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Exploring practices for facilitating integrated strategic land use and transport planning in the Nordic countries

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Abstract: Drawing on examples from the Nordic countries, this article aims to explore the practical application of strategic policy and planning instruments and approaches that facilitate the integration of land use and transport planning and promote sustainable policy measures through collaboration among stakeholders across various governance levels. This research applies a qualitative research design including literature research, interviews, and workshops involving practitioners from the five Nordic countries. In this paper, we present an overview of the planning structure in the Nordic countries, including institutions that govern land use and transport planning. We identify different approaches to bridge the gap between land use and transport planning, such as the Finger Plan in Denmark, MAL in Finland, Concept Studies in Norway, and Strategic Choice of Measures in Sweden. Many of the examples employ informal collaborative approaches among authorities to form a shared vision and seek consensus on a combination of policy measures and actions. The paper examines collaborative approaches in relation to regulatory planning and discusses the role of these processes in advancing integrated land use and transport planning and fostering sustainable urban development.

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1 Introduction

A holistic and integrated approach to urban land use and transport planning and investment is needed to achieve social, environmental, and economic sustainability in urban areas (UN-Habitat, 2013). Building upon this, UNEP (2019) emphasizes that achieving this transformation requires urgent change in cross-cutting sustainable development policy areas in which social, economic and environmental dimensions are closely intertwined. To address cross-cutting issues and foster sustainability, effective policy linkages and joint horizontal working across departments in local government are crucial, alongside integration across a range of levels of planning vertically from national to the local level (Hull, 2005). Various types of policy integration can be distinguished, all of which are important to promote more

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sustainable land-use planning, transport, and environmental policies. Geerlings and Stead (2003) outline the following types of policy integration:

1. *Vertical integration*—policy integration between different levels of government
2. *Horizontal integration*—policy integration between sectors or professions within one organization (i.e., inter-sectoral)
3. *Inter-territorial integration*—policy integration between neighboring authorities or authorities with some shared interest in infrastructure and/or resources
4. *Intra-sectoral*—policy integration between different sections or professions within one department.

Van Geet et al. (2021), point out that in practice, land use and transport integration (LUTI) is conceptualized by differentiating between a strategic orientation that can be regarded as land use/transport policy integration and operational that can be regarded as land use/transport project integration. The conceptual differences between, e.g., integration, coordination and cooperation in transport planning are discussed by several scholars (e.g., Stead, 2003). Keast et al. (2007) state that integration, cooperation, coordination, and collaboration should be considered as complementary approaches. Additionally, Candel and Biesbroek (2016) propose that cross-cutting issues can be satisfactorily addressed without necessarily resorting to the most advanced form of integration. Instead, they argue that exchanging information or engaging in coordinated actions could be more suitable in certain situations. However, Te Brömmelstroet and Bertolini (2010) emphasize that achieving integration in earlier phases of planning, such as strategy development, goal orientation, or visioning, has the potential to produce shared policy goals, which would promote mutually reinforcing land use and transport measures.

Yet, multiple studies have shown how combining transport infrastructure development, e.g., roads, with other local land-use development, such as housing, energy, nature, or recreation, can improve the societal, economic, and environmental benefits of projects (e.g., van Geet et al., 2019). Additionally, there is a broad and growing consensus regarding the integration of land use and transport infrastructure development in establishing more resilient and sustainable urban environments (e.g., Arts et al., 2016; Duman et al., 2022). However, the practical implementation of integrated land use and transport infrastructure development encounters barriers that are challenging to overcome (Te Brömmelstroet & Bertolini, 2010). For example, institutional barriers, causing a gap between the stated goals and the eventual outcome (Duffhues & Bertolini, 2016). An explanation for these institutional barriers is that planning and realization of transport infrastructure and spatial planning have traditionally existed as separate entities or "silos" (UN-Habitat, 2013). These silos are characterized by specific planning systems that contained own specific planning legislation, sectoral policy frameworks regarding different levels of government, own funding mechanisms as well as specific planning agencies (Arts et al., 2016). Consequently, it is important to explore different approaches to establishing cross-connections between sectors and institutional entities. This is especially critical when addressing cross-cutting issues such as climate change and sustainable development that require coordination between different policy areas to address them comprehensively (UNEP, 2019). Therefore, fostering collaboration among various organizations becomes crucial, demanding the overcoming of organizational barriers and sectoral boundaries (Hrelja et al., 2018). This implies, for example, that planning and implementing efficient transport require collective action of organizations with different responsibilities and driven by different rationalities (Pettersson et al., 2018). However, successful collaboration between several formal, discrete organizations—each with its own

budget and area of responsibility—working across organizational boundaries on shared priorities and implementation, is challenging (Hrelja et al, 2016). For example, collaboration often involves tensions between local-level priorities and control over land-use planning clashing with a more strategic regional approach to transport planning (Pettersson & Hrelja, 2020). The concept collaboration as applied in this paper, should be understood as an attempt to overcome problems with collective action and to transform a situation in which the various organizations operate independently into a situation in which they act in concert to achieve shared objectives (Pettersson & Hrejla, 2020).

To strengthen the integration between land use and transport planning, various instruments have been developed to guide the planning process such as technical decision support instruments and policy instruments that aim to bridge gaps between land use and transport practices (van Geet et al., 2021). The majority of the existing literature in transport policy primarily emphasizes technical decision-support systems, with a particular focus on transport models and quantitative analysis (Marsden & Reardon, 2017). However, there has been a growing recognition among scholars in recent times regarding the significance of collaborative or governance-oriented instruments in facilitating land use and transport integration (van Geet et al., 2021). Stead (2021) echoes this perspective, emphasizing that procedural policy tools can foster interaction and consensus building among stakeholders to generate or strengthen support for policy goals or initiatives.

Howlett (2008) distinguishes between substantive policy tools, which directly impact the delivery of policy goals, and procedural policy tools, which influence the processes and procedures involved in policy development. These two types of policy tools are closely interlinked (Stead, 2021). Van Geet et al. (2021) classify procedural instruments into three groups: those employed to facilitate the formation (strategic focus), the adoption (the interface between strategic and operational) and the implementation (operational focus) of integrated land use/transport policy. In addition, Stead (2021) points out that many countries have witnessed increases in the trends toward a wider use of "softer" tools related to, e.g., citizen engagement, while "harder" financial and regulatory tools have often been scaled back.

In this paper, we examine strategic policy and planning practice, as outlined by van Geet et al. (2021), and seek to bridge the gap between land use and transport domains to facilitate the integration throughout the policy process. The instruments and approaches presented in this paper have primarily a strategic focus, but we also include examples on approaches in the interface between strategic and operational. Drawing on examples from the Nordic countries, the paper aims to explore the practical application of strategic policy and planning instruments and approaches that facilitate the integration of land use and transport planning and promote sustainable policy measures through collaboration among stakeholders across various governance levels.

Following three research questions have guided the study:

- How do the Nordic countries employ strategic policy and planning instruments and approaches to facilitate collaborative land use and transport planning?
- What are the practitioners' perceptions of contemporary practices regarding the potential to bridge the gap between strategic land use and transport policy and planning in the Nordic countries?
- How can strategic policy and planning instruments enable the integration of environmental aspects and sustainability perspectives in contemporary practices for land use and transport planning in the Nordic countries?

The study is confined to examining strategic land use and transport policy and planning conducted solely by public authorities at the national, regional, and local levels. Moreover, the paper is limited in scope as it neither addresses technical support tools such as transport models nor includes regulatory planning instruments, such as environmental impact assessments. The paper is structured as follows: First, the introduction sets the context and outlines the objectives and scope of the study. In the second section, the research design is described and the specific research methods to gather data, (literature study, workshops, and interviews) are explained. The third section, offers an overview of the planning structure in each of the Nordic countries, including institutions that govern land use and transport planning. In the fourth section, the results of the planning practices are presented and in the fifth section, the results of the study are discussed followed by the conclusions.

2 Material and method

A qualitative research design was applied to explore the practical application of strategic planning instruments and approaches that facilitate land use and transport integration through collaboration among stakeholders across various governance levels in the Nordic countries. The qualitative data was collected through a literature study, workshops, and semi-structured interviews.

Scientific literature was reviewed to map previous studies on strategic land use and transport planning practice in the Nordic countries. The literature was reviewed according to an iterative approach (Lavallée et al., 2014) through a forward and backward "snowballing" process (Jalali & Wohlin, 2012) to facilitate an explorative approach to the study. In addition, policy documents by governments and reports by national transport authorities were reviewed to obtain country-specific information on the land use and transport planning systems.

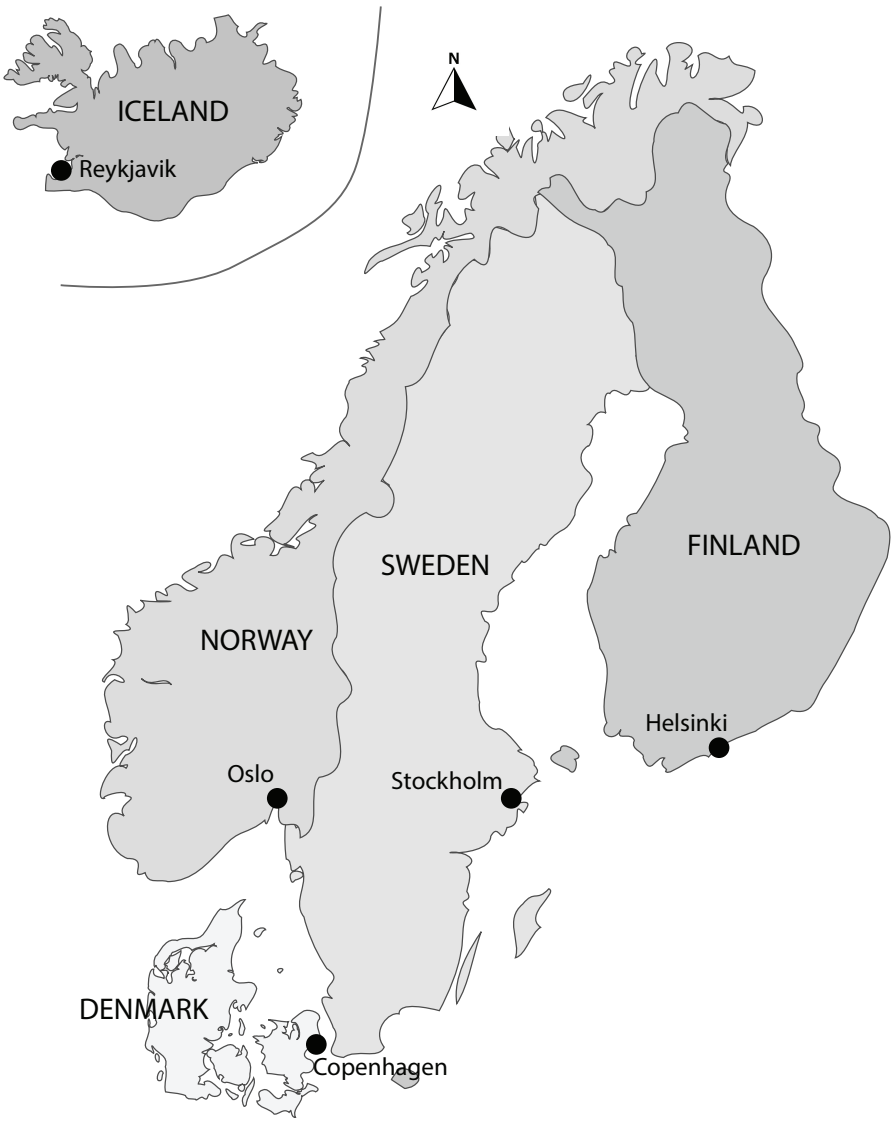
The first workshop was held in November 2018, as two half-day seminars in Stockholm, attended by key representatives from Finland, Norway, Iceland, Denmark, and Sweden (see Appendix A for list of respondents). One or two practitioners from each country gave a short presentation where they discussed examples of strategic transport planning practice and challenges encountered in the process. After the presentations, structured group discussions were held in smaller groups that focused on comparing the different practices and perspectives that emerged in the previous discussions. These perspectives related to challenges and opportunities concerning (1) collaboration between actors in strategic transport planning in city regions, and (2) consideration of environmental aspects and sustainability perspectives in the planning process. Due to the covid-19 pandemic, the second workshop was held as a webinar on Zoom in June 2021. As in the previous workshop, key representatives from the Nordic countries (Appendix A) gave presentations using examples from their own planning practice, after which a discussion was held based on questions from the other participants and on the results from the first workshop. The workshop and webinars were coordinated by one researcher and documented by two researchers taking notes. All participants in the workshop and webinar shared their presentations afterwards.

In addition to workshops, semi-structured individual interviews (Bryman, 2016) were conducted based on an interview guide (Brinkmann & Kvale, 2014) (see Appendix B for interview-guide). The aim was to acquire in-depth information on strategic land use and transport planning practice in the country concerned and to understand how the interviewed practitioners perceived their practice. The interview guide addressed three main themes (see Appendix B) that focused on transport planning practices, consideration of sustainability and environmental aspects and coordination of land use and transport planning. The themes were derived from the literature and the results from the first workshop. A total of 16 key

representatives in Finland, Norway, Iceland, Denmark and Sweden were interviewed (Appendix A). The interviewees were selected based on their experience concerning their involvement in strategic land use and transport planning practice in their respective countries. The interviews were conducted on Skype or Zoom from 2019 to 2022 and lasted about one hour. The interviews were recorded and then transcribed. The analysis of the empirical material from the workshops and interviews was structured in a content analysis (Bryman, 2016).

3 Transport and land-use planning in the Nordic countries

To institutionalize the exchange of information between policymakers in the Nordic countries, the Nordic Council was founded in 1952 (Rose, 2004). The Nordic Council has made significant contributions over the years to harmonizing land use and transport planning practices in Finland, Norway, Iceland, Denmark, and Sweden. These countries are alike in several respects; for example, they have a similar climate and a similar institutional structure with municipalities that have strong self-governance in both land use and local transport planning (COMPASS, 2018; SNBHBP, 2020). However, the transport challenges faced by the Nordic countries are heterogeneous due to differences in, e.g., population density, the state of public transport, and infrastructure for electrification of transport (Sovacool et al., 2018). In addition, three of the countries (Finland, Denmark, and Sweden) are members of the European Union, which means that EU directives must be implemented by these countries, which in turn influences and harmonizes planning practices between countries (Dolowitz & Marsh, 1996). Furthermore, all the Nordic countries have the political ambition to achieve the SDGs and to meet the goals of the Paris agreement, which is reflected in their national transport policy goals (Nordic Council of Ministers, 2020). However, even if the Nordic countries show similarities concerning these goals, all countries have developed different approaches when it comes to facilitating the consideration of environmental aspects and sustainability perspectives in land use and transport planning.



	Finland	Norway	Iceland	Denmark	Sweden
Area (km2)	339 000	385 000	103 000	44 000	529 000
Population (mil)	5,6	5,4	0,38	5,9	10,5
State owned roads (km)	78 000	55 000	13 000	3700	98 500
Railway (km)	5900 (3300 electric)	4000 (2500 electric)	-	2600 (1000 electric)	14 200 (8200 electric)

Figure 1. Map of the Nordic countries (Fig. 1a) with some descriptive statistics (Fig. 1b) regarding surface area, population, state-owned roads (km) and railways (km) (Figures are approximate; Sources: See Appendix C)

3.1 Finland

The Finnish Transport Infrastructure Agency (FTIA), acting under the Ministry of Transport and Communication, is responsible for the development and use of the state-owned transport system (Figure 3) (Lundgren et al., 2023). Finland's National Transport System Plan has been put in place for the period 2021-2032 and encompasses all transport modes, infrastructure and services, but also issues related to the transport system such as traffic safety.

Against the background of the national land-use goals, the National Transport System Plan specifies three overall objectives "which run in parallel and all seek to mitigate climate change" (Finnish Government, 2021). First, the transport system should guarantee accessibility to all regions of Finland and respond to different needs such as those from industry, commuters, and housing. Second, the socio-economic efficiency of the transport system should be improved, and third, people should be able to choose more sustainable modes of transport. These objectives are defined in terms of strategic guidelines, which mainly relate to various aspects of accessibility.

The Finnish system for land-use planning operates on a hierarchical structure, requiring regional and local authorities to take into account the national land-use planning goals. (Lidmo et al., 2020; Puustinen et al., 2017). The regional land-use plan is developed by the regional councils and is legally binding for planning at lower levels, i.e., municipal master plan and municipal detailed plans. The regional land-use plans can also address the development of the transport system.

In ten designated city-regions, the state collaborates with municipalities to establish regional agreements, so called MAL agreements (Duman et al., 2022; Granqvist et al., 2019; Mäntysalo et al., 2022), which address land use, housing and transportation[1]. The MAL planning process is established to promote balanced development, enhance regional cooperation, and ensure coordinated decision-making in land use and transportation matters. The planning process that precedes the MAL agreement combines national, city-regional, and local perspectives on the development of urban regions in question, as well as different actors' views on land use, housing, and transport as part of a discussion on certain themes, such as climate impacts and appropriate locations for housing development and specific types of land use. In essence, the MAL planning process aims to create a joint regional plan that includes the city-region's key measures on land use, housing, and transport (Myllymäki, 2021).

3.2 Norway

The Norwegian Public Road Administration (NPRA) is responsible for planning, building, operating, and maintaining the national roads (Lundgren et al., 2023). Every four years, the NPRA presents an updated version of the National Transport Plan to the parliament, outlining the investment priorities for the next 12 years. The overarching, long-term policy objective for the transport sector is to have an efficient, environmentally friendly and safe transport system by 2050 (Norwegian Ministry of Transport, 2020).

At the local level, the municipality holds responsibility for municipal roads, while at the regional level, the county takes charge of county roads and public transport. However, the national strategic ambitions extend across all levels of governance. For transport infrastructure investments, municipalities and regions depend on national authorities, as the costs are often

[1] MAL is an abbreviation for Maankäytön (land use), Asumisen (housing) and Liikenteen (transport).

too high for local and regional actors to cover alone (Tønnesen et al., 2019). To secure national funding, municipalities seek to incorporate projects of local importance into the National Transport Plan (Tønnesen, 2015). In addition to formal policy and planning tools, the government employs two other instruments to steer transport planning. First, so-called Concept Studies (CS) that are utilized for infrastructure projects valued at over €95 million and are usually conducted by the NPRA with the purpose to explore alternative transport solutions before making a decision (Tønnesen, 2015). Secondly, multi-level policy packages for land use and transport development are used in Norway, e.g., the Urban Growth Agreements (UGA) (Tønnesen et al., 2019; Westskog et al., 2020). These policy packages form a set of multi-sectoral agreements established outside the formal planning system (Tønnesen et al., 2022), e.g., between municipalities and the state. These agreements aim at reaching the Zero Growth Goal (ZGG).

Land-use planning is formally organized on the national, regional and local level of planning. The municipal land-use planning is guided by regional plans and planning strategies, as well as national expectations and guidelines provided by the ministries (Lidmo et al., 2020). The national and regional authorities can object to municipal plans and develop alternative plans to exert pressure on the municipalities to comply with national interests.

3.3 Iceland

In Iceland, the Icelandic Road and Coastal Administration (IRCA), acting under the Ministry of Infrastructure, is responsible for national roads as well as public countryside roads (Figure 3) (IRCA, 2017). The IRCA is also responsible for ferry operations, although these are outsourced to ferry companies. Its responsibilities regarding roads include planning, design, construction, maintenance, and servicing.

The parliamentary resolution on the National Transport Plan for the period 2020-2034 outlines the country's goals for the transport system. According to this resolution, the transport system should be sustainable and help to reduce the global, regional and local environmental impact of transport. Furthermore, the development of the transport system should be in line with the Icelandic Climate Action Plan. The transport plan is established by the IRCA.

Since 2010, Reykjavik Capital Region is responsible for making a regional plan based on its common interests (Saevarsdottir, 2020). In other places in Iceland, two or more municipalities can voluntarily join forces to create a sub-regional plan (Lidmo et al., 2020). The regional plans require approval from the National Planning Agency as well as the municipalities involved.

Regarding land use, the Icelandic National Planning Agency is the state authority responsible for the administration and implementation of the Planning Act. However, as described in Lidmo et al. (2020), most planning and implementation of planning takes place at the municipal level. These Municipal Plans and Detailed Development Plans must consider directives from various laws and policies among which, for example, promote sustainable development, enable equal access for people and create economic growth.

3.4 Denmark

In Denmark, the Danish Road Directorate (DRD), acting under the Ministry of Transport, is responsible for the state-owned roads. However, in practice Danish transport planning is highly political and decisions are in general strongly influenced by political coalitions (Stead & Geerlings, 2005). National decisions are often made as result of political agreements within

the coalition, where political support for one (policy) decision may depend on support for another decision (De Jong & Geerlings, 2005).

Although Denmark now has a National Transport Plan, the Danish practice is to decide upon individual infrastructure projects one by one, and the plan does not guarantee that infrastructure projects will be implemented (Lundgren et al., 2023). However, sustainability policies adopted at national level, guide and influence both the transport investments made at national level and transport planning practice at regional and local level (Barfod et al., 2018).

In land-use planning, there has been a shift towards municipalities taking over regional authorities' responsibility for land-use planning, while the regional councils are responsible for, e.g., health care, public transportation and development of nature and environmental issues. Consequently, the municipalities have gained more freedom, such as more flexible urban planning, more public participation and more room for contractors and development companies to participate directly in urban development (Lidmo et al., 2020). At the national level, ministries set general guidelines for functional and physical development, which are binding for municipal plans and local development plans (Lidmo et al., 2020). In particular, the Danish Planning Act requires an overall plan for the Greater Copenhagen area that focuses on maintaining the overall city structure in the "Finger Plan." The Finger Plan differentiates between the core urban region and the peripheral urban regions and specifies development strategies for green structures, station areas, urban development and regeneration, transport corridors and business development (Danish Ministry of Environment, 2015).

3.5 Sweden

The Swedish Transport Administration (STA), acting under the Ministry of Rural Affairs and Infrastructure, is responsible for state-owned infrastructure in Sweden. This responsibility encompasses the long-term planning of the national transport system for road, rail, maritime and air traffic. STA is also responsible for construction, operation and maintenance of roads and railways within the national network (Ingo, 2013).

The transport policy objectives (Government Bill, 2008) guide the Swedish transport planning practice and form the basis of the National Investment Plan for transport infrastructure, which is the national strategic and economic planning process to allocate national resources to investments in infrastructure. The investment plan is developed for a 12-year period but is updated every four years (Balfors & Gunnarsson-Östling, 2021).

To identify measures to be included in the National investment plan for transport infrastructure, the so-called Strategic Choice of Measures (SCM) approach is applied. The SCM is applied by the state, together with other actors, to suggest measures to be included in the National Investment Plan for transport infrastructure as well as other plans (Eckersten et al., 2021; Tornberg & Odhage, 2018). The application of the so-called four-step principle is central when choosing measures through SCM. The intention behind the application of the four-step principle is to ensure resource use efficiency and a sustainable development of the transport infrastructure (Figure 2).

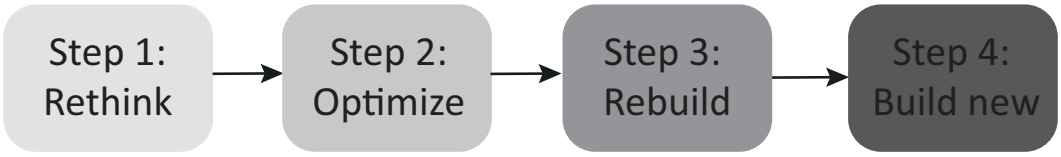


Figure 2. The Swedish four-step principle (Johansson et al., 2018; STA, 2014)

In the first step, "Rethink," measures are suggested to affect the need for transport and promote more sustainable transport modes. In the second step, "Optimize," measures are suggested to improve the efficiency of the existing transport infrastructure. In step three, "Rebuild," measures are selected to solve a problem by rebuilding parts of the existing infrastructure. Finally, in step four, "Build New," problems not solved in the previous steps are suggested to be solved by building new infrastructure.

Government grants are another instrument that the Swedish government uses to steer transport planning (Isaksson et al., 2017), such as national financial contributions to rail infrastructure for trams and metro systems or so-called Urban Environment Agreements (UEAs) (STA, 2015). A UEA consists of measures for which co-financing can be obtained as well as counter-performance from the municipality in the form of supplementary measures, instruments, programs and plans. Together, these should lead to sustainable passenger transport as well as sustainable freight transport solutions in cities. Another example of a negotiation process outside the formal planning process is the Stockholm negotiation process (Stockholm negotiations, 2007) which involves agreements between the state, the region, and municipalities. That process has resulted in, for example, the construction of a new railway tunnel and investments in new road infrastructure in Stockholm.

At regional level, the state funds investments in the Regional Transport Infrastructure Plans. Decisions regarding what measures to include in these regional plans are delegated to the regional authorities, which have responsibility for public transport services and facilities in the region concerned.

Land-use planning is a municipal responsibility according to the Swedish Planning and Building Act (Högström et al., 2017). The municipalities have two main planning instruments: the Municipal Comprehensive Plan and the Detailed Development Plan. The Municipal Comprehensive Plan is not a legally binding plan but should include guidance on future land-use development and describe long-term strategic developments within the municipality. The Municipal Comprehensive Plan guides the Detailed Development Plan, which is legally binding and regulates the use of land and water (Planning and Building Act, 2010). Municipal land-use planning must account for general interests such as the functioning of roads, conservation or protection of land or water that is of national interest, or certain geographical areas with high cultural or ecological value and environmental quality standards (Lidmo et al., 2020). How the municipality intends to deal with general interest is presented in the Municipal Comprehensive Plan. The county administrative boards are tasked with monitoring the enforcement of national policies at local and regional level.

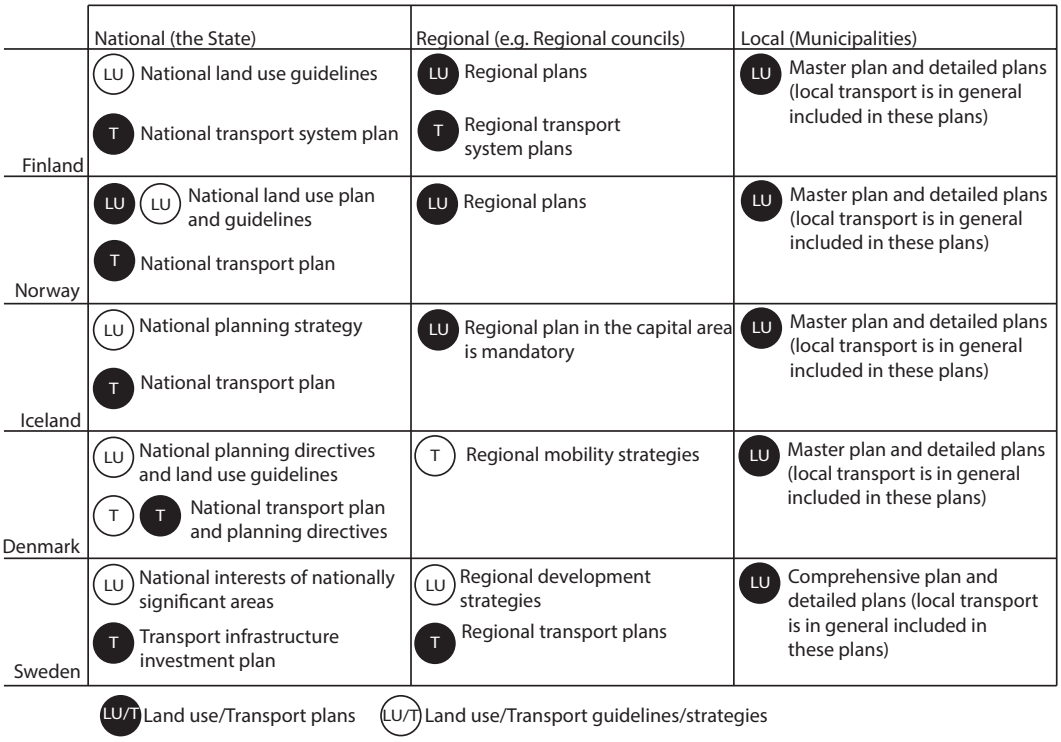


Figure 3. An overview of transport and land-use plans at the national, regional and local level in the Nordic countries

4 Practitioners' perspectives on planning practice

The review of the Nordic systems for land use and transport planning demonstrates that besides numerous similarities between the Nordic countries there are several differences between how the systems are organized and responsibilities are divided. In addition, the study unfolds a variety of policy measures and planning practices to bridge the gaps between land use and transport planning.

In terms of transport goals, the Nordic national transport plans share important commonalities in their focus on efficiency, accessibility, safety and sustainable mobility—although the specific goals are formulated with different emphases (Lundgren et al., 2023). All national transport plans have a similar time frame from 12-15 years with regular updates. At the national level, a Ministry holds the political responsibility with an exclusive focus on transport and infrastructure, along with one or several national authorities that act under the ministry. However, one important difference between the Nordic countries is that, according to the Danish and Norwegian public administration models, the national transport authorities have less independence from the transport ministry than the equivalent agencies in Sweden and Finland (Lundgren et al., 2023). In all Nordic countries, there exist regional councils that have a diversity of responsibilities, some of which involve regional development planning and public transportation. The municipalities are responsible for local land-use planning but may also have tasks relating to transport infrastructure, such as local roads, local public transport, ports and airports.

The national transport authorities in the Nordic countries use various instruments and approaches at national level to carry out transport planning in the strategic stages, and to coordinate transport planning and land-use authorities at regional and local levels.

4.1 The role of national transport planning in the Nordic countries

In the Nordic countries, the national transport plans intend to align with national guidelines and objectives, serving as action programs for the development of transport systems at all levels that shape land use and transport planning at the local and regional levels. For instance, in Finland, the recently introduced National Transport System Plan for 2021-2032 is designed to consolidate transport planning at various levels by mandating stakeholders to adhere to the goals and guidelines outlined in this plan. Interviewee F3 emphasized that when collaboration occurs between the national level and regional/local authorities, the National Transport System Plan effectively align various plans in the same direction. This alignment fosters a smoother and more efficient planning process, promoting the implementation of national policies and plans. Interviewee F3 highlighted the significance of early collaborations between the Finnish Transport Infrastructure Agency, regional authorities, and municipalities in facilitating information sharing and creating an environment that minimizes conflicts of interest. In addition, interviewee F3 mentioned that the goals of the National Transport System Plan promote sustainable transport modes whenever feasible, and substantial efforts has been dedicated to calculating and mitigating emissions in the construction phase. However, the interviewee highlighted that the sustainability goals primarily focus on reducing greenhouse gas emissions, potentially overshadowing other crucial aspects like biodiversity.

Apart from the shared characteristics of national transport planning in the Nordic countries, there exist several distinctive insights from individual countries that deserve mention. First, the four-step principle, employed in both Sweden and Norway, which is supposed to play a critical role within the national transport planning process. As described earlier, its purpose is to evaluate the effectiveness of alternative measures in addressing existing transport issues. In the workshops, participants expressed that measures in step 1 ("Rethink") and 2 ("Optimize") often foster sustainability goals. However, workshop participants and interviewees S1, S2, and S3 highlighted that the Swedish Transport Administration normally cannot finance step 1 and 2 measures, which typically require interventions that fall under the responsibility of municipalities. They agreed that motivating other actors, particularly municipalities, to implement step 1 and 2 measures has proven to be a challenging task.

Another interesting insight pertains to the National Transport Policy Plan in Iceland, which involves a preparation phase where a delegation from the Ministry of Infrastructure travels across the country to engage with representatives from various municipalities and discuss global and national goals, rural developments, municipal needs, and other relevant topics. Furthermore, every second year, a transport congress is organized, open to all stakeholders and the public, where they can give input to the development of the plan. This broad dialogue fosters coordination between land use and transport planning, which as highlighted by interviewees (I1, I2), is critical during the creation of a five-year national implementation plan. This plan requires approval from both the Ministry of Infrastructure and relevant municipalities.

A third insight is derived from Denmark, where the Ministry of Transport, along with political parties in the Danish Parliament play a dominant role in shaping the direction and priorities of transport planning activities conducted by the Danish Road Directorate (DRD). Interviewees (D1, D2, D3) and participants in workshops WS1 and WS2 emphasized the high political control in transport planning. Interviewee D3 described the process of coordinating national transport planning and land use as follows: "When the DRD receives a project from the Ministry or minister, they engage representatives from the concerned municipalities.

Throughout the project, this group of municipal representatives acts as a reference group offering input and obtaining information from the DRD." However, D3 also reflected on challenges related to negotiations with municipalities: "Municipalities often struggle to speak with one voice. City hall governance involves different politicians, and they may not always agree on certain measures."

4.2 Collaboration at the city regional level

In addition to the nationwide systems for transport planning in the Nordic countries, various policy and planning practices exist to develop visions and action plans fostering multi-level land use and transport planning in city regions.

In Finland, interviewees highlighted the MAL agreements that provide a flexible framework for dialogue and collaboration between national authorities and municipalities. The MAL planning process is based on voluntary cooperation between municipalities, which means there are no strict rules or requirements for the strategic work. Interviewee F1 expressed that this freedom allows planners to make decisions regarding the inclusion of specific issues in the plans according to their discretion. Additionally, interviewees F1, F2, and F3 highlighted that the MAL agreement offers municipalities the opportunity to obtain financial resources from the state budget through cooperation. This financial benefit serves as an incentive for municipalities to collaborate on land use, housing and infrastructure planning, promoting cooperation and coordination among different local authorities.

From a national perspective, interviewees F1 and F3 indicated that the state utilizes the MAL agreement as a means to ensure the implementation of national interests. For instance, interviewee F1 mentioned that the MAL agreement is utilized to ensure that municipalities construct houses in locations that align with national priorities and suitability criteria.

The interviewees (F1, F2, and F3) and participants in workshops WS1 and WS2 expressed the perception that the goals at the city-regional level, particularly in the context of the MAL planning process, were considered too narrow. Interviewee F1 pointed out that achieving a balance between simple and comprehensive objectives is essential, since having too many and too detailed primary objectives can make discussions overly complex. Prioritization becomes crucial in this context to identify and focus on the most relevant measures that align with the overarching goals. This highlights the need for clarity in setting objectives, allowing for effective and focused discussions to achieve desired outcomes while avoiding overwhelming complexities. All interviewees (F1, F2, F3) as well as the participants in WS1 and WS2 underline the need for collaborative efforts and joint decisions at national, regional and local level in order to handle complex sustainability and environmental tasks such as mitigating climate change. This recognition of the need for coordinated actions emphasizes the significance of multi-level governance and integrated approaches in achieving comprehensive and sustainable outcomes across different administrative levels.

In Iceland, the infrastructure projects that apply to the local level are prepared in a collaboration between the Icelandic Road and Coastal Administration (ICRA) and the relevant municipality. Most projects handled at national level by the ICRA also must be incorporated in the municipalities' master plans. Regarding collaboration between different planning levels, interviewee I1 and the participants at WS1 and WS2 pointed at an agreement from 2019 between six municipalities in the capital area, Reykjavik, and the state. This agreement sets out a shared vision and goals for the capital region concerning land use and transport issues with a focus on public transport. Interviewee I1 also stressed the potential of this agreement to enable the municipalities to join forces and push the state towards making sustainable

investments, instead of municipalities fighting with each other to be included in the national implementation plan.

In Denmark, the "Finger Plan" for the Copenhagen region is put forward as an example on an urban planning strategy that integrates land use and transportation considerations to guide the city's growth and development. By envisioning the expansion of urban development along "finger-like" corridors connected by efficient transport networks, the plan aims to ensure sustainable and balanced urban growth while promoting accessibility and mobility for residents. The interviewees (D1, D2, D3) and participants in workshops WS1 and WS2 cited the Finger Plan in Copenhagen as an exemplary plan that effectively addresses both land use and transport planning issues. Interviewee D1 explained that "in Copenhagen, the coordination between land use and transport planning takes place through the Finger Plan. The idea behind this plan is that roads and railways are developed along five "Fingers," whereas the spaces between the Fingers are green wedges. The Finger Plan is continuously revised."

Moreover, interviewee D1 added that the municipalities, in general, make new plans for the municipality every four years, coinciding with the election of a new city council. These plans encompass both land use and transport aspects, allowing for integrated considerations of mobility and urban development at the city level. In contrast to the national level, where planning might be more separate, interviewee D1 emphasized that at the city level, land use and transport planning are usually more interconnected, fostering a cohesive approach to urban development and transportation. Additionally, interviewee D3 mentioned the crucial role played by planners at the DRD as coordinators between municipalities with conflicting interests, especially in areas that fall under the DRD's purview. By facilitating coordination and collaboration among different local authorities, the DRD ensures that the planning process for the Finger Plan takes into account diverse perspectives and interests, contributing to more cohesive and sustainable land use and transport solutions at a regional level.

In Norway, the Urban Growth Agreement (UGA) plays a significant role in city regions as it represents a joint effort between the state, regional authorities, and municipalities to work together towards achieving the Zero Growth Goal (ZGG). The interviewees (N1, N2 and N3) and participants at WS1 emphasized that UGA serves as a vital tool for coordinating land use and transport planning during the strategic planning stage. By entering into the UGA, the involved parties commit to coordinating their efforts to achieve sustainable urban growth and development. Interviewee N3 explained that the Urban Growth Agreement (UGA) in Norway entails financial support from the state for public transport investments in city-regions. As a condition of receiving this support, city-regions must undertake specific measures aimed at achieving the Zero Growth Goal (ZGG). These measures include, e.g., implementation of congestion taxes and the promotion of land-use planning that encourages the use of sustainable transport modes, such as locating housing in close proximity to public transport nodes. Prior to entering into the UGA, a Concept Study (CS) is often conducted, which focuses on identifying potential measures that can contribute to reaching the ZGG. Interviewee N3 emphasized the significance of indicators in the UGA, as they are essential for monitoring and evaluating progress towards the ZGG targets.

In Sweden, the Urban Environment Agreement (UEA) functions similarly to the UGA in Norway and holds significant importance in many city regions. However, according to one interviewee (S4), there is room for improvement in utilizing the UEA for implementing measures with a strong emphasis on contributing to sustainable development. The interviewee pointed out that joint applications for funding of measures with the UEA could be further developed, for example, in the Strategic Choice of Measures (SCM).

The interviewee highlighted that municipalities, in particular, have the potential to better leverage this opportunity to enhance collaboration and coordination in implementing sustainable measures. By actively engaging in joint applications for funding under the UEA, municipalities can pool their resources and expertise, leading to more effective and impactful implementation of measures that align with sustainable development goals. This approach could strengthen the integration of land use and transport planning efforts, leading to more cohesive and well-coordinated urban development practices that support sustainability objectives.

4.3 Strategic approaches prior to the operational level

In Norway and Sweden, the national transport authorities apply the methods Concept Studies (CS) and the Strategic Choice of Measures (SCM), respectively, to identify and analyze alternative solutions to transport-related problems. These methods are linked to the earlier mentioned four-step principle and intend to explore potential measures that do not require the (re-)construction of transport infrastructure. Instead, they focus on reducing mobility needs and optimize the use of existing infrastructure. The pursuit of appropriate measures needs engagement of local and regional actors capable of providing valuable contextual insights into transport and mobility needs and facilitating actions towards modal shift and changes in land use. This involves making strategic decisions about the selection of measures and investments in transport systems through a dialogue between national authorities and local and regional actors. Both SCM and CS support coordinated planning of actions based on a shared problem definition among various actors at the operational level.

Concerning the practical implementation of CS in Norway, the interviewees (N1, N2, N3) as well as the participant in WS1, emphasized the role of CS as an established approach for strategic transport planning practices. In addition, the interviewee pointed out that the planning process systematically involves various stakeholders, which ensures that different perspectives and interests are considered, enhancing the transparency and legitimacy of the decision-making process for infrastructure projects.

Interviewee N1 explained that the CS process starts with a mapping of wishes and needs, along with conducting investigative work to gain a comprehensive understanding of the specific area. Subsequently, stakeholders, including representatives from local and regional authorities responsible for land-use developments, discuss in workshops and meetings, diverse perspectives to arrive at a well-informed and context-specific solutions.

According to interviewee N3, the introduction of Concept Studies (CS) has resulted in notable improvements in sustainability and the inclusion of environmental aspects in the operational phase of transport planning. The interviewee emphasized that today's infrastructure projects are more considerate of environmental impacts, thanks to the utilization of the four-step principle and other analytical methods. However, it is essential to note that a CS is initiated by the National Public Roads Administration (NPRA) based on identified needs for transport infrastructure investments. As a result, while the overall goal of a CS encompasses socioeconomic efficiency, accessibility, and traffic safety, sustainability is not the only focus of these studies. However, the interviewees also acknowledged challenges as part of CS. For instance, interviewee N2 explained that conducting detailed investigations to analyse land-use impacts may not be feasible at this stage. As a potential method, interviewee N3 advocated landscape analysis involving professionals from different disciplines, such as biologists, architects, planners, and others, that visit the project area and discuss its characteristics and potential impacts. Both interviewees N1 and N3 argued that an integrated landscape analysis approach is superior to conducting separate environmental investigations on different themes

and contributes to capturing a holistic picture of the area that facilitates a more informed decision-making process during the strategic planning stages.

In Sweden, interviewee S1 explained the process Strategic Choice of Measures (SCM): "In general, we (officials working with strategic planning at the STA) identify problems and deficiencies in the infrastructure and then we work together with other external actors (municipalities, regional authorities, etc.), and with other departments at the STA that are concerned with the infrastructure in question, to find solutions."

The general opinion among the interviewees (S1, S2 and S3) was that the SCM worked well as a facilitator for coordination of transport and land-use planning. However, the interviewees (S1, S2, S3) had experience of both situations where transport and land-use planners had managed to allocate joint forces to investigate solutions to problems, as well as of situations where the municipality had refused to collaborate on an issue brought up by the STA. Interviewee S2 highlighted that framing the objectives for each SCM process should bring actors together around a shared problem and strive to create a joint vision for its solution. However, all interviewees (S1, S2, S3) expressed that linking the SCM objectives to the overarching transport policy goals and determining the measures to achieve those goals is a challenging task. Interviewee S2 pointed out that some process coordinators do not succeed to link the process to transport policy objectives and therefore they may choose not to set up SCM objectives. This highlights the complexity and potential difficulties in aligning the strategic ambitions for the SCM process with overarching policy goals.

The interviewees (S1, S2 and S3) highlighted that the inclusion of environmental aspects in the Strategic Choice of Measures (SCM) varies depending on the specific focus of each SCM process. In addition, interviewee S2 explained that certain environmental aspects are more challenging to address than others; for instance water protection areas require specific attention, while more elusive aspects like climate change impacts, pose difficulties in defining effective mitigation measures. Moreover, interviewee S1 pointed out that the importance of various aspects varies between rural and urban areas, with air quality and noise pollution often being shared concerns in city-regions. However, many environmental problems extend beyond the scope of a single SCM, making it challenging to resolve them comprehensively within its framework. As in CS, the interviewees also addressed landscape analysis in SCM as a way to strengthen the sustainability perspective, for example, interviewee S1 mentioned that a landscape analysis has been applied in some SCMs with the aim to approach the environmental aspects from a more holistic perspective.

5 Discussion and conclusions

5.1 Policy instruments for bridging the gap between land use and transport planning

Similar to most other European countries, the Nordic transport planning systems are to a high degree structured hierarchically to establish a unified framework encompassing multiple transport modes. At the national level, overarching policies set the overall goals that influence transport interventions at all levels. This approach, in accordance with Geerlings and Stead's typology (2003), fosters vertical integration within the transport sector. National transport policy documents also have implications for other policy areas, for instance, in Denmark and Sweden, where municipal land-use plans are presumed to accommodate the realization of future transport projects that hold national significance. This fosters coordination between land use and transport planning, while at the same time it also highlights the asymmetric relationship between municipal land-use planning and national transport planning, which influences the coordination between both policy areas.

The results from this study highlight that the Danish Finger Plan is an effective policy instrument for coordinating land use and transport planning. Through national directives, the government establishes overarching principles for the development for the Greater Copenhagen region, with particular attention to urban green structures, transport infrastructure and the localization for business development (Danish Ministry of Environment, 2015). It bears resemblances with the regional plans in for example Finland and Norway that also involve an integrated perspective on regional development. However, the Finger Plan exhibits a more explicit political guidance by the national government.

Apart from the formal coordination through top-down governance, the results of the study convey several other practices aimed at enhancing the integration of land use and transport planning. These are policy instruments that are embedded in national regulatory frameworks and are primarily employed to facilitate multi-actor collaboration in addressing complex cross-sectoral challenges within city-regions or projects. Several examples from Nordic planning practice are included in this paper, i.e., the MAL agreements in Finland, the Norwegian Urban Growth Agreements (UGA) and Concept Studies (CS), as well as the Swedish Urban Environment Agreements (UEA) and Strategic Choice of Measures (SCM). UGA in Norway, UEA in Sweden and MAL agreement in Finland are similar policy instruments through which local, regional and national authorities seek an agreement on the development of urban regions. These agreements are rooted in a shared vision of the problems and goals for the specific area and include a trajectory with policy measures and actions for each partner towards integrated land use and transport planning in alignment with the anticipated development. The Finnish MAL is designed to provide a flexible framework for voluntary cooperation in city regions, allowing municipal and regional authorities to identify common issues and prepare a joint vision for future land use, housing and infrastructure development in the region. The vision is used in the discussion with the national authorities to connect shared transport infrastructure investments and subsidized housing development to the integrated MAL plan (Mäntysalo et al., 2022). The UGAs in Norway, have been promoted as a tool for achieving the Zero-Growth Goal through shared political commitments among parties that foster compact land use, invest in sustainable transport modes and introduce toll-schemes (Tønnesen et al., 2019). While the Swedish UEA is inspired by the Norwegian experiences, its scope is limited to cost sharing among partners for investments in facilities for public transport, walking and biking (Behrends et al., 2019). Besides the UEA, agreements between national, regional and municipal authorities were established in Sweden following the Stockholm negotiations and Sweden negotiations. These correspond with the Norwegian UGAs in terms of the magnitude of the investments and political commitment. However, their primary objective was to increase housing in exchange for transport infrastructure investments by regional and national authorities.

A common feature of these policy instruments is their aim to converge perspectives of various authorities regarding the needs and potentials for a specific region, leading to a commitment to a shared vision on its strategic development. Therefore, these serve as examples of strategic policy instruments for integrated land use and transport planning according to the typology of van Geet et al. (2019). As CS and SCM operate at the interface between strategic and operational phases, these policy instruments should be classified as adoption. Both aim to assess potential measures and interventions in the nexus between land use and transport in a specific context prior to project implementation (Figure 4). However, a clear distinction between different classifications of policy instruments may not always be evident.

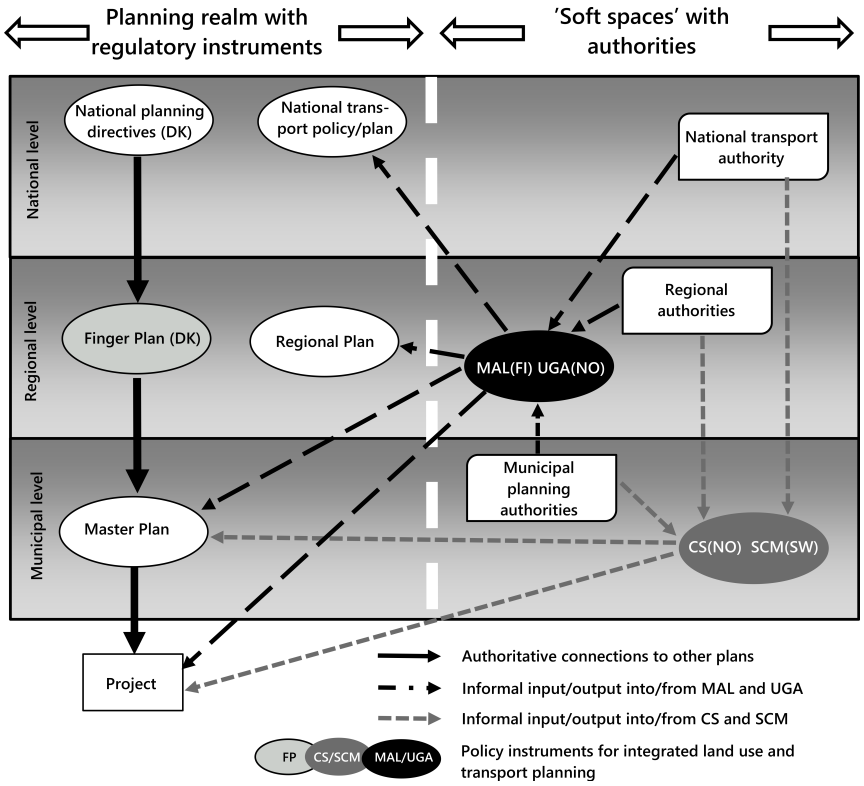


Figure 4. The integration of several strategic policy instruments (Finger Plan, MAL, UGA, SCM and CS) in Nordic planning, and their connections with authorities and regulatory instruments

The existence of multiple agreements in the Nordic countries highlights the need for novel policy instruments that foster shared commitments for land use and transport development, which go beyond traditional planning practices. The shift to collaborative approaches facilitates the creation of so-called soft spaces across various administrative and political spaces (Allmendinger & Haughton, 2009). Soft planning instruments are particularly articulated in strategic planning processes that attempt to free the imaginative potentials of urban regions and transform these into development that mixes regulative and visionary approaches (Mäntysalo & Bäcklund, 2017). However, soft planning practices cannot be disconnected from their wider institutional setting, including, for example, statutory planning procedures, legal requirements and existing planning hierarchies. This connection directs the outcome when reaching agreements through strategic policy instruments. Additionally, the informality and lack of transparency in collaborative processes involving various authorities pose challenges to the democratic quality of decision-making and its legitimacy (Mäntysalo et al., 2017).

In this respect, the Icelandic approach differs from the processes for reaching agreement in Finland, Sweden and Norway. The extensive dialogue involving national authorities, municipal representatives and the public fosters an open planning process. This process facilitates meaningful discussions on integrated land use and transport planning while effectively embedding the National Transport Policy Plan at the local level in society. As the final plan requires approval from relevant municipalities, this process ensures the merging of national and local perspectives in the plan.

The review of planning practices in the Nordic countries reveals a wide range of policy instruments used to promote integrated land use and transport planning. In a study conducted by van Geet et al. (2021) on three Dutch provinces, they concluded that there is no singular "right" tool for integrating land use and transport. Instead, it is about combining an appropriate mix of instruments that can effectively address challenges like resource fragmentation in the planning process. Our study confirms that a tailored approach is essential for successful integration, considering the unique circumstances and requirements of each situation. By adopting a flexible and adaptive strategy, we can optimize the synergy between land use and transport planning, leading to more efficient and sustainable outcomes.

Recently, the Swedish Transport Administration has taken the initiative to establish a Nordic Forum with the aim of fostering a more extensive exchange of knowledge and experiences among the Nordic countries. This platform will facilitate discussions on various topics, e.g., to enable a more integrated land use and transport planning at a strategic level.

5.2 Preconditions for coordinating land use and transport planning

The strategic policy instruments examined in this study rely heavily on effective collaborations among participants from various authorities. In practice, achieving a seamless cooperation between public stakeholders with different agendas and preconditions can prove to be a challenging task. Ansell and Gash (2007) point out three factors that determine the starting conditions for collaboration: the incentives to collaborate, power differences among stakeholders, and past history of cooperation. These factors also apply to the collaborative approaches that are included in this study.

Regarding the first factor, the primary incentive for stakeholders to engage in collaborations is the potential for concrete, tangible, effectual policy outcomes that cannot be achieved through alternative means (Ansell & Gash, 2007). Several respondents referred to the financial gains, in particular governmental (co-)funding of infrastructure investments through various agreements, for instance the MAL agreements, the UGAs and UEAs. Moreover, as highlighted by a respondent from Iceland, local actors can unite their efforts to actively promote local or regional matters, aiming to gain attention from national authorities and other relevant stakeholders. This aligns with a common expectation that collective work towards sustainable, long-term solutions will benefit the entire region, which is an observation that finds support in other studies as well. For instance, Thomas and Bertolini (2015) highlight several examples from the Netherlands, illustrating that municipalities, faced with limitations in independently implementing projects, often engage in collaborative efforts with neighboring municipalities to collectively achieve their distinct goals.

The second factor relates to the institutional setting as discussed in the former section. In all Nordic countries, nationally funded transport infrastructure investments need to align with the overall goals and regulations of the national transport policies. This entails restrictions on the types of interventions that national transport authorities can approve and impose constraints to the strategic discussion on potential interventions. For instance, workshop participants pointed out that step 1 and 2 measures that often concern adjustments to the local transport system, lie outside the jurisdiction of the STA (Swedish Transport Administration). Municipal representatives argue that modifications that are generated by the national transport system should be funded by STA.

At times, challenges arise in aligning project goals with overarching transport policy. As highlighted by some interviewees, the project coordinator may, in such cases, refrain from defining the goals from the outset and instead anticipate the outcomes of the SCM process. The disparity between strategic and operational levels highlights the crucial role of SCM in

broadening the scope for project planning, for example by incorporating local and regional perspectives, thus facilitating a more comprehensive approach. This resonates with the findings of Duffhues and Bertolini (2016) who point out that the most critical phases in the planning process are those in which goals are translated into actions.

The third factor connects with perceptions and experiences. Some of the results indicate a negative attitude towards collaboration, plausibly depending on previous experiences, e.g., a municipality that refuses to collaborate on issues raised by STA. Otherwise, the results of the study reflect mainly positive experiences and suggestions for strengthening collaborative planning approaches. For instance, through their emphasis on systematic involvement of multiple perspectives, recognition of the need for reducing complexity through prioritization, and acknowledgment of the role of key players in merging various standpoints, the respondents express their commitment to multi-actor endeavors to bridge the gap between land use and transport planning.

The analysis of the results indicates a positive stance towards shared planning practices in the Nordic countries, offering favorable prospects for effective collaboration among stakeholders. Nevertheless, linking goals at different governance levels remain a challenging task, requiring coordinated action(s) among actors representing diverse organizations and sectors to overcome these challenges (Banister, 2005). Pettersson and Hrelja (2020) offer several recommendations on establishing an effective collaboration. For instance, they propose developing a shared understanding of the purpose of collaboration and its benefits for the organizations involved. By involving key stakeholders from various governance levels in the goal-setting process, ownership is enhanced, and the likelihood of achieving consensus on shared objectives increases. Glaser et al. (2019) highlight the importance of learning to build strategic capacity for fostering transformative change. Encouraging stakeholders to reflect on earlier experiences and evaluate outcomes can contribute to an enhanced understanding of challenges and promote the development of more holistic and impactful approaches to policymaking and implementation.

5.3 Integration of environmental aspects and sustainability perspectives

Land use and transport infrastructure have a significant impact on achieving the objectives set forth in the 2030 Agenda (UNEP, 2021). The Nordic countries have embraced the Sustainable Development Goals (SDGs) and incorporated them into their policies and objectives. As can be seen in the national goals, environmental aspects and sustainability perspectives are integral to the national transport policies of the Nordic countries. Similarly, the national planning regulations mandate the consideration of environmental aspects in land-use planning, with sustainable development being a primary objective for land-use planning in most countries (Lidmo et al., 2020). Despite the high national ambitions in many countries, significant gaps persist concerning the assessment of interlinkages and synergies between targets (Allen et al., 2018). Aligning land use and transport planning can unlock inherent potentials to create synergies and foster sustainable transport options, which in turn contributes to the reduction of carbon emissions, improvement of air quality and promotion of public health. Moreover, integrating environmental considerations into land use and transport planning can help mitigate the impact of development on natural resources and ecosystems.

The study exhibits a widespread consensus among practitioners on the significance of goals that embrace a sustainability perspective. Participants in the workshop not only deliberated on economic aspects but also actively engaged in discussions on cross-cutting issues, such as climate change, environmental concerns, and social factors. This is in line with Stanley (2023)

who highlights the shift in strategic land use and transport planning, transitioning from a primary emphasis on economic goals to a heightened priority on urban livability and reducing global greenhouse gas emissions.

Practitioners generally recognized the significance of planning practices that involve multi-level governance and integrated approaches for land use and transport planning, as these are instrumental in achieving comprehensive and sustainable outcomes. For example, experiences from CS manifest notable progress in incorporating environmental aspects and sustainable perspectives even though national authorities need to balance sustainability with goals related to socioeconomic efficiency, accessibility, and traffic safety. Likewise, the experiences from SCM indicate improvements in considering environmental aspects and sustainability. However, some aspects, such as the earlier mentioned step 1 and 2 measures of the four-step principle, lie outside the scope. Tangible impacts such as CO_2 emissions tend to garner more attention in the strategic discussions among various authorities, owing to their close correlation with car transport volumes. In Norway, CO_2 emissions guides the pursuit of national funding for local and regional investments within UGAs.

In Sweden, environmental aspects in processes for transport infrastructure linked to the STA are mainly focusing on impact on climate, health, and landscape (STA, 2021). However, in SCM, the consideration of environmental aspects focus mainly on measurable environmental aspects such as noise, while aspects that are more difficult to quantify or garner less attention, such as biodiversity (Eckersten et al., 2021). One reason why only a few environmental aspects are taken into account may be a lack of relevant expert knowledge, which Tennøy et al. (2016) consider as fundamental for goal fulfilment.

There is a growing interest to employ landscape analytical approaches in various contexts as a means to effectively integrate a complex web of environmental factors. This allows for a comprehensive consideration of multiple aspects and potential conflicts between goals. The incorporation of landscape considerations in transport planning goes beyond minimizing or mitigating negative effects; it also emphasizes the creation of positive ecological, aesthetic, and social qualities (Löfgren, 2020). The Swedish Transport Administration (STA) plays an active role in advancing landscape-oriented approaches within transport planning (Sjölund et al., 2016) which is also interconnected with the development of green infrastructure in line with EU policies.

Follow-up of the implementation of UGAs is essential in Norway in order to monitor the progress towards ZGG targets. Otherwise, there is limited knowledge about the effectiveness of sustainability measures that have been planned and whether the actions included in shared visions and commitments have successfully undergone the political and regulatory scrutiny in national, regional and local procedures. These items were not part of the scope of this study and further research is needed to deepen the understanding of how the policy measures included in various agreements actually contribute to sustainable land use and transport planning. In addition, future research is needed to identify how policy instruments can strengthened collaboration and foster shared commitments for land use and transport development, which go beyond traditional planning practices.

5.4 Concluding remarks

The results of this study point at a diverse mix of strategic policy instruments in the Nordic countries that aim to foster integrated land use and transport planning through multi-actor involvement. MAL and UGA are typical examples of collaborative approaches for working towards the formation of a shared vision and selection of policy measures, in particular in major city regions. SCM and CS are policy instruments that employ collaborative approaches

prior to project implementation to discuss combinations of measures for minimizing environmental impacts. These instruments establish informal arenas ("soft spaces") for consensus seeking to foster commitment on enforcing policy measures and interventions through regulatory planning processes. The consensus may be concluded with an agreement but remain informal until authorities have incorporated the agreed policy measures in their regulatory instruments, such as municipal master plans or national policy plans.

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Appendices

Appendices available as supplemental files at https://jtlu.org/index.php/jtlu/article/view/2350.

References

Allen, C., Metternicht, G., & T. Wiedmann, T. (2018). Initial progress in implementing the sustainable development goals (SDGs): A review of evidence from countries. *Sustainability Science, 13*(5),1453–1467. https://doi.org/10.1007/s11625-018-0572-3

Allmendinger, P., & Haughton, G. (2009). Soft spaces, fuzzy boundaries, and metagovernance: The new spatial planning in the Thames gateway. *EPA: Economy and Space, 41*(3), 617–633. https://doi.org/10.1068/a40208

Ansell, C., & Gash, A. (2007). Collaborative governance in theory and practice. *JPART, 18*(4), 543–571. https://doi.org/10.1093/jopart/mum032

Arts, J., Hanekamp, T., Linssen, R., & Snippe, J. (2016). Benchmarking integrated infrastructure planning across Europe—Moving forward to vital infrastructure networks and urban regions. *Transportation Research Procedia, 14*, 303–312. https://doi.org/10.1016/j.trpro.2016.05.024

Balfors, B., & Gunnarsson-Östling, U. (2021). Strategisk miljöbedömning och nationell transportplanering. In L. Eriksson, K. Isaksson, & J. Witzell (Eds.), *På väg mot hållbar omställning? - Kunskap, makt och mening i nationell transportplanering* (pp. 95–104). Boxholm, Sweden: Linnefors förlag.

Banister, D. (2005). Unsustainable transport: City transport in the new century. London: Routledge. https://doi.org/10.4324/9780203003886

Barfod, M. B., Leleur, S., Gudmundsson, H., Sørensen, C. H., & Greve, C. (2018). Promoting sustainability through national transport planning. *EJTIR, 18*(3), 250–261. https://doi.org/10.18757/ejtir.2018.18.3.3236

Behrends, S., Fredricsson, C., Lund, E., & Sköld, S. (2019). *Samverkansformer mellan nationella och lokala myndigheter för att underlätta målstyrd vägplanering*. Retrieved from https://www.ivl.se/download/18.694ca0617a1de98f4739bc/1628417386117/FULLTEXT01.pdf

Brinkmann, S., & Kvale, S. (2014). *InterViews: Learning the craft of qualitative research interviewing* (3rd ed.). Los Angeles: Sage Publications.

Bryman, A. (2016). *Social research methods* (5th ed.). Oxford, UK: Oxford University Press.

Candel, J. J. L., & Biesbroek, R. (2016). Towards a processual understanding of policy integration. *Policy Sciences, 49,* 211–231. https://doi.org/10.1007/s11077-016-9248-y

COMPASS. (2018). *Comparative analysis of territorial governance and spatial planning systems in Europe* (Final report). Luxembourg: ESPON and TU Deft.

Danish Ministry of Environment. (2015). *The Finger Plan. A strategy for the Development of the Greater Copenhagen Area*. Copenhagen: The Danish Nature Agency.

De Jong, M., & Geerlings, H. (2005). Exchanging experiences in transport infrastructure policies between Denmark and the Netherlands. *International Journal of Technology, Policy and Management*, *5*(2), 181–199. https://doi.org/10.1504/IJTPM.2005.007520

Dolowitz, D. P., & Marsh, D. (1996). Who learns what from whom: A review of the policy transfer literature. *Political Studies, 44*(2), 343–357. https://doi.org/10.1111/j.1467-9248.1996.tb00334.x

Duffhues, J., & Bertolini, L. (2016). From integrated aims to fragmented outcomes: Urban intensification and transportation planning in the Netherlands. *Journal of Transport and Land Use,* 9(3), 15–34. https://doi.org/10.5198/jtlu.2015.571

Duman, O., Mäntysalo, R., Granqvist, K., Johnson, E., & Ronikonmäki, N.-M. (2022). Challenges in land use and transport planning integration in Helsinki metropolitan region—A historical-institutional perspective. *Sustainability, 14*(1), 146. https://doi.org/10.3390/su14010146

Eckersten, S., Balfors, B., & Gunnarsson-Östling, U. (2021). Challenges and opportunities in early stage planning of transport infrastructure projects: Environmental aspects in the strategic choice of measures approach. *Sustainability, 13*(3),1295. https://doi.org/10.3390/su13031295

Finnish Government. (2021). *The national transport system plan for 2021–2032* (Report 2021:77). https://urn.fi/URN:ISBN:978-952-383-804-8

Geerlings, H., & Stead, D. (2003). The integration of land use planning, transport and environment in European policy and research. *Transport Policy, 10*(3), 187–196. https://doi.org/10.1016/S0967-070X(03)00020-9

Glaser, M., Te Brömmelstroet, M., & Bertolini, L. (2019). Learning to build strategic capacity for transportation policy change: An interdisciplinary exploration. *TRIP, 1,*100006. https://doi.org/10.1016/j.trip.2019.100006

Government Bill. (2008). Mål för framtidens resor och transporter 2008 09:93. Stockholm: Swedish Government.

Granqvist, K., Sarjamo, S., & Mäntysalo, R. (2019). Polycentricity as spatial imaginary: The case of Helsinki city plan. *European Planning Studies,* 27(4), 739–758. https://doi.org/10.1080/09654313.2019.1569596

Howlett, M. (2008). Managing the "hollow state": Procedural policy instruments and modern governance. *Canadian Public Administration*, *43*(4), 412–431. https://doi.org/10.1111/j.1754-7121.2000.tb01152.x

Hrelja, R., Pettersson, F., & Westerdahl, S. (2016). The qualities needed for a successful collaboration: A contribution to the conceptual understanding of collaboration for efficient public transport. *Sustainability, 8*(6), 542. https://doi.org/10.3390/su8060542

Hrelja, R., Rye, T., & Mullen, C. (2018). Partnerships between operators and public transport authorities: Working practices in relational contracting and collaborative partnerships. *Transportation Research Part A: Policy and Practice, 116*, 327–338. https://doi.org/10.1016/j.tra.2018.06.032

Hull, A. (20050. Integrated transport planning in the UK: From concept to reality. *Journal of Transport Geography, 13*(4), 318–328. https://doi.org/10.1016/j.jtrangeo.2004.12.002

Högström, J., Balfors, B., & Hammer, M. (2017). Planning for sustainability in expansive metropolitan regions: Exploring practices and planners' expectations in Stockholm, Sweden. *European Planning Studies, 26*(3), 439–457. https://doi.org/10.1080/09654313.2017.1391751

IRCA (Icelandic Road and Coastal Administration). (2017). *The road system 2017*. Retrieved from https://www.road.is/vefur2.nsf/Files/RoadSystem2017/$file/vegakerfid2017-enska.pdf

Ingo, S. (2013). Swedish transport planning—A new deal in a new reality. In M. J. Lundström, C. Fredriksson, & J. Witzell (Eds.), *Planning and sustainable urban development in Sweden* (pp. 111–132). Stockholm: Swedish Society for Town and Country Planning.

Isaksson, K., Antonson, H., & Eriksson, L. (2017). Layering and parallel policy making—Complementary concepts for understanding implementation challenges related to sustainable mobility. *Transport Policy, 53,* 50–57. https://doi.org/10.1016/j.tranpol.2016.08.014.

Jalali, S., & Wohlin, C. (2012). Systematic literature studies: Database searches vs. backward snowballing. *Proceedings of the 2012 ACM-IEEE International Symposium on Empirical Software Engineering and Measurement*, 29–38. https://doi.org/10.1145/2372251.2372257

Johansson, F., Tornberg, P., & Fernström, A. (2018). A function-oriented approach to transport planning in Sweden: Limits and possibilities from a policy perspective. *Transport Policy, 63,* 30–38. https://doi.org/10.1016/j.tranpol.2017.11.006

Keast, R., Brown, K., & Mandell, M. (2007). Getting the right mix: Unpacking integration meanings and strategies. International Public Managment Journal, 10(1), 9–33. https://doi.org/org.10.1080/10967490601185716

Lavallée, M., Robillard, P.-N., & Mirsalari, R. (2014). Performing systematic literature reviews with novices: An iterative approach. *IEEE Transactions on Education, 57*(3), 175–181. https://doi.org/10.1109/TE.2013.2292570

Lidmo, J., Bogason, A., & Turunen, E. (2020). *The legal framework and national policies for urban greenery and green values in urban areas—A study of legislation and policy documents in the five Nordic countries and two European outlooks*. Copenhagen: Nordic Council of Ministers, Nordic Walking Group for Sustainable Cities.

Lundgren, A., Löfving, L., & Westin, L. (2023). *Cross-border transport infrastructure planning in the Nordic Region—An introduction*. Copenhagen: Nordic Council of Ministers, Nordic Walking Group for Sustainable Cities.

Löfgren, S. (2020). *Considering landscape in practices of transport planning* (Doctoral thesis), Luleå University of Technology, Luleå, Sweden.

Marsden, G., & Reardon, L. (2017). Questions of governance: Rethinking the study of transportation policy. *Transportation Research Part A: Policy and Practice, 101,* 238–251. https://doi.org/10.1016/j.tra.2017.05.008

Myllymäki, A. (2021). *Defining the role of walking in strategic level land use and transport planning—Lessons from the Nordics for the Helsinki Region Land Use, Housing and Transport Plan* (Master's thesis), Aalto University, Espoo, Finland. https://aaltodoc.aalto.fi/handle/123456789/110572

Mäntysalo R., & Bäcklund, P. (2017). The governance of planning: Flexibly networked, yet institutionally grounded. In M. Gunder, A. Madanipour, & V. Watson (Eds.), *The Routledge Handbook of Planning Theory* (pp. 237–249). Abingdon-on-Thames, England: Routledge.

Mäntysalo, R., Granqvist, K., Duman, O., & Mladenović, M. N. (2022). From forecasts to scenarios in strategic city-regional land-use and transportation planning. *Regional Studies, 57*(4), 629–641. https://doi.org/10.1080/00343404.2022.2058699

Nordic Council of Ministers. (2020). Nordisk arbetsplan för hållbar utveckling i perioden 2021-2024 (Report 2020:721). https://doi.org/10.6027/politiknord2020-721

Norwegian Ministry of Transport. (2020). *National transport plan 2022-2033* (English summary, white paper). Retrieved from https://www.regjeringen.no/no/dokumenter/meld.-st.-20-20202021/id2839503/

Pettersson, F., & Hrelja, R. (2020). How to create functional collaboration in theory and in practice—Practical experiences of collaboration when planning public transport system. *International Journal of Sustainable Transportation, 14*(1), 1–13. https://doi.org/10.1080/15568318.2018.1517842

Pettersson, F., Westerdahl, S., & Hansson, J. (2018). Learning through collaboration in the Swedish public transport sector? Coproduction through guidelines and living labs. *Research in Transportation Economics, 69,* 394–401. https://doi.org/10.1016/j.retrec.2018.07.010

Planning and Building Act. (2010). SFS 2010:900. Stockholm: The Swedish National Board of Housing, Building and Planning.

Puustinen, S., Mäntysalo, R., Hytönen, J., & Jarenko, K. (2017). The 'deliberative bureaucrat': Deliberative democracy and institutional trust in the jurisdiction of the

Finnish planner. *Planning Theory & Practice, 18*(1), 71–88. https://doi.org/10.1080/14649357.2016.1245437

Rose, R. (2004). *Learning from comparative public policy: A practical guide.* Abingdon-on-Thames, England: Routledge.

Saevarsdottir, B. (2020). *A study on early-stage transport planning in the Nordic countries—With special focus on collaboration and integration of environmental aspects* (Master's thesis], KTH Royal Institute of Technology, Stockholm.

Sjölund, A., Bergkvist, J., Rundcrantz, K., & Lundin, U. (2016). *Anpassning av transportinfrastrukturen som ett bidrag till en fungerande grön infrastruktur. Planera, bygga och sköta* (Report 2016:133). Borlänge, Sweden: Swedish Road Administration.

SNBHBP. (2020). *Internationell förstudie av nationella anspråk i fysisk planering—Uppdrag 5 i Boverkets regleringsbrev 2020* (Report 2020:29). Stockholm: Swedish National Board of Housing, Building and Planning.

Sovacool, B. K., Noel, L., Kester, J., & Zarazua de Rubens, G. (2018). Reviewing Nordic transport challenges and climate policy priorities: Expert perceptions of decarbonization in Denmark, Finland, Iceland, Norway, Sweden. Energy, 165, 532–542. https://doi.org/10.1016/j.energy.2018.09.110

STA. (2014). *Strategic choice of measures, A new step for planning of transportation solutions.* Handbook (Report 2013:176). Borlänge: Swedish Transport Administration.

STA. (2015). *Regeringsuppdrag om stadsmiljöavtal, slutredovisning* (Government assignment on urban environment agreement, report 2015:078). Borlänge: Swedish Transport Administration.

STA. (2021). *Trafikverkets miljörapport 2021* (STA's environmental report for 2021, report 2022:008). Borlänge: Swedish Transport Administration.

Stanley, J. (2023). Opportunity equity in strategic urban land use transport planning: Directions in London and Vancouver. *Transp. Policy, 136*, 137–146. https://doi.org/10.1016/j.tranpol.2023.03.019

Stead, D. (2003). Are transport and land-use planning policy really coordinated? *International Social Science Journal, 176,* 371–387. https://doi.org/10.3917/riss.176.0371

Stead, D. (2021). Conceptualizing the policy tools of spatial planning. *Journal of Planning Literature, 36*(3), 297–311. https://doi.org/10.1177/0885412221992283

Stead, D., & Geerlings, H. (2005). Integrating transport, land use planning and environment policy: Views of practitioners from Denmark, England and Germany. *Innovation, 18*(4), 443–453. https://doi.org/10.1080/13511610500384194

Stockholm Negotiations. (2007). *Samlad trafiklösning Stockholmsregionen för miljö och* tillväxt-2020 med utblick mot 2030. Retrieved from https://www.regeringen.se/contentassets/dbe6b0ffa7844f258e9aa0c78795ba50/samlad-trafiklosning-stockholmsregionen-for-miljo-och-tillvaxt---till-2020-med-utblick-mot-2030/

Te Brömmelstroet, M., & Bertolini, L. (2010). Integrating land use and transport knowledge in strategy-making. *Transportation*, *37,* 85–104. https://doi.org/10.1007/s11116-009-9221-0

Tennøy, A., Hansson, L. Lissandrello, E., & Næss, P. (2016). How planners' use and non-use of expert knowledge affect the goal achievement potential of plans: Experiences from strategic land-use and transport planning processes in three Scandinavian cities. *Progress in Planning, 109,* 1–32. https://doi.org./10.1016/j.progress.2015.05.002

Thomas, R., & Bertolini, L. (2015). Policy transfer among planners in transit-oriented development. *Town Planning Review, 86*(5), 537–560. https://doi.org/10.3828/tpr.2015.32

Tornberg, P., & Odhage, J. (2018). Making transport planning more collaborative? The case of strategic choice of measures in Swedish transport planning. *Transportation Research Part A: Policy and Practice*, *118*, 416–429. https://doi.org/10.1016/j.tra.2018.09.020

Tønnesen, A. (2015). Policy packages and state engagement: Comparing car-use reduction policy in two Norwegian cities. *Journal of Transportation Geography, 46,* 89–98. https://doi.org/10.1016/j.jtrangeo.2015.06.006

Tønnesen, A., Knapskog, M., Rynning, M. K., & Groven, K. (2022). Planning for climate-friendly transport in Norwegian rural areas. *Transportation Research Part D, 102,* 103156. https://doi.org/10.1016/j.trd.2021.103156

Tønnesen, A., Runde Krogstad, J., Christiansen, P., & Isaksson, K. (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. https://doi.org/10.1016/j.tranpol.2019.05.018

UNEP. (2019). *Systemic policy approaches for cross-cutting issues — Global environment outlook (GEO-6): Healthy planet, healthy people Chapter 17.* New York: United Nations Environmental Program. https://wedocs.unep.org/20.500.11822/27669.

UNEP. (2021). *Making peace with nature — A scientific blueprint to tackle the climate, biodiversity and pollution emergencies* (DEW/2335/NA). New York: United Nations Environment Program. https://wedocs.unep.org/xmlui/bitstream/handle/20.500.11822/34948/MPN.pdf

UN-Habitat. (2013). *Planning and design for sustainable urban mobility: Global report on human settlements 2013.* Abingdon-on-Thames, England: Routledge. https://unhabitat.org/sites/default/files/2013/06/GRHS.2013_Rev.2014.01_00.pdf

van Geet, M. T., Busscher, T., Lenferink, S., & Arts, J. (2021). Finding the right tools for the job: Instrument mixes for land use and transport integration in the Netherlands. *Journal of Transport and Land Use, 14*(1), 125–149. https://doi.org/10.5198/jtlu.2021.1710

van Geet, M. T., Lenferink, S., Arts, J., & Leendertse, W. (2019). Understanding the ongoing struggle for land use and transport integration: Institutional incongruence in the Dutch national planning process. *Transport Policy, 73,* 84–100. https://doi.org/10.1016/j.tranpol.2018.11.001

Westskog, H., Amundsen, H., Christiansen, P. & Tønnesen, A. (2020). Urban contractual agreements as an adaptive governance strategy: Under what conditions do they work in multi-level cooperation? *Journal of Environmental Policy & Planning, 22*(4), 554–567. https://doi.org/ 10.1080/1523908X.2020.1784115