Towards Sustainable and Inclusive Corridors: Rethinking Planning of Infrastructure and Spatial Development

Charlotta Faith-Ell[1,2(✉)], Jos Arts[3,4], and Heikki Kalle[2]

[1] Department of Natural Science, Design and Sustainable Development, Mid Sweden University, 831 25 Östersund, Sweden
charlotta.faith-ell@miun.se
[2] Estonian Environment Institute (EKKI), Raekoja plats 8, 51004 Tartu, Estonia
heikki@ekki.ee
[3] Department of Planning, Faculty of Spatial Sciences, University of Groningen, PO Box 800, 9700AV Groningen, The Netherlands
jos.arts@rug.nl
[4] Environmental Sciences and Management, North-West University, Potchefstroom, South Africa

Abstract. The transformation of Europe towards a more sustainable built environment has large implications on the development of transport infrastructure. National and European authorities invest hugely in transport infrastructure focusing usually on improving individual links for single modes in the form of largescale projects. In practice, such planning often results in cost overruns, time delays and limited public support. Often local (land-use) planning issues become the focus instead of the overall system of transport corridors connecting individual places and services. This paper aims at exploring the concept of sustainable and inclusive corridor planning for large infrastructure development that connects with (local) land-use development and (cross) national transport needs. To this end, we examine experiences from three different cases of corridor-oriented planning in Estonia, Sweden and the Netherlands. Our findings suggest the need for a strategic programmatic approach aligning local needs, individual projects and setting overall goals for corridors and networks. This implies developing and applying multi-level governance frameworks with leadership, early and ongoing stakeholder involvement, and joint platforms for monitoring and learning.

Keywords: cross-national corridors · TEN-T network · LUTI (land use - transport interaction) · multi-level governance

1 Introduction

The transition of Europe towards a more sustainable built environment has large implications on the development of transport infrastructure. National authorities invest hugely in infrastructure as it is considered a prerequisite for spatial-economic development

C. McNally et al. (Eds.): TRAconference 2024, LNMOB, pp. 599–605, 2025.
https://doi.org/10.1007/978-3-031-85578-8_80

by improving connectivity and accessibility of places and regions [1] – relating to the notion of Land-Use Transport Interaction (LUTI). Many land-use developments (housing, offices, industrial estates) are initiated by local and regional authorities, which interact with policies for large-scale infrastructure projects [2]. While most countries have national infrastructure strategies or plans aiming for optimizing multi-modal infrastructure networks and for achieving sustainability and inclusiveness objectives, their financing practice focuses on granting individual projects for one mode – solving congestion and capacity 'bottlenecks' [1]. At the European level, the TEN-T policy of a system of corridors and networks focuses on improving individual linkages for separate modes aiming especially at connecting peripheral areas to the common market [3].

Therefore, infrastructure planning – both at the European and national level – is dominated by project planning rather than by a network- or corridor-planning approach of integrated infrastructure and spatial development [4, 5]. Also, the resulting practice of large-scale projects meets much local resistance as projects cause impacts on local society (e.g., land take, environmental emissions, barrier impacts) while their benefits to localities remain unclear. To address such issues, usually local (land-use) planning initiatives are integrated in – and paid for by – (large) infrastructure projects. Examples include: modernizing station areas for high-speed railway projects; building tunnels for highway projects through cities creating new space for urban development; or other expensive local mitigation measures. Nevertheless, the planning of infrastructure projects becomes often cumbersome and results in cost overruns, time delays and little public support [6]. Infrastructure projects become arenas for solving local planning issues rather than for addressing systems level connectivity and accessibility – let alone broader goals of sustainability and inclusiveness [7, 8].

Overall, what can be seen is that the multiplicity of transport infrastructure makes its planning very complex, when dealing with functional interrelatedness – i.e., multiple sectors (land-use, transport); and multiple scales (local, regional, (cross)national) – and institutional interdependencies (i.e., multiple actors, and multi-level governance) [9]. To overcome this multiplicity, integrated planning is opted as an approach to deal with the complex circumstances of transport infrastructure [5]. Corridor planning aims to take such integrated approach into account [4, 10].

This paper aims at exploring the concept of sustainable and inclusive corridor planning for large infrastructure development that connects with (local) land-use development and (cross) national transport needs. To this end, we examine experiences gained in three different cases of corridor-oriented planning: Rail Baltic (Estonia), High-Speed Rail (Sweden), and South-East Freight Corridor (the Netherlands).

2 Methods and Cases Selected

This paper builds upon a comparative analysis of the planning and decision-making processes in these cases, and the results of recent European studies. Our study addresses functional interrelatedness (using the LUTI concept) and institutional inter-dependencies (using multi-level governance). The planning and decision-making processes were analyzed on basis of key documents, interviews [see also 7, 8], and the authors' experiences who were directly involved in the cases and all have long-standing experience in infrastructure and land-use planning in their countries. In addition, we build upon European

studies we were involved in [see 11]: Vital Nodes (Horizon2020), Freight and Logistics in a Multimodal Context (Fluxnet, CEDR), Collaborative Planning of Infrastructure and Spatial Development (CEDR), Networking for Urban Vitality.

The *Rail Baltic program* in Estonia pertains to a new high-speed rail system (240 km/h) connecting the capitals of the Baltic States with Europe. In Estonia, the 220 km HSR stretch is part of the Estonian National Spatial Plan as well as national transportation strategy. In 2013, the program started with a regional planning process of parallel actions at multiple tiers with various parties and institutions. The program coordinated extensive discussions involving >100 meetings with specific stakeholders as well as the general public. Construction of the railway has started and will finish by 2030.

The *high-speed rail (HSR) program* in Sweden stretches from Stockholm to Malmö and Gothenburg, respectively. The cases in this paper encompass *Jönköping-Malmö* (ca 300 km) and *Linköping-Borås* (ca 217 km). Both projects were carried out by the National Transport Administration at the regional level as so-called 'Strategic Choice of Measures' (SCM) studies in the period 2015–2018. In parallel, a political process called 'National Negotiation on Housing and Infrastructure' was carried out with local cities on the corridors. After the finalization of the SCM studies and the National negotiations, in December 2022, the Swedish government abandoned the corridor approach, deciding to discontinue the planning of new trunk lines for high-speed trains.

The *East/South-East Freight Corridor* program in the Netherlands started in 2017 and comprises the corridor Rotterdam – Rhein-Ruhr (Germany), which has a highly developed network of rail-, water- and highway (and pipeline) connections. This cross-national corridor is not only vital to the Netherlands' transport system and economy, but also to the EU (the TEN-T Rhine-Alpine Corridor). In the Freight Corridor program national government examines how to maintain and optimize this crucial multimodal corridor with the ambition of being a 'topcorridor in 2030'. A coherent package of measures is developed, for which national, regional, local authorities collaborate with private companies. The program focuses explicitly on optimization of 6 major nodes.

3 Results

3.1 Functional Interrelatedness – Land-Use Transport Interaction

Initially, the *Rail Baltic* program involved alignment design of high-speed rail aiming at achieving the optimal technical solution with the least restrictions (nature conservation, cultural heritage, health impacts to settlements etc.). From an urban planning perspective, the study of the Rail Baltic program shows that at the start this program focused mainly on the (detailed) design of stations, including architectural competitions. Only later in the process, the discussion evolved into topics as the role of railways in the city and location criteria for stations. Furthermore, the Rail Baltic served as a steppingstone for adjacent project proposals such as improvements in Tallinn light rail (tram) system and the Finest Link tunnel connecting Tallinn and Helsinki. Consequently, discussions in Tallinn shifted from 'form' (architecture) to 'function' – what sectors and which social groups will benefit?

Initially, the two *Swedish HSR projects* focused mainly on travel time between Stockholm, Malmö and Gothenburg. There was little discussion within the SCM process on the role of the HSR for the cities within the corridors. The cities were instead involved in the National negotiation process. The national negotiation had a very tight coupling between infrastructure and housing, while the SCM process by the Transport Administration process did not. Since the SCM process was carried out from a large-scale perspective, current land-use was considered a prerequisite for the planning of the railway. This means that there was a very limited interaction between land-use planning and transport planning in the SCM process. At the same time, the national negotiation focused very much on planning of new residential areas in the cities that were to become nodes in the HSR system. In this process, the railway functioned as a prerequisite for the negotiation about new housing. This meant that the SCM was planning on basis of current land-uses while the national negotiations at the same time changed the planed land-use, stemming from the assumption that a railway would be present in the future.

The *Dutch Topcorridor program* focused on the optimization of the Dutch part of the TEN-T Rhine-Alpine Corridor and particularly on six major nodes. Measures related to: improving transport flows for different modalities at the corridor (solving bottlenecks); improving intermodal connectivity at nodes (allowing a sustainably modal shift); focusing on service and reliability for end-users (synchro-modality); and looking for sustainability and innovation (renewable energy, alternative fuels). The program strives for economic development with specialization in the six major nodes to prevent unwanted competition between nodes and other cities.

3.2 Institutional Interdependencies – Multi-level Governance

At the (supra)national level, the main institution for the *Rail Baltic program* was the coordinating organization (RBE) overseeing linkages between different plans and governance levels (supra-national collaboration in the Baltic, state, cities). However, RBE focused mostly on engineering; not on regional implications and (land use) planning. At the regional level, there was no permanent organizational form to continue the corridor-level discussions about the meaning of the newly created link, discussing losses and benefits, agreeing on possible roles etc.

The main focus of both the SCM process and the national negotiations in the *Swedish case* was the development of new railway lines for national passenger traffic with few stops. This meant that the current railway system was to become a system for regional traffic and freight traffic the day the HSR system was to be in place. The Transport Administration focused on the regional scale in the SCM process while the National Negotiation focused on the local municipal scale. Also, within the SCM, there was little discussion about the role of the HSR for cities within the corridor. This resulted in two parallel processes and rivalry between cities rather than a reflection on how cities could cooperate and become stronger together. The National Negotiation had a very tight coupling of infrastructure and housing, while the planning process of the Transport Administration did not. Only at the end of the SCM process came the discussion about the function of HSR for cities. This meant that the objectives of the HSR were retrofitted in a separate process after the finalization of the SCM and the National negotiation.

For the *Dutch Topcorridor program*, the program objective (of new economic development with specialization in the major nodes and preventing unwanted competition between nodes and cities) proved to be a complex multi-level governance issue, as it required that: 1) provinces and cities think at corridor/network level (while competing as local terminals and hubs); and 2) that national government links up local/regional spatial-economic development issues (while funding is limited and for national infrastructure). However, the program has increased the awareness about being positioned on a corridor, and about the importance of the corridor to the country, regions, and cities. Under the current institutional framework, the programmatic approach faces difficulties in: implementing multi-level governance (including also the EC), creating multimodality, balancing freight and persons transport, and developing a scope for cross-border issues and measures (to Germany and Flanders).

Table 1. Comparison of the three cases

	Estonia	Sweden	The Netherlands
Land-use transport integration	Yes, rail (freight/persons) and local land uses (and mitigation of impacts)	No, separate processes. SCM focuses on passenger traffic while the National negotiation focused on housing	Yes, multimodal freight transport (road, rail, waterway, pipelines), urban-regional economic development
Spatial scales	Start on EU corridor level developing new rail, later attention for local (land use) issues, and environmental impacts (SEA/EIA)	Start focus on travel time HSR, later on land use in the National Negotiation: (housing) issues for city-regions (only SEA for rail)	Optimizing the overall corridor (for transport) and focusing on 6 specific urban-regional nodes (spatial-economic development) (no SEA/EIA)
Main objectives	(Geopolitical) connectivity as central aim, room for integration (LUTI) locally	No common objective in this period. Separate tracks: municipalities focus on land use, Trafikverket (national) on transport	At program level central policy goals, and alignment with regional/local authorities. Alignment with businesses was missing

(*continued*)

Table 1. (*continued*)

	Estonia	Sweden	The Netherlands
Multi-level governance	(Supra)national level leading (EU funding), rather technical process. Much collaboration with regional and local authorities (via SEA)	Political process, national government leading, other authorities involved through the SCM (regions), and the National negotiation (municipalities)	Nationally driven process (of joint factfinding and will-shaping), with collaboration with provinces, and (major) cities + Port of Rotterdam
Involvement of other parties in the process	All parties (in)directly involved (still court cases). Also, Latvia, Lithuania (and Finland). Businesses late in process	Limited. Main governmental, public and businesses not actively included (National negotiation)	Limited. Mainly governmental parties. Businesses and international (Germany, Belgium and EC) not included
Planning process	No existence of a formal transport planning system. Planning was based on County plans and detailed plans for stations	No existence of a formal planning system for transport corridors. Panning had to be based on SCM. Local implementation still to be done via detailed rail planning	Specific national program, linking up with the existing Planning, Programming Budgeting process for infrastructure. Regional and local implementation still to be done via land-use plans

4 Discussion and Conclusion: Toward a Programmatic Approach

Our analysis (Table 1) shows that in all three cases, there are many institutions at various levels that need to collaborate in the planning of corridors. However, we see imbalances in power between institutions creating barriers for effective planning and decisions. The many dimensions of planning in the cases does not align with current practices of corridor development, as they are often performed on a project base, neglecting the multiplicity of corridors, as an integrated network of nodes and infrastructure [4, 10]. This indicates a need for flexible planning systems that accommodate the challenges but also capture the potentials of planning at corridor level [7].

Our findings suggest the need for rethinking existing practice of large-scale infrastructure project planning, because of the limited added value at both the local and corridor/network level (resulting in missed opportunities and politicization). The cases indicate that a strategic programmatic approach could align local (land use) needs, individual projects and setting overall goals for a corridor and network. This implies developing and applying multi-level governance frameworks with leadership, early and on-going stakeholder involvement, and joint platforms for monitoring and learning.

References

1. Arts, J., Leendertse, W., Tillema T.: Road infrastructure: planning, impact and management. In: Vickerman, R. (ed.) International Encyclopedia of Transportation, pp. 360–372. Elsevier, UK (2021)
2. Bertolini, L., le Clercq, F., Kapoen, L.: Sustainable accessibility: a conceptual framework to integrate transport and land use plan-making. Two test-applications in the Netherlands and a reflection on the way forward. Transp. Policy **12**(3), 207–220 (2005)
3. Witte, P.A.: The Corridor Chronicles - Integrated perspectives on European transport corridor development. Utrecht University (2014)
4. Faith-Ell, C., Kalle, H., Arts, J.: Connecting the dots: rethinking large-scale corridor infrastructure planning. In: 8th Transport Research Arena TRA 2020, Helsinki, Finland (2020)
5. Heeres, N., Tillema, T., Arts, J.: Integration in Dutch planning of motorways: from "line" towards "area-oriented" approaches. Transp. Policy **24**, 148–158 (2012)
6. Arts, J., Hanekamp, T., Linssen, R., Snippe, J.: Benchmarking integrated infrastructure planning across Europe. Transp. Res. Procedia **14**, 303–312 (2016)
7. Vedder, K.: Dealing with infrastructure multiplicity – exploring institutional arrangements for corridor planning. University of Groningen, Groningen (2022)
8. Verhulst, S.: Sustainable Topcorridors – institutional arrangements for sustainable corridor development. University of Groningen, Groningen (2022)
9. Heeres, N.: Towards area-oriented approaches in infrastructure planning - development of national highway networks in a local spatial context. University of Groningen, Groningen (2017)
10. de Vries, J., Priemus, H.: Megacorridors in north-west Europe: issues for transnational spatial governance. J. Transp. Geogr. **11**(3), 225–233 (2003)
11. Raskeyn, C., Arts, J., Hanekamp, T., van der Werf, S.: Transitioning towards area-oriented approaches in transport infrastructure planning. In: 10th Transport Research Arena 2024, Dublin (forthcoming)