The likely impacts of target setting and performance rewards in local transport. *Transport Policy, 16*(2), 55–67.

Ministry of Environment. (2012). *White paper 21 (2011–2012)*. Norsk: Klimapolitikk.

Ministry of Transport, 2017. White Paper No. 33 (2016–2017), *National Transport Plan 2010–2019*.

Moran, M. E., Laa, B., & Emberger, G. (2020). Six scooter operators, six maps: Spatial coverage and regulation of micromobility in Vienna, Austria. *Case Studies on Transport Policy, 9*, 658–671.

Næss, P. (2012). Urban form and travel behavior: Experience from a Nordic context. *Journal of Transport and Land Use, 5*(2), 21–45.

Nordbakke, S., & Vågane, L. (2007). *Daglige reiser med kollektivtransport i byområder. Den nasjonale reisevaneundersøkelsen 2005*. Report no. 877/2007. Institute of Transport Economics.

Norheim, B., Nilsen, J., & Frizen, K. (2013). *Bompengenes omfang i Norge. Lokal innflytelse over ressursbruk og prioriteringer*. Report no. 41/2013. Urbanet Analyse/Nivi Analyse.

Oslo-region, U. G. A. (2019). Byvekstavtale mellom Oslo kommune. *Bærum kommune, Skedsmo kommune, Oppegård kommune, Akershus fylkeskommune og Staten*, 2019–2029.

POLIS. (2017). Mobility as a Service: Implications for Urban and Regional Transport. Retrieved from https://www.polisnetwork.eu/wp-content/uploads/2017/12/polis-maas-discussion-paper-2017-final_.pdf.

POLIS. (2019). Macro managing micro mobility. Taking the long view on short trips. Retrieved from https://www.polisnetwork.eu/document/macromanaging-micromobility/.

Polydoropoulou, A., & Ben-Akiva, M. (2007). Combined revealed and stated preference nested logit access and mode choice model for multiple mass transit technologies. *Transportation Research Record: Journal of the Transportation Research Board, 1771*, 38–45.

Ramjerdi, F., & Fearnley, N. (2014). Risk and irreversibility of transport interventions, special issue "policy packaging". *Transportation Research Part A: Policy and Practice, 60*, 31–39.

Rhodes, R. (2006). Policy network analysis. In M. Rein, & R. E. Goodin (Eds.), *Moran, M* (pp. 425–447). Oxford University Press: The Oxford Handbook of Public Policy.

Schakenbos, R., La Paix, L., Nijenstein, S., & Geurs, K. T. (2016). Valuation of a transfer in a multimodal public transport trip. *Transport Policy, 46*(February), 72–81.

Shaheen, S., & Cohen, A. (2019). Shared Micromoblity Policy Toolkit: Docked and Dockless Bike and Scooter Sharing. Retrieved from https://escholarship.org/uc/item/00k897b5.

Sørensen, C. H., Isaksson, K., Macmillen, J., Åkerman, J., & Kressler, F. (2014). Strategies to manage barriers in policy formation and implementation of road pricing packages. *Transportation Research Part A, 60*, 40–52.

Sørensen, E., & Torfing, J. (2009). Making governance networks effective and democratic through metagovernance. *Public Administration, 87*(2), 234–258. https://doi.org/10.1111/j.1467-9299.2009.01753.x.

Soria-Lara, J. A., & Banister, D. (2017). Dynamic participation processes for policy packaging in transport backcasting studies. *Transport Policy, 58*, 19–30. https://doi.org/10.1016/j.tranpol.2017.04.006.

Stead, D., & Meijers, E. (2009). Spatial planning and policy integration: Concepts, facilitators and inhibitors. *Planning Theory and Practice, 10*(3), 317–332. https://doi.org/10.1080/14649350903229752.

Strand, A., Næss, P., Tennøy, A., & Steinsland, C. (2009). *Gir bedre veier mindre klimagassutslipp?*. Report no. 1027/2009. Institute of Transport Economics

Tennøy, A., Gundersen, F., Hagen, O. H., Knapskog, M., & Uteng, T. P. (2017). *Effects on traffic and emissions of densification in nodes in Bergen, Kristiansand and Oslo*. Report no. 1575/2017. Institute of Transport Economics.

Tran, M. T., Zhang, J., & Fujiwara, A. (2014). Can we reduce the access by motorcycles to mass transit systems in future Hanoi? *Social and Behavioral Sciences, 138*(2014), 623–631.

Trondheim-region, U. G. A. (2019). Byvekstavtale Mellom Trondheim Kommune. *Melhus Kommune, Malvik Kommune, Stjørdal Kommune, Trøndelag Fylkeskommune og Staten 2019–2029*.

Wen, C. H., Wang, W. C., & Fu, C. (2012). Latent class nested logit model for Analyzing high-speed rail access mode choice. *Transportation Research Part E, 48*(2012), 545–554.

Wicki, M., Huber, R. A., & Bernauer, T. (2019). Can policy-packaging increase public support for costly policies? Insights from a choice experiment on policies against vehicle emissions. *Journal of Public Policy*, 1–27.

Yin, K. R. (1994). *Case study research. Design and methods* (2nd ed.). Thousand Oaks, CA: Sage Publications.