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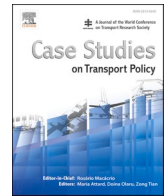
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Building transformative capacity towards active sustainable transport in urban areas – Experiences from local actions in Finland

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ABSTRACT

Recent research has recognised cycling and walking (active transport) as substantial elements contributing to sustainable mobility and public health challenges. There is less knowledge available on the integrated contributions of local-level governance processes and practical implementation of active transport promotion activities. To illustrate comprehensively the contributions of local-level activities, we defined a framework presenting transformative capacity towards active sustainable transport. The framework presents the essential elements and criteria in assessing the level of contributions towards active and sustainable mobility. Previous literature and a case study in six Finnish municipalities comprising interviews and documentary analysis were our primary research data. The Finnish experience shows that local actors can have different, yet successful, approaches in building transformative capacity towards active and sustainable transport.

1. Introduction

In recent decades, local actions in support of active transport (i.e., cycling and walking) have been recognised as one of the primary elements supporting the transition towards sustainable mobility in urban areas (e.g., Banister, 2008, European Commission, 2013; 2020). Active transport is also a means to counteract the decrease in physical activity plaguing Western populations and its consequent public health challenges (Götschi et al., 2015). In the academic literature, the most discussed themes supporting active modes have been investments in new cycling and walking infrastructure such as lanes, trails, cycle parking and their impacts (e.g., Heinen & Buehler, 2019, Mölenberg et al., 2019, Panter et al., 2019). Also, the impacts of actions supporting commuter travel by active modes (e.g., Stewart et al., 2014, Kelly et al., 2020), integrative public transport and active travel modes as a sustainable alternative to the car (e.g. Ton et al., 2019, Bruzzone et al., 2021, Cobbold et al., 2022), bike sharing or renting initiatives and adjustments or reallocations of urban space have gained interest (Scheepers, 2010). Different types of information-sharing instruments (campaigns and events), economic instruments (subsidies, reward systems, penalties)

and piloting or demonstrating of a new service or equipment have often been included as part of the activities. Cycling safety is a topic that has received wide interest in transport research for decades, but rather as a part of wider transport safety (e.g., DiGioia et al., 2017) or societal cost (Welsh et al., 2020) discussions than as an element of sustainable urban mobility discussions.

Many of the above actions and measures towards sustainable mobility in urban areas are already well known, and many of those have been implemented in different contexts with varying degrees of success. The context of active transport is, however, very complex (see e.g., Götschi et al., 2017), and potential impacts of activities may or may not occur through various paths, interlinkages and combined influences of activities and actors, which makes the implementation and impact assessment of activities challenging. Due to this, the impacts and implications of local activities supporting active modes have been assessed mostly on a project level if at all. Comprehensive analysis of the integrated contributions of governance processes and practical implementation of successful active transport activities has received less attention.

Further, as argued by Banister (2008) more than a decade ago,

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effective implementation of sustainable mobility requires the engagement of key stakeholders, so that they can understand the reasoning behind different actions and measures and support their introduction. In the more recent literature on sustainability transitions, [Avelino & Wittmayer \(2016\)](#) and [Fischer & Newig \(2016\)](#) argue that responsibilities of actors and agency in sustainability transitions are not that well understood. Furthermore, [Williams et al. \(2019\)](#) suggest that even various institutional policy-making practices (such as funding procedures for experiments) may greatly affect local transport conditions where sustainable travel practices ought to occur.

In this paper, we aim to expand the discussion on the contribution of active transport activities as a part of sustainable urban mobility transitions to the dimensions of local decision-making, implementation and impact assessment processes and contributing actors. We do this by identifying and applying a criteria framework for demonstrating local transformative capacity towards sustainable, active transport (walking and cycling) in Finland. The framework is based on the Urban Transformation Capacity (UTC) framework by [Wolfram \(2016\)](#) and [Castán Broto et al. \(2019\)](#). The UTC provides us with a tool for analysing the ability of sustainability initiatives and related processes and institutions to drive (radical) change in urban areas towards more sustainable futures in a comprehensive manner. Our approach builds on the UTC framework by elaborating the criteria to fit for the purpose of sustainable mobility and active transport promotion in particular. Further, we emphasise the delivery and assessment of the results and impacts of the initiatives, the type of criteria which the UTC framework is lacking ([Wolfram, 2016](#), [Ziervogel, 2018](#)).

Our approach contributes to meeting the need for knowledge in gaining a systemic view of the impact mechanisms of sustainable mobility initiatives, in our case of active transport in particular, driving transition towards more sustainable futures in urban areas. More specifically, we address the topic through the following research questions:

1. What are the key elements that build transformative capacity towards active and sustainable transport in the local context?
2. Who are the key actors involved and what are their roles?
3. How have Finnish municipalities demonstrated transformative capacity building in recent years, and what have been the success factors?

2. Theoretical background

2.1. Local level actions supporting transition towards active and sustainable transport

The present mobility paradigm, emphasising speed and efficiency as the main indicators for development and growth, has long traditions and strong path dependency within the European transport policy and mobility culture. The discussion on the sustainability of European transport systems has occupied the EU-level and national political agendas (e.g., [European Commission, 2011; 2013; 2020](#)) and scientific discussion (e.g., [Banister, 2008](#), [Geels, 2012](#)) for two decades, but the achievements have been modest. The Transport and Environment Reporting Mechanism (TERM) of the European Environmental Agency stated in 2019 ([EEA, 2019](#)) that: "Current efforts to limit the sector's environmental and climate impacts in Europe are not sufficient to meet the EU's long-term climate and environmental policy objectives."

Only quite recently, as stated also in the Sustainable and Smart Mobility Strategy of the [European Commission \(2020\)](#), have the transport sector stakeholders begun to understand the relevance of local actions supporting active transport as important means towards a new, more sustainable, more equitable and healthier mobility paradigm. The present mobility paradigm underlines speed and efficiency aims, and also the scientific literature on active modes has served these objectives. Cycling safety, for example, is a highly investigated topic (e.g., [Vanparijs et al., 2015](#), [DiGioia et al., 2017](#)), in which the focus has been on

improving the cycling environment and assessing the cost of incidents to society, without questioning the dominance of motorised vehicles. It is, however, crucial for any enquiry into active and sustainable transport to recognise the various power struggles and tensions resulting from the private-car-dominated transport system ([Lee, 2016](#)).

During the past decade, local cycling and walking activities have gained more attention from national and local public stakeholders as a part of Mobility Management initiatives that emphasise information sharing, knowledge transfer, competence building and other means of transportation demand management ([EPOMM, 2020](#)). Also, topics such as the impacts of actions supporting commuter travel by active modes (e.g., [Stewart et al., 2014](#)), bike sharing or renting initiatives, adjustments or reallocations of urban space ([Scheepers, 2010](#)) and piloting or demonstrating a new service or equipment have often been associated with mobility management initiatives. These initiatives, commonly referred to as soft measures, aim to alter the way people perceive travel alternatives as opposed to physically altering the options themselves ([Headicar, 2009](#)), and hence present the first signs towards a renewal of the present mobility culture. However, mobility management measures have not been recognised and systematically implemented in the development of sustainability transitions, leaving individual initiatives and their evaluation underdeveloped and transformative potential unfulfilled ([Kepaptsoglou et al., 2012](#), [Hiselius & Rosqvist, 2016](#)).

As regards cycling, the recent scientific literature (see e.g., [Vaismaa, 2014](#), [Nielsen & Skov-Petersen, 2018](#), [Hong et al., 2020](#), [Félix et al., 2020](#)) highlights the considerable impact of cycling infrastructure on cycling volumes in municipalities. High-quality main routes from residential areas to centres and workplace areas seem of special importance. Also, the costs and benefits and modal implications of new cycling and walking infrastructure has been widely investigated (e.g., [Brand et al., 2014](#), [Van Goeverden et al., 2015](#), [Heinen & Buehler, 2019](#), [Pritchard et al., 2019](#)). Cycling to work as an embodied experience has been explored, for example, by [Rerat \(2019\)](#) and [Petrunoff et al. \(2016\)](#).

The rapid growth of bike sharing in the past fifteen years is also reflected in the large number of different publications on the topic. According to the review article of [Ricci \(2015\)](#), the evidence presented in the literature focuses on three main aspects of bike sharing: (1) users and use characteristics; (2) direct and indirect impacts associated with bike sharing schemes, such as travel attitudes and behaviours, effects on multi-modality and intermodality, environmental, health and economic impacts; (3) issues around implementation and operation of bike sharing schemes. Relating to the third point, [Shen et al. \(2018\)](#), for example, have explored the impacts of fleet size, built environment and weather conditions on the usage of dockless bike-sharing services, [Du et al. \(2019\)](#) and [Maas et al. \(2021\)](#) have assessed the influence of spatial and temporal factors on the demand for shared bicycles.

Apart from the literature on activities promoting cycling or walking, there is also a growing field of literature considering the predictors or determinants of active mode choices (e.g. [Ton et al., 2020](#), [Badland et al., 2013](#), [Bopp et al., 2013](#)). Also multimodal sustainable travel chains, e.g. combining public transport with bike sharing systems, to support sustainable mobility transitions and wellbeing has been of interest (e.g. [Bruzzone et al., 2021](#), [Ton et al., 2019](#), [Cobbold et al., 2022](#)).

Further, there is a vast amount of literature on the implications of behavioural interventions for increasing the use of active modes within the field of health sciences ([Bird et al., 2013](#), [Arnott et al., 2014](#), [Foster et al., 2018](#), [Kelly et al., 2020](#)). These present a relevant but separate field of active mode promotion that has not been widely integrated into the development processes towards active and sustainable urban mobility.

The emerging interest in walking in policies and transport-related literature in recent years shows a positive development towards new values and a new mobility paradigm. Examples of topics of interest are walking as a practice encouraging social interaction ([Middleton, 2018](#)) and walking indicators contributing to goals that are aligned with public health and transport policies ([Merom et al., 2018](#)). The mobility

practices of young adults (Porskamp et al., 2019) and the interplay of multiple factors influencing active travel among older adults (Laatikainen et al., 2019), as well as applying social theories to promoting active travel in working aged adults (Guell et al., 2017, Spotswood et al., 2015), have similarly received attention. School commutes or the role school choices play in active travel have also been the focus of some studies (Nikitas et al., 2019, Sener et al., 2019).

Active transport is an essential element in sustainable urban developments, but as the reviewed literature shows, the context in which active transport stakeholders operate is a very complex one. Götschi et al. (2017) provided one of the first frameworks systematically combining structural features, behavioural determinants and a large number of other factors to illustrate active travel behaviour. The framework also shows the lack of knowledge on the complexities and processes within the support and governance of active transport as an element of sustainable urban developments.

Local actors have been active around Europe (see e.g., EPOMM, 2020) in developing and implementing active transport activities, but due to the complexity of the context, there is little knowledge on either the system level impacts of such activities or on the governance and learning processes that have supported the developments (Winters et al., 2017). Our further work in this area thus generates new insights into the elements and criteria that have a crucial role in building potential for transformation towards active, sustainable transport at the (local) transport system level.

2.2. Transformative capacity for active sustainable transport

Nowadays, urban areas are considered prime sites of demonstration for sustainability transition. This simultaneously poses significant governance challenges due to the structural changes (Simon and Leck, 2015) needed, for example for scaling up the demonstrated actions. To tackle the challenge, Wolfram (2016) and Castán Broto et al. (2019, 450) have defined the notion of transformative capacity in the urban context as the ability of an urban system (inclusive of physical and human dimensions) to reconfigure and move towards a new and more sustainable state. For urban governance, it is considered to serve as an indicator or predictor of the ability of a dynamic constellation of public and private actors to steer urban development in a radically different direction from historical pathways.

Wolfram (2016) identifies a set of components determining the extent of transformative capacity in urban areas that enable or drive systemic change towards sustainability. These can be grouped in three categories: Agency and forms of interaction, development processes, and relational dimensions. Each category can be split further into criteria as presented in Table 1.

According to Wilhelmer et al. (2018), there is consensus about the important role that local governments can play in advancing urban sustainability through policy and in creating the institutional conditions to foster social and technical innovations, but considerably less understanding of whether the local level (often collaborative) initiatives actually deliver transformative capacity showcased by the criteria. It

Table 1
Elements of Urban Transformative Capacity, UTC (Wolfram 2016).

Agency and forms of interaction	Development processes	Relational dimensions
Inclusive, multiform urban governance	System awareness	Working across human agency
Transformative leadership	Foresight	Working across levels and scales
Empowered communities	Practical experimentation Innovation embedding Reflexivity and social learning	

seems that empirical understanding of the extent to which municipalities demonstrate the sets of skills, resources and interactions to deliver transformative capacity is lacking (Wolfram, 2019, Ziervogel, 2018). Further development needs, e.g., the evaluation processes of the initiatives, and their systematic structure and up-to-datedness have not received much attention either.

In local transitions, the municipality is only one of many actors. Governance of sustainability transitions is not a top-down process, and it is indispensable to understand the dynamic relations between actors operating at various societal sectors and levels of agency (Farla et al., 2012, Avelino & Wittmayer, 2016, Fischer & Newig, 2016). Hence, network governance is an important part of contemporary sustainability transitions shaping the context-specific local processes and outcomes (Khan, 2013). In the sustainable mobility context, the role of the public sector is often to act as an enabler (e.g., by providing infrastructure or a regulatory framework) for the modal shift from car to active modes. Commercial actors provide services to the public (e.g., city bikes), different communities use the services, and the third sector promotes the service uptake and use through its own actions (e.g., information and knowledge sharing, research, best practices). Harms et al. (2016) and Gössling (2013) present examples from the Netherlands and Denmark on the key elements of cycling policies supporting urban transport transformation. Cole et al. (2010) have identified barriers and enablers for active transport in Australia based on perceptions of representatives of public, private, and community sector institutions.

Local initiatives supported by municipalities and governmental grants have provided the means to promote active modes also in Finland. The challenge of demonstrating the transformative capacity of urban areas is relevant also in this context, although in a slightly different form. Active transport initiatives are linked to many operational sectors of municipalities such as network construction, traffic management, recreation and sports, public health and education. Consequently, in many municipalities active transport promotion has had no organisational home base and the responsibility has scattered across the sectors. This has hampered the intersectoral dialogue and collaboration which are essential for transformational change in complex systems. The ability to exchange knowledge (Guell et al., 2017) and understand shared skills (Petrunoff et al., 2017) has been identified as a key factor in facilitating collaboration.

Our approach contributes to meeting the above knowledge needs by further elaborating the urban transformative capacity framework components (Wolfram, 2016) and analysing local level developments, activities and deliveries with an in-depth approach as opposed to project database analysis (Castán Broto et al., 2019). We focus on selected Finnish municipalities and the evolution of their governance processes in promoting active transport (cycling and walking) during the past decade. Further, we assess the impacts and implications of local initiatives in recent years and the delivery of strategies and policy statements.

3. The Finnish context

Finland's first Walking and Cycling Promotion Programme was published in 2018 by the Ministry of Transport and Communications. The programme aims to improve the conditions for walking and cycling in Finnish municipalities and to support the reduction of greenhouse gas emissions from transport and promote public health in Finland by presenting ten key action areas. The programme complements the first National Strategy for Walking and Cycling (2011) and related Action Plan (2012). The ambitious target of the programme is a 30% increase in the number of walking and cycling trips by 2030 (compared to 2018 level). The target is derived from the national Energy and Climate strategy (2016). The 30% increase means around 450 million additional walking and cycling trips in 2030, and a 35–38% modal share for walking and cycling instead of the current 30%. The programme indicates the frame and basis for municipalities and other national actors to build their future activities upon.

In addition to the state administration (ministries, agencies, regional centres), municipalities are very important actors in Finland in implementing walking and cycling measures in collaboration with local businesses. Furthermore, the public and various non-profit and expert organisations have a strong influence at the local level. Traditionally, walking and cycling promotion at the local and regional level have focused on road safety and infrastructure measures, and only during the past five to ten years has the need for more comprehensive development plans and activities been acknowledged.

According to the survey of Finnish municipalities ($n = 144$), 25% of Finnish municipalities had a cycling promotion programme, strategy or similar in 2018 (Turunen, 2019). Compared to 2010, the share has more than doubled. Cycling promotion programmes have advanced cycling-related policy decisions and increased human resources and cycling investments in the municipalities. Of the Finnish municipalities, 22% have a working group on cycling. User surveys on cycling conditions are conducted by a quarter of the municipalities, and biking volumes and the modal share of bicycle traffic are followed by one-fifth (2018). Of the respondents, 52% considered that cycling volumes have remained the same or increased compared to 2010. The highest increase has been identified in the six largest municipalities (over 150 000 inhabitants). The municipality respondents considered a high quality, well connected and well maintained cycling network along with cycling safety as the key issues in developing cycling conditions (Turunen, 2019). Walking is often promoted as a part of cycling (e.g., City of Turku, 2010) or city centre development programmes (e.g., City of Tampere, 2018). Programmes promoting only walking are scarce in Finland. One example is the Helsinki Metropolitan area walking strategy published in 2018 (HRT, 2018). Further, the municipality of Helsinki is currently preparing a walking programme.

During the past decade, the main responsible actors in funding and implementing walking and cycling measures have been municipalities and regional authorities. As a supporting instrument, in 2010–2019 the government funded around 110 local walking and cycling projects through a national Mobility Management (MM) programme, MM government grants, and walking and cycling programme. The municipalities have considered this funding (around 0.9 M€/year) as a very important initiator for local walking and especially cycling promotion and actor collaboration, despite its modest financial contribution. The topics of the funded projects fall under four themes: (1) campaigns, marketing, communication and events; (2) local strategies and action plans; (3) pilot projects in organisations (e.g., on using e-bikes for commuting); and (4) new service development (Liikennevirasto, 2018). The themes put forward the fundamental MM message that significant change in mobility choices cannot be achieved simply by building new pedestrian and cycling routes. In addition, there is a need for influencing attitudes, raising awareness and improving the quality of existing road networks, urban form and service network that promote walking and cycling. A recent, very positive sign for future developments in Finland is the considerable ten-fold increase in cycling infrastructure funding, launched by the government in 2020 (FG, 2019).

According to the national consumer survey on biking (2018), 13% of population in Finland cycle year-round, 64% during the snow-free period, and 23% do not cycle at all. The main reasons for using a bicycle are ease of travel, benefits to health, and recreation and sports. The respondents perceived shorter distances to the workplace, shops and services, better cycling infrastructure and parking facilities, owning a better bicycle and the possibility to transport larger items and groceries on a bicycle as factors that could increase their cycling.

4. Methodology

4.1. The case study

Our methodology is based on a tradition of qualitative case study research (Yin, 2014) and focuses on walking and cycling promotion in

Finland. The six municipalities we have selected as cases for our analysis have shown interest and progress in developing conditions for, and a culture towards, active modes during the past decade. Oulu, in the northern part of the country, and Joensuu in the east have been the forerunners in improving cycling infrastructure and maintenance. The capital city, Helsinki, in the south has also emphasised infrastructure developments and introduced the very popular city bike system. Jyväskylä, in central Finland, has been the most active in long-term marketing, communication and cycling experimentations due to the active local level stakeholder collaboration. Turku and Tampere have also shown potential and interest in active transport developments, albeit at a lower level. The modal shares of walking and cycling in the municipalities based on the latest national transport survey (Traficom, 2018) are presented in Table 2.

4.2. Research data

We employed a mixed method approach in our research data collection by gathering empirical, newly collected interview data and documentary data, including written documents in electronic form. The research data was collected in 2020 and consists of three sets of information:

1. Ten interviews of experts with a background in active transport promotion
2. Reports on walking and cycling projects funded by the national MM programme, governmental MM grants or governmental walking and cycling programme during the 2010–2019 and implemented in any of the case municipalities
3. Local strategies, promotion programmes and additional policy documents relating to active modes and available on the sustainable mobility and cycling and walking web pages of the five case municipalities during the time period 2010–2020.

4.2.1. Interviews

We applied a semi-structured interview protocol to ensure flexibility and obtain in-depth data on the subject (Yin, 2014). All the interviews followed a similar pattern and employed the same template for questions. The questions in the interviews covered: a) Successful cycling and walking initiatives in the municipality during the past decade and the reasons for success; 2) Obstacles for implementing the planned actions; 3) Processes and practices within the municipality and with stakeholders in promoting active transport; 4) The role of the three governmental programmes in promoting active modes in the municipality during the past decade; and 5) The future of active transport in Finland and in the region, opportunities and threats.

Purposive, iterative sampling (Drisko and Maschi, 2015) was applied to select the interviewees. The identification of potential interviewees started by visiting the web pages of case municipalities and related stakeholders focusing on walking and cycling promotion, and familiarising ourselves with the reports of projects funded under the three

Table 2
Modal shares in the case municipalities.

Municipality	Population (2019)	Modal share in 2016 (% of trips)				
		Walking	Cycling	Public transport	Car	Other
Helsinki	653 835	30	7	26	35	2
Joensuu	76 850	24	16	3	55	2
Jyväskylä*	142 400	24	15	5	53	2
Oulu	205 489	21	17	4	57	2
Tampere	238 140	31	7	12	48	2
Turku	192 962	29	10	10	49	2

*Modal shares in 2019.

governmental programmes. To ensure the representativeness, richness and adequacy of data, the interviewees were chosen among municipality officials and other stakeholders from the six case areas based on their active involvement in the projects funded under the above-mentioned three national programmes and in the Mobility Management network of Finland. We also used our own existing contacts. Table 3 presents the backgrounds of the selected interviewees in detail.

The interviews were conducted as face-to-face interviews or online through videoconferencing. Two interviewers were present in all the interviews except one, which had only one interviewer. The length of the interviews ranged from 60 to 90 min. The interviews were conducted in Finnish, recorded and transcribed.

4.2.2. Project reports and policy documents

Dataset 2 consists of altogether 50 project reports, six to 16 per case municipality. If the actual report was not available, we used the executive summary instead. All of the case municipalities and their supporting local advisory organisations had received funding from one or more of the governmental programmes during the past 10 years, individually or with collaborators. The number of funded projects from the past 10-year period varied from six to 16 per case municipality. The subject matters of the projects fall under four themes: 1) Strategies, policies and collaboration for active transport; 2) Communication, marketing and branding; 3) Active mode experiments; and 4) Commuting with active modes and Workplace Travel Planning (WTP). Themes 3) and 4) overlap somewhat; thus in some cases the project could be placed under either of them. Most of the abstracts and reports on the walking and cycling projects were available on the programmes' web pages.

Dataset 3 on policy documents consists of 33 documents, three to eight per case municipality. In addition, a strategy document on walking promotion from a public transport agency was included in the study. The material was accessed through the web pages of the six case municipalities and the public transport agency. The dataset included electric documents focusing on city development and climate strategies, plans and agreements, cycling, and cycling and walking promotion plans, programmes and strategies.

All the documentary material of datasets 2 and 3 was accessed in Finnish and is available from the authors upon request.

4.3. Data coding and analysis

For the coding and analysis of the interviews, we used a directed approach of qualitative content analysis, which assumes that a theory or research findings are used as guidance for initial coding (Hsieh & Shannon, 2005). In our case, we used the concept of Urban Transformative Capacity (UTC) (Wolfram, 2016, Castán Broto et al., 2019) as the starting point for our analysis. We began by taking the ten UTC elements as initial coding categories. At first, we used also the criteria for each category determined by Castán Broto et al. (2019) as second-level codes, but soon realised that the categorisation needed adjustment for our purposes. We thus elaborated the categorisation iteratively

Table 3 Interviewed stakeholders.

Stakeholder	Number of interviews
Municipality, transport planning and construction	2
Municipality, sustainable mobility activities	3
Regional advisory organisation promoting sustainable development	1
Community-based local association promoting sustainable development	1
Public Transport Authority	1
Private company specialised in sustainable mobility services	1 (2 representatives)
Network of Finnish cycling municipalities	1

throughout the analysis of the interviews and ended up with seven key elements and supplementing criteria, which describes the topics on which we found evidence in the interviews. Table 4 shows the number of codes identified for each of the elements. The coding was done with NVIVO qualitative data analysis software. The coded interview data was then organised using an Excel spreadsheet.

For the coding and analysis of the documentary material of datasets 2 and 3, we used the categorisation elaborated during the analysis of the interview transcripts, including seven key elements and supplementing criteria for assessing local transformative capacity towards sustainable, active transport (Table 4). The analysis comprised screening of the project reports and policy documents, reflecting the document contents and actors involved against the seven elements and the criteria of the categorisation, and collecting the main deliveries under each criterion, following the analysis of the interviews. As previously, the coding was done with NVIVO qualitative data analysis software and the coded data was then organised using an Excel spreadsheet.

5. Results

5.1. Key elements and a framework for building local transformative capacity towards active sustainable transport

The first result of our analysis is the framework for assessing local transformative capacity towards active, sustainable transport (Table 4). The seven framework elements and complementing criteria describe the topics, consideration of which is essential when assessing the level of

Table 4 The framework for assessing local transformative capacity towards active, sustainable transport. The figures in the left column show the number of codes identified for each of the elements from the interviews.

Element	Criteria
Multiform governance (31)	Transformative leadership driving the change Commitment of local government to promote active modes Collaboration of various stakeholders in building support to active modes Intermediaries and hybrid actors positioned between the stakeholders to build support Participation of the public in planning or decision-making processes, recognising and addressing different social needs
System awareness (50)	Understanding and monitoring of the state of the transport system Recognition of path dependencies, systemic barriers that need to be overcome
Future orientation (11)	Building collective vision for change, strategy or future pathways
Experimentation (61)	Implementing new solutions or ideas that seek to challenge the established policies, technologies or social practices
Delivering the impacts and implications of the experiments (39)	Assessment of the impacts, implications and social learning delivered by the experiments Availability of methods, criteria and processes for assessing the impacts
Embedding new solutions, best practices (59)	Sharing lessons learned, knowledge, expertise and offering direct advice or support Replicating good practices in different settings, embedding changes in institutional settings New regulation, guidance or recommendations established as a result of a good experiment
Working and learning across agencies and scales (31)	Activities of collaboration and capacity development at local level: involving various and multiple stakeholders in knowledge production processes, social learning Activities of collaboration and capacity development across geographical or political-administrative levels, social learning

local transformative capacity, that is the progress towards active sustainable transport. The framework is applicable to local developments in general or project assessments, but is at its best with multiple input data, as we show in the following. Some of the elements, such as system awareness, experimentation and embedding new solutions, are equal to the original UTC framework by Wolfram (2016). Delivering the impacts and implications is a new element, requested by the previous literature (e.g., Wilherlmer et al. 2018) and demonstrating the outcomes achieved by local-level activities. The remaining elements have been compiled by merging components from the original frame to better fit the purposes of assessing local-level transformative capacity towards active and sustainable transport.

5.2. Using the framework to assess the transformative capacity towards active sustainable transport in Finnish municipalities

The following results are based on three sets of data: interviews [I], project reports [R] and municipality policy documents [P], explained in the previous section. We present the key results from each dataset under the seven elements of the framework, complemented with selected quotes from the interviews. From the interviews, we have analysed what kind of activities, developments and collaboration have taken place in the case municipalities. Analysis of project and policy documents displays how their results and deliveries have performed against the framework criteria and hence strengthened the transformative capacity towards active, sustainable transport in the Finnish municipalities.

5.2.1. Multifunctional governance

Governance processes supporting active modes have manifested themselves in multiple forms in our case municipalities. In the two forerunner cycling municipalities in Finland, Oulu and Joensuu, the visionary leadership of the municipality transport engineer has played a crucial role in developing the cycling network since the 1970 s and convincing the city council of the importance of construction investments and human resources for cycling promotion, resulting in concrete outputs. Further support from local non-profit organisations has created a positive trend of cycling initiatives and enabled the emergence of cycling culture, which the present municipality strategy also highlights. [I, P].

Another type of successful governance approach comes from Jyväskylä, where two very active local non-profit associations have been the key initiators for promoting active modes. Here again, the positive developments originate from the long-term persistent work of individual (s) possessing transformative leadership. The importance of various stakeholders is also acknowledged in policy documents and policy implementation, as nowadays non-profit actors and the municipality work together on most of the decisions and undertakings on active modes. In addition, community empowerment has been strong in Jyväskylä. Participation of the public has been a core element of the activities of local non-profit stakeholders from the beginning, and has been the strength and key success of these activities. [I, R, P].

“Almost all cycling activity suggestions and ready-made ideas have come from the two collaborating local non-profit stakeholders organising a lot of campaigning and experimentation which has initiated cargo bike shops and a lot of concrete stuff. And they have made an impact. The promotion of cycling has been such an ambition in Jyväskylä. The triangle of non-profit stakeholders and the municipality have formed such a trinity there.” [Representative of the Network of Finnish cycling municipalities].

Helsinki has followed the example of Oulu and Joensuu, after the decision of local councils to start developing Helsinki as a cycling city. A development plan and a programme for cycling, an annual budget for cycling infrastructure, and the position of cycling coordinator show the level of commitment. The regional public transport authority (Helsinki Regional Transport, HRT) has supported the development with its own actions, for example, providing user interface for the very successful city bikes in Helsinki region. [I].

Also, in Tampere and Turku, promotion of active modes have started to gain foothold in the local transport policy discourse, especially in the context of climate and city strategies, but the commitment and consequent resources have not reached the level of forerunner municipalities. Newly established positions of sustainable mobility coordinators supporting stakeholder engagement and community empowerment are good examples of increased support for active modes. [I, P].

On a general level, all municipalities have involved the public in strategy or planning processes related to active modes, or engaged citizen groups such as families and children, the elderly or sports clubs in the experiments. [R].

5.2.2. System awareness

System awareness and path dependencies are well presented in the majority of local cycling and walking promotion programmes and plans. For example, the need to either develop metrics or monitor consistently the state of active transport modes is clearly emphasised. Local promotion programmes have identified the slow progress of infrastructure development as the main challenge, which constrains the increase of cycling and walking volumes. As regards transport planning, Helsinki, Oulu and Joensuu consider and plan active modes equally to other modes. All the case municipalities follow the cycling (and some also walking) flows with automated calculators and carry out user surveys and active transport barometers, and this data is used in strategic planning and development plans. [R, I].

The recent activities of the municipalities both reinforce and diminish path dependencies. The pioneer municipalities in advancing the cycling culture in Finland, Oulu and Joensuu, have built their leadership on the basis of long-term cycle lane network development, construction and good maintenance. The interviewees emphasise that even small advancements are important since decision makers need examples of good practices before making further decisions. In Oulu, the municipality budget for the cycling infrastructure network has increased annually with the cost of street construction. The annual implementation plan ensures deployment. [I].

“We have invested quite a lot in cycling and walking in recent years, and it has been widely discussed in the media. This caused reactions among the car-oriented population, who experienced that their mode of transport was not developed at all. We sort of forgot to communicate that if, for example, some car drivers switched to cycling, it would not worsen the situation of the population who are dependent on their cars, but on the contrary, it would relieve traffic jams.” [Municipality civil servant].

Workplace Travel Planning (WTP) activities have been implemented during the past decade in all of the case municipalities. According to the experiments in the Helsinki, Tampere and Turku areas, many organisations have had obstacles to overcome before the WTP activities could have a wider impact on commuting and other work-related travel. It seems that many employers are afraid of bothering employees with surveys and experiments on daily travel. The responsibility for commuting issues is often dispersed across departments; there is seldom a responsible person nominated for promoting WTP and organising the process systematically, and consequently funding for WTP is neither reserved nor allocated. In the absence of such a person, activities (if implemented) may receive very little attention and neither monitoring nor further actions will take place. Furthermore, traditional parking policy (i.e., companies offering a free parking place for employees) may act as a barrier to active mode and car sharing scale-up. [I].

5.2.3. Future orientation

Future orientation is part of the municipalities' activities, primarily through local walking and cycling promotion plans or strategies, which all our case municipalities issued recently. The linkages to municipality strategies and climate strategies and plans have strengthened in recent years. Helsinki's cycling promotion programme was first published in 2014 and updated in 2020. Since then, other municipalities have followed and developed visions, promotion programmes or plans targeting

either walking, cycling or both. Only the Joensuu sustainable mobility development plan 2024 has received funding from a governmental programme. The forerunner cycling municipalities show strong, long-term commitment to developing a cycling infrastructure also in the future. Based on the interviews, climate change mitigation and employees' health issues will be given more emphasis in organisations' decisions on travel planning in the future. The same orientation is likely also among individuals. [I, R, P].

"We will probably continue investing primarily in infrastructure and measures that are visible to users right away. We are often asked to be involved in various intelligent transport projects, and it is always up to us to decide whether we will spend time on future robot car solutions or similar that may or may not materialise in 15 years, or will we make cycling infrastructure plans this year and implement a new stretch next year. In a way, they are relatively easy prioritisations." [Municipality civil servant].

5.2.4. Experimentation

Our interviews showed that there are clear differences in the experimental activities carried out in the case municipalities over the past decade. Oulu and Joensuu, as mentioned earlier, have focused on small, visible improvements in cycling infrastructure and parking to highlight the impact. Campaigning and branding has supported these activities, and some WTP projects have been carried out. HRT has completed a large portfolio of experiments on cycling as an equal means for commuting in the Helsinki region. This has included projects on, for example, parking, cycle-train-cycle travel chains, WTPs, infrastructure developments and shared electric scooters. Jyväskylä has had a very strong culture of experimentation, campaigning and information sharing since 2006. Cycling experiments, commuting and work-related travel, cargo bike rentals, and communication and information-sharing activities have been initiated mostly by local non-profit actors. The municipality organisation came along later with a slightly different project palette, for example on WTP. In Tampere, the experiments have focused mostly on electric bike experiments at workplaces, day care, WTP and complementing information sharing. In Turku, the activities have been more dispersed and covered, for example, cargo bikes (city logistics), city bikes, new electric mobility devices, and cycling infrastructure winter maintenance. Collaboration with European partners has been somewhat active. [I, R].

"There are a lot of people who were about to buy an electric bike, and who saw the opportunity to test whether it really fits their purposes by joining the experiment. Then, they bought it. We have also received a lot of feedback from the experimenters, saying, 'I never thought I could start commuting by bicycle, but through the experiment I discovered a cyclist within myself that I had not imagined.'" [Municipality civil servant].

5.2.5. Delivering the impacts

According to the interviewees, in order to deliver the message to individual users on the positive environmental, economic and health impacts of biking and walking, constant campaigning, information sharing and media visibility are essential. Even though the main message is often the same, the target groups change. Four of the municipalities have invested in cycling branding, which has brought more visibility to cycling among users of other modes and hence promoted the positive image. [I].

In all of the case municipalities, user experimentation with ordinary and electric bikes has been organised and targeted to commuting and other work-related travel, personal and city logistics, day care, etc. The experiences have been positive, especially in indicating whether or not a bike is a suitable mode for a particular travel purpose. User experiments provide individuals and organisations an opportunity to try something new that can change their views on, for example, the most convenient mode of commuting. A behavioural change of a small group of people can make a difference, as they can potentially work as initiators. [I].

Workplace Travel Planning (WTP) projects supporting cycling have been implemented in public or private organisations in all of the

municipalities. Experiences vary. Very positive results and changes in modal shares towards sustainable modes occurred when the employer had a clear need, motivation and resources for the planning and change in travel patterns. The process also required gradual implementation of several small complementing measures and monitoring their delivery. The municipalities, which have made large investments in cycling infrastructure, have noticed that constant, long-term work also in this field is necessary to get measurable results and make an impact. Modal implications are not always visible, since the individual improvements are often small, but they are relevant, because otherwise the modal shares of active modes would drop. [R, I].

The main shortcoming of government funding for Mobility Management and Walking and Cycling has been a lack of both quantitative and qualitative information on the impacts of the walking and cycling experiments funded. The interviewees and project reports confirmed this. The duration of the projects is often only 12 or 18 months, which was considered too short by all of the interviewees. Based on the few quantitative project outputs, workplace travel planning experiments delivered good experiences and positive impacts. Physical activity of the participants increased, and the experiments had at least a small impact on daily travel patterns towards more sustainable modes for 70–80% of the participants. One main reason for the scarcity of impact assessments seems to be the lack of a systematic framework and process for these assessments within governmental programmes. In absence of such a process, the impacts and implications of the projects are difficult to identify and follow up, which again complicates the application and allocation of further resources and upscaling of project results, creating a risk of fragmented experiments with little societal value. [I, R].

"One should always include the impact assessment as part of the programme projects. It is just that the duration of these projects is often twelve months, and the impact assessment part often receives little attention. We have certain indicators to report, but monitoring the long-term impacts is not included." [Municipality civil servant].

In the majority of local walking and cycling promotion strategies and plans of the case municipalities, the continuous assessment of progress and impacts is clearly stated. [P].

5.2.6. Embedding new solutions, best practices

Both the interviews and project reports revealed that one of the municipalities, Jyväskylä, has been very active in sharing information, knowledge, lessons learned and expertise and organising marketing events. Local non-profit organisations have been the initiators, but later received support and funding also from the municipality. Joensuu and Helsinki Regional Transport have also been active in the above activities, with good results. In Turku and Tampere, the roles and responsibilities of actors supporting active modes are still a bit unclear, and consequently embedding of the best practices has been slower. [I, R].

As regards embedding changes in institutional settings, Oulu and Helsinki have created the position of, and allocated resources for, a cycling coordinator, which has given credibility to actions supporting active modes among other modes of transport. The Helsinki cycling office has become a highly valued and desired place to work among transport professionals. The very successful cargo bike borrowing shop in Jyväskylä has gained a lot of publicity and been nominated as one of the best practices in the European Mobility week, which will potentially increase replication of the practice across Europe. [R, I].

It seems that all the case municipalities have continued some of the good practices identified in individual projects. A good example of new guidance resulting from an experiment is designing and constructing cycling street(s) in Joensuu, even before cycling streets were officially adopted into Finnish legislation. Oulu has been a frontrunner in designing and constructing cycle super highways and sharing knowledge on winter cycling on a global scale. Cycling brand building and marketing in Helsinki and Oulu are also good examples of projects in this field. Further, Helsinki Regional Transport has designed a concept for

awarding a certificate to workplaces with a commitment to sustainable commuting practices. [1].

“We have this Good Workplace to Travel certificate. When the employer has done the state-of-the-art review with the commuter calculator and made a workplace travel plan, then they get the certificate... and the best achievements are rewarded nationwide.” [Representative of public transport authority].

5.2.7. Working and learning across agencies and scales

Our interviews and the project reports showed that all case municipalities have collaborated with multiple local public and private stakeholders in cycling and walking promotion activities and knowledge production processes. Especially in Jyväskylä, but also in Joensuu, the collaboration has been extensive and long-term between local associations in experimenting and information sharing, marketing and organising events. Most of the municipalities have also collaborated with private consultants specialised in products and services promoting sustainable mobility, for example in the contexts of WTPs, experiments or walking and cycling promotion plans.

Three out of six of our case municipalities received funding from the governmental Mobility Management programme for identification of and network building with potential sustainable mobility stakeholders and collaborators. It seems that in Oulu, Joensuu and Helsinki, such networking was carried out successfully without any external funding. Turku has participated actively in European research projects promoting sustainable modes.

All of the municipalities have collaborated with public actors at local, regional and national level in different transport and urban planning activities. The Mobility Management Network of Finland has provided a good platform for collaboration during the past decade. Local walking and cycling promotion programmes, implemented in a cross-sectoral process, here provide examples of success stories. Other examples of capacity development across administrative sectors are physical activity promotion programmes in Helsinki, Turku and Tampere, where transport, education, recreation and health sectors have collaborated to reach a common objective. In the Helsinki region, HRT coordinates park-and-ride cycle park activities, an effort that requires broad collaboration with regional public actors and showcases its intermediary role.

“The main tool to take this [cycling] forward has been the municipality-specific promotion programmes, which can then of course rely on the national promotion programme. But above all, municipalities need their own promotion programmes, which are carried out as cross-administrative processes.” [Representative of the Network of Finnish cycling municipalities].

5.3. Summary of key factors that have facilitated local transformative capacity building

Based on our analysis of the three sets of data using the transformative capacity framework, Table 5 presents the key factors that have built local transformative capacity towards active sustainable transport in the six Finnish case municipalities. The figures in brackets indicate the number of case municipalities in which the factor has been recognisable based our data.

6. Discussion

Our first research question focused on identifying the key elements that build local transformative capacity towards active sustainable transport. By elaborating the Urban Transformative Capacity framework (Wolfram, 2016; Castán Broto et al. 2019) with our research data on

Table 5

Key factors that have built local transformative capacity in the context of active transport in Finland (+); important factors in transformative capacity building but less evident in our data than the key factors (±).

Element	Key factors
Multiform governance	+ Visionary individual(s) driving the change (4)
	+ High-level commitment from the municipality council (3)
	+ Human resources and a budget for development activities (4)
	+ Active stakeholders working constantly to implement the activities/change (3)
	+ Intermediaries supporting the change through their own actions (3)
	+ Knowledge transfer, training with different user groups (youth, the elderly, children, families) (6)
System awareness	+ Continuous monitoring of active mode volumes (6)
	+ Commonly accepted hierarchy of transport modes (walking-cycling – public transport followed by other means) in planning and resource allocation (3)
	+ Long-term development strategies and short-term implementation plans for infrastructure to receive measurable results and make an impact (3)
Future orientation	+ Local development programmes for active modes with regular updates (6)
	+ Climate, health issues among the priorities of organisations applying WTP (2)
Experimentation	+ Long-term focus on and investment in selected themes, allowing the public to experience the change and adjust (3)
	+ Gradual, step-by-step approach to demonstrate the impact of each measure to decision-makers (2)
	+ Collaboration of different stakeholders in experiments, sharing the responsibilities (2)
Delivering the impacts and implications of the experiments	+ Continuous campaigning, information sharing, branding and media visibility, since target groups renew and change (5)
	+ Governmental programmes and grants as a significant funding resource for active mode experiments, but currently lacking process and evaluation criteria for assessing the impacts and scaling up the results. (6)
Embedding new solutions, best practices	+ Clear responsibilities of stakeholders on sharing information, knowledge, lessons learned, expertise and marketing (4)
	+ Position and resources for an active mode coordinator to bring credibility among other modes and support the active mode identity (6)
	± Resources for replication of best practices (e.g., in WTP), not just for developing new solutions (4)
	± Delivering practical guidelines, certificates that are easy to take into use as a result (3)
Working and learning across agencies and scales	+ Clear responsibilities for knowledge production and transfer in collaboration with different stakeholders at local level (4)
	± Projects and processes across administrative sectors at local regional and national levels as tools for knowledge production and social learning (5)

active transport, we arrived at seven elements and complementing criteria (see Table 4). The modified framework presents the essential elements in assessing the level of local transformative capacity towards active sustainable transport. Thus, it complements the findings of Cole et al. (2010), Gössling (2013), Harms et al. (2016) and Moradi & Vagnoni (2018), and provides municipalities and other interested stakeholders with a practical tool to identify and follow the local transformative capacity and contribute to wider sustainability transition.

The framework widens the original UTC approach to cover also the delivery of results and impact assessment process, items that have been identified by the previous literature as a knowledge gap (Wilhelmer et al., 2018, Wolfram, 2019, Ziervogel, 2018). Apart from mere project and policy documents, our data covered a rich material of stakeholder interviews, allowing us to put more emphasis on the delivery of results and impacts, which are often difficult to identify in documentary material. In practical terms, the modified framework presented in this paper can be applied to any municipality having information on the criteria of the proposed seven elements of the local transformative capacity, making the approach generalizable outside Finland.

The second research question asked which key actors are involved in building transformative capacity and what their roles are. Our analysis showed that visionary individuals, working for the municipality or other local organisation, with an ambition to support and promote active modes and having good, often personal contacts, are the key actors for transformative change. Local councils are equally important, since their decisions define the monetary and human resources allocated to the promotion of active modes. However, the active and persistent work of individuals and associations in sharing information, knowledge and experience through campaigning and experimentation is crucial prior to council decisions. Furthermore, since the promotion of active modes touches different organisational sectors of municipalities, such as transport and urban planning, construction, traffic management, recreation and sports, public health and education, collaboration across sectors is decisive in realising mutual benefits. Based on our results, the role of municipality active mode coordinator is important, as the coordinator can act as an intermediary between the municipality sectors, highlighting the pros of active modes and requesting equal resources as for the other modes.

In Finland, the role of national organisations such as transport agencies has been to provide a wider strategic frame for local activities and governmental programme funding for active modes. Our results show a clear shortcoming in the present programme funding process. This is due to the lack of an assessment framework and criteria for project impacts. The current process does not encourage monitoring the results and hence does not provide evidence on the impacts of the projects. This discourages funding organisations from sharing new resources and makes it difficult for stakeholders to get new funding, thus projects often remain short-term experiments with little societal benefits. The lack of systematic assessment and evaluation procedures of government-funded initiatives reflects their rather weak status compared to other measures pursuing sustainable mobility transitions.

At present, a couple of small, private companies and public organisations provide Work Place Travel Planning services in Finland. A notable future challenge here is that the subsidised public organisations have come to the WTP market with the same product that private companies have, which distorts the market. Further, there seems to be a need for simple service packages for employers to buy. However, the governmental programme funding is currently targeted to the municipalities only, private companies offering WTP services do not have the possibility to apply for funding. They can just collaborate with the municipalities, which leaves them with little opportunity for business development.

The third research question sought to clarify how Finnish municipalities have demonstrated transformative capacity building towards active and sustainable transport in recent years. Our analysis shows (see

also Table 5) that four of the municipalities have performed very well, yet with different approaches. In Oulu and Joensuu, there is a long-term, civil-servant-led and systematic emphasis on infrastructure development and investments for active modes. These municipalities have initiated and managed to create a thriving cycling culture, which again has shaped the governance processes emphasising the importance of active mode promotion, experimentation and project implementation. In Jyväskylä, extensive campaigning, information sharing and experimentation efforts of local associations, supported by governmental programme funding, has encouraged also the municipality to work actively towards the increase in active mode shares. In Helsinki again, the driving force behind active mode promotion has been the decision of the municipality council to develop Helsinki as a cycling city, which has initiated several positive actions relating to funding, implementation and hierarchy of active modes among the other transport modes. The regional public transport authority has supported the activities with its own projects and with funding from governmental programmes. In Turku and Tampere, even though a lot of experimentation has taken place, the governance processes and the collaboration and dedication of stakeholders have not reached the level of the other case municipalities. This leaves them behind the other municipalities in the level of local transformative capacity, since active governance is a particularly important prerequisite for the other elements to advance.

Future orientation and system awareness elements of the framework have linkages to multimodal governance. Future orientation manifests itself particularly through local walking and cycling promotion programmes or strategies, which all the municipalities have recently issued. System awareness is linked also to experimentation, delivering the impacts, and embedding the new solutions through monitoring the volumes of active modes, which all the municipalities perform. Our results show that accepting walking and cycling as equal to other transport modes in planning and infrastructure construction seems to influence significantly the local transformative capacity as a whole.

The elements of experimentation, delivering the impacts and embedding the new solutions are intertwined and here perseverance and clear focus, be it on information and knowledge sharing, resource and responsibility allocation or project implementation, has been shown to increase the local transformative capacity. The funding received from the governmental Mobility Management and Walking and Cycling programmes and grants has had a significant role, either as an initiator or as a complement to local activities, in spite of the challenges in the programme impact assessment identified by all of the interviewees. Working and learning across agencies and scales relates to all the other elements and is hence an essential part of the local transformative capacity building, manifested e.g., in the local walking and cycling development plans.

To conclude, the proposed framework on transformative capacity towards active sustainable transport contributes to the sustainability transition in urban areas by presenting a tool for municipalities and other stakeholders to measure the comprehensiveness of the activities at local level. The approach needs to be validated and further developed with complementing data representing a wider range of activities, but as of now it presents a starting point for analysis on the integrated contributions of governance processes and practical implementation of measures supporting active transport towards sustainable urban mobility.

CRediT authorship contribution statement

Anu Tuominen: Conceptualization, Formal analysis, Investigation, Methodology, Writing – original draft. **Henna Sundqvist-Andberg:** Formal analysis, Investigation, Methodology, Writing – review & editing. **Minna Aittasalo:** Validation, Writing – review & editing. **Jonne Silonsaari:** Validation, Writing – review & editing. **Katarina Kivi-luoto:** Validation, Writing – review & editing. **Petri Tapio:** Validation, Writing – review & editing.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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