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## LITERATURE REVIEW REPORT FOR THE SALOMON PROJECT

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## 1. Introduction

There is an increasing need to promote sustainable transport use in urban environments as frequent use of motor vehicles has several negative consequences, such as increases in air pollution, traffic congestion, traffic safety, and health risks. Since a big part of the adult population in European countries is working and work trips are predominantly made by private cars, it is especially important to start promoting sustainable transport in work settings (Guzman et al., 2020; Petrunoff et al., 2016). A shift from the use of private cars towards sustainable travel modes (cycling, walking, public transport) in workplace settings could lead to significant decreases in traffic congestion and improvements in individuals' health (Petrunoff et al., 2016). In line with this notion, the SALOMON project<sup>1</sup> aims to increase the percentage of employees, patients, and visitors that travel to the Novo mesto hospital, which is the second largest regional hospital in Slovenia, by environmentally friendly transportation alternatives. Additionally, the project aims to raise awareness among employees and patients on the sustainable mobility alternatives (e.g., regular, and electric bikes, e-scooters, e-cars, pedestrian routes, buses, trains, or car-sharing) that they can use while traveling to/from the hospital.

The present literature review report provides an overview of the previous research findings and good practices that are relevant to the SALOMON project goals. This report is one of the deliverables of Work Package T1 (Travel Habits in High Traffic Locations) within the project. A literature search was made using the search engines, such as Google Scholar. The keywords used in the search included *mobility plan, travel plan, workplace-based interventions, mobility management, sustainable mobility, hospital, staff, and healthcare*. After reviewing the results, 51 scientific publications, which were most relevant to the SALOMON project goals, were included in the present report. Almost all the publications were scientific articles written in international peer-reviewed journals and most of them were published after 2010. In addition, some information is provided about other similar European projects in the fields of sustainable and smart mobility and mobility management. The findings from the literature search are summarized under the following sub-titles:

- Effectiveness of mobility/travel plans in the workplaces
  - Parking interventions
  - Active transport (cycling and walking) interventions
  - Public transport interventions
  - Carpooling interventions
  - Electromobility interventions
- Employers' perception and role in the implementation of sustainable mobility plans at the workplaces
- Summary of findings from the healthcare sector
- Key findings and good practices from existing sustainable mobility projects
- Conclusions

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<sup>1</sup> <https://www.norwaygrants.si/en/projects/projects-of-the-programme-climate-change-mitigation-and-adaptation/salomon/>

## 2. Effectiveness of mobility/travel plans in the workplaces

There are several terms related to sustainable mobility that need to be defined for a better understanding of the topic. At a more general level, European Commission proposes *sustainable urban mobility plans* (SUMP), which are local-level transportation plans that have a long-term and sustainable vision for cities. SUMPs require the participation of citizens and stakeholders and should serve as a vehicle for the coordination of policies across sectors to respond effectively to the mobility needs of people (Arsenio et al., 2016). *Travel demand management* (TDM) is a more specific approach that refers to different strategies aiming to change traveler behavior and choices to reach specific planning goals and increase transport system efficiency (Black & Schreffler, 2010). One of the approaches used for TDM is called *workplace travel plans* (WTP), which can be defined as a group of measures implemented by an organization to encourage sustainable travel modes (e.g., cycling, walking, and public transportation use) instead of private car use among people who travel to and from the organization (Rye et al., 2011). Similar to WTP, *mobility plans* (MPs) are defined as planning instruments that include some sustainable mobility strategies used in an organization to reduce the impact of trips of people who travel to/from the workplace (Guzman & Hessel, 2022; Rye, 2002).

There is clear evidence that mobility/travel plans implemented in the workplaces are effective for reducing private car use and increasing more sustainable transport modes among the staff, although the size of the effect varies depending on the type and scope of strategies used (e.g., Cairns et al., 2010; Guzman et al., 2020; Petrunoff et al., 2015; Rye, 2002). There are both incentives (carrots, pull measures) and disincentives (sticks, push measures) that are used by organizations to change the travel behaviors of the employees in the desired way. Giving subsidies for carpools/vanpools, using public and active transportation, and providing bicycle racks and showers at the workplaces are some examples of used incentives, whereas reducing the parking spaces and introducing parking charges are among the commonly used disincentives. Most successful MPs often include an overall travel plan and combine the use of both incentives and disincentives for the employees (Cairns et al., 2010; Petrunoff et al., 2015)

Based on the literature review, workplace-based interventions used under the mobility plans could be categorized into five groups: 1) Parking interventions 2) Active transport use interventions 3) Public transport use interventions 4) Carpooling interventions 5) Electromobility interventions

### 2.1. Parking interventions

Previous studies clearly indicate that parking policies at workplaces have a big role in changing the travel behavior of employees (Brockman & Fox, 2011; Christiansen et al., 2017; Evangelinos et al., 2018; Guzman et al. 2020; Petrunoff et al., 2015). For example, in their study Petrunoff et al. (2015) compared the results of survey results from hospital staff working at two adjoining hospitals in Western Australia, with a before/after study (2016 and 2012). The results show that at one of the hospitals that reduced the parking spaces and introduced parking charges there

was 42% reduction in employees driving to work alone, whereas, at the other hospital which implemented a mobility plan only using encouragement strategies, there was only 5% reduction in employees driving to work. Similarly, some other studies also show that reducing parking availability at workplaces can lead to significant reductions in private car use and an increase in active travel, such as cycling and walking, among commuters (Brockman & Fox, 2011; Christiansen et al.; 2017). There are also some studies (Evangelinos et al. 2018; Shoup, 1997) showing that parking cash-out programs (i.e., employers offer the cash equivalent of the parking service value instead of providing free parking on modal choice) might be a good approach to decrease private car use. For example, Evangelinos et al. (2018) showed that pricing workplace parking via cash-out by rewarding the abandonment of the parking right at work rather than penalizing its use decreases the probability of car usage significantly among German commuters.

Although the majority of the studies reviewed support the effectiveness of parking policies in reducing private car use, there is also evidence that parking policies might not give the desired consequences in some cases. For example, in their study, Yan et al. (2019) showed that commuters of the University of Michigan responded to parking policies primarily by shifting parking locations rather than switching to another travel mode, such as public transport. The authors discuss relatively low gas and parking prices in the United States and poor public transport services in non-central areas as the possible reasons for this finding. The study also showed that besides parking prices, how much time travelers used in searching for a parking space and getting from the parking lot to the destination are also important variables that need to be considered when planning parking policies.

## *2.2. Active travel (walking and cycling) interventions*

Walking and cycling are considered active travel modes, which have clear benefits for reducing environmental problems, and traffic congestion and improving individuals' health. Therefore, in many workplaces, some interventions are implemented to increase the use of active travel modes among employees. A review of the previous studies examining the effectiveness of such interventions indicates that they have a positive influence on increasing active travel mode use among employees, although their effect might be small in some cases (e.g., Petrunoff et al., 2016; Wesemael & Schuit, 2014). In a systematic literature review study about the effect of active travel interventions in work settings, Petrunoff et al. (2016) showed that most of the studies included in the review found positive effects of active travel interventions for increasing physical activity and decreasing driving to work.

One of the commonly used interventions to increase walking to work is pedometer interventions, which allow individuals to monitor their daily steps. One previous study (Blake & Batt, 2015) which examined the perceptions of a pedometer walking intervention among employees in a hospital setting showed that most of the participants increased their physical activity, including walking to work, during the 6-week intervention period. Overall perceptions towards the intervention were positive among the participants, who were predominantly female employees. Similarly, another study that examined the effectiveness of a pedometer intervention among employees of occupational health care services in Southern Finland showed that

although the effects were modest, the intervention had a positive effect on increasing walking for transportation purposes among the participants (Aittasalo et al., 2012).

In addition, it is also necessary to understand and eliminate the common barriers against walking to increase walking among travelers. How attractive and suitable is the built environment for walking refers to walkability (Larranaga et al., 2019) and it is considered as one of the important measures for walking behavior. One common categorization used by the previous studies to assess walkability includes two factors: 1) safety and security (e.g., feeling of safe from crime while walking and pedestrian safety threats such as tripping and pedestrian-vehicle collisions) and 2) convenience and attractiveness (e.g., street connectivity, destinations proximity, width, and quality of the sidewalks) (e.g., Larranaga et al., 2019). Problems with the connectivity of the streets, topography (e.g., steep uphill topography), sidewalk surface, and feeling unsafe and insecure while walking appear as the most common barriers against walking (e.g., Forsyth et al., 2008; Larranaga et al., 2019; Larranaga & Cybis, 2014; Sehatzadeh et al., 2011; Tian & Ewing, 2017). One previous study (Loo & Lam, 2012) that assessed walkability to healthcare facilities in Hong Kong among elderly residents indicated that continuity/connectivity of the pedestrian walkways is one of the most critical factors influencing walking such that the more crossings a walkway had, the less walkable it was for the elderly people. Therefore, improvements in the built environments in the neighborhoods, such as designing more continuous pedestrian paths, and wider and better sidewalks, appear as a very important step to increase walking among travelers.

Cycling is another active travel mode that could be a better replacement for walking in some cases since it is a faster means of transportation. Similar to walking, there are several factors, such as travelers' attitudes, characteristics of the built environment, and facilities at the workplace, that influence cycling to work. A recent study from Switzerland based on a large survey (n=13,700) has shown that the opportunity to do exercise followed by flexibility and freedom and pleasure were the most frequently reported motivations for cycling to work among travelers, whereas bad weather conditions followed by logistical constraints (e.g., transport of big items, activities before or after work) and accident and safety risks were the most frequently reported barriers related to cycling to work (R erat, 2019). The study also identifies four groups of cyclists according to their motivations (active, civic, independent, and enthusiast) and concludes that to promote cycling it is important to understand not only utility motivations for cycling but also the meanings and experiences people associate with cycling. Similarly, based on their study from the UK Gatersleben and Appleton (2007) reports that non-cyclists are not a homogenous group but rather include people with different attitudes towards cycling thus different cycling policies need to be developed for different target groups. For example, forming positive attitudes and building a positive culture for cycling might be a good strategy for people who have negative attitudes toward cycling and never contemplated cycling, whereas specific action plans and encouragement programs could be developed for people who have positive attitudes toward cycling but do not cycle due to perceived barriers (Gatersleben & Appleton, 2007). Another study that examined the effects of work-related factors on bicycle use for commuting to work in the Netherlands indicated that besides some hard factors (e.g., built environment, availability of

infrastructure) attitudes and expectations of commuters and their colleagues at the workplaces also play an important role on the decision to cycle to work (Heinen et al., 2013). Results of this study showed that having a positive attitude towards cycling, colleagues' expectations that an individual will cycle to work as well as the facilities at the workplace (e.g., bicycle storage inside the buildings, having access to clothes changing facilities) increase the likelihood of cycling to work.

Literature review studies about the effectiveness of active travel interventions indicate both interventions focusing on improving built environments (e.g., implementing new pedestrian and cycling lanes, car-free city centers, widening sidewalks) and changing attitudes and perceptions of the travelers in a more positive way are needed for increasing active travel mode use (Guzman et al., 2020; Petrunoff et al., 2016; Scheepers et al., 2014). Mass media campaigns, spreading educational and practical information about the possible ways of using active travel modes at the workplaces, economic incentives, increasing bike facilities at the workplaces (e.g., bicycle parking, lockers, and showers), introducing fees for car parking, bike sharing and renting interventions, are among the commonly used intervention tools for increasing active travel mode use to workplaces. Also, there is evidence that in most cases a combination of several intervention tools is more effective than only using one tool (Guzman et al., 2020; Scheepers et al., 2014).

### *2.3. Public transportation interventions*

Compared to private car use, public transportation use (e.g., bus, metro, tram) has significantly fewer environmental challenges. Increase public transportation use can lead to reduced air pollution and traffic congestion as well as economic and health benefits for individuals. Thus, increasing public transportation use among employees appears as a common aim of the travel plans implemented in different workplaces. Previous research examining the factors that are critical for the choice of public transportation indicates that having fast, frequent, and reliable public transport services is a very important factor in attracting travelers to use public transportation more (Aruwajoye, 2020; Chakrabarti, 2017; Guzman et al, 2020; Rye, 1999). In addition to improving the quality of public transport services, it is also essential to focus on forming positive attitudes towards public transportation use and challenging the habits of travelers. Often, private car use is a habitual behavior that is carried out automatically without deliberate thinking and it is known that people who have a strong habit of using a particular travel mode (e.g., car) acquire less information and elaborate less about other available travel mode options (Verplanken et al., 1997). One previous study from Norway (Simsekoglu et al., 2015) has shown that a strong car use habit was a negative predictor of both intentions to use public transportation and reported public transportation use in the Norwegian public. Therefore, interventions aiming to increase public transportation use to/from the workplaces should use effective tools that can make the employees elaborate about changing their car use habits and using alternative travel options.

One of the commonly used incentives for increasing public transportation use to/from workplaces is providing subsidies (e.g., reduced fees or free) to employees for public transportation use. Studies examining the effect of such subsidies show

that overall, they have a positive effect on increasing public transportation use, especially among users with lower income levels (e.g., De Witte et al., 2016; Guzman & Hessel, 2022). However, there is also evidence that only providing subsidies to employees would not be alone enough to increase public transportation use, if service attributes of the public transportation are not good enough. For example, Guzman et al. (2020) have shown that in a specific mobility strategy, subsidizing the cost of a company bus fare appeared as less important than service attributes of the public transport, such as travel and waiting time, for the employees.

#### *2.4. Carpooling interventions*

None-household carpools, where two or more commuters from different residents travel in the same private car, is another beneficial method that is encouraged for employee transport at the workplaces (Abrahamse & Keall, 2012; Cairns et al., 2010; Neoh et al., 2017). Carpooling leads to reduced car use and thus contributes to a reduction of environmental problems and traffic congestion, while at the same time individuals do not have to sacrifice some benefits of personal car use, such as comfort and flexibility. This makes carpooling a good replacement for private car use; however, similar to the other travel modes there are both facilitators and barriers related to carpooling. A recent meta-analysis study (Neoh et al., 2017) has shown that being female, in full-time employment with a regular work schedule, owning a vehicle, and working in an organization with many employees are the factors that are most positively associated with carpooling in different countries. Also, having a reserved parking space for the carpools and having a partner-matching program at the workplace were found as effective interventions to increase carpooling among the employees (Neoh et al., 2017). Similarly, another study based on 20 case studies from UK employers (Cairns et al., 2010) reports that providing dedicated parking spaces for car sharers, arranging events for car sharers to meet, incentive payments, and exemption from parking charges are commonly used interventions that help to increase carpooling among the employees. On the other hand, not being able to find suitable matches for carpooling and problems with getting in touch with the carpool matches are reported as barriers against using carpooling. *“Let’s carpool”* is a successful example of a web-based intervention, which provides personalized information by making use of online ride-matching software to enable commuters to find carpool matches, to increase carpooling to/from workplaces in New Zealand (Abrahamse & Keall, 2012). After this intervention, there was a significant increase in the percentage of individuals traveling to/from work (from 12% to 27%) by carpooling, while there was a decrease in the number of commuters who reported they drove to work alone (Abrahamse & Keall, 2012). It is likely that the increasing use of digital tools/apps in transport, fewer people willing to take driving licenses, and the practical and economic benefits of car sharing will lead to increases in carpooling in the future.

#### *2.5. Electromobility interventions*

Electromobility has been emerging rapidly as a new and sustainable mode of transportation in many countries. Use of electric cars has been increasing in many European countries, especially in northern European countries, such as Norway. 64.5% of the newly registered cars in 2021 were Battery Electric Vehicles (BEV) in

Norway (Statistics Norway, 2022) and an increasing number of people are using BEVs in their work trips in Norway, which could be an example to other countries. Replacing conventional cars with electric cars could bring significant environmental (e.g., reduced tailpipe emissions) and economic benefits (e.g., economic incentives, and lower operational costs) (Figenbaum, 2017; Hardman et al., 2017). Electric bikes and electric scooters, on the other hand, are active travel modes thus they bring health benefits (e.g., increased physical activity) to individuals as well as environmental and economic benefits. Previous research indicates that a shift from the use of conventional cars to e-bikes has been associated with a reduction in the use of energy resources and environmental problems, increased health benefits due to increased physical activity, and decreased traffic congestion (e.g., Berntsen et al., 2017; Plazier et al., 2017). Thus, increasing the use of electric vehicles when commuting to work appears as another important step towards increasing sustainable mobility at organizations and workplaces.

Workplace charging facilities and free parking are among the important incentives to promote electric car use for employees (Hardman, 2019; Wu, 2018). When it is possible to charge their BEVs at the workplace, drivers could have less worry of range anxiety (i.e., fear that the car won't have sufficient charge to reach their destination) and thus feel more encouraged to use their BEVs to work (Wu, 2018). In terms of e-bike and e-scooters, it seems that simply making them available at workplaces and allowing employees to use them help to increase active mode of travel among the employees. For example, in one intervention study from Norway when different bike types (including e-bikes) were provided at the workplaces for the employees, who are parents to children in kindergarten, the use of cycling to work increased while car use to work decreased significantly (Bjørnarå et al., 2019). Particularly e-bikes achieved the greatest cycling amounts for the participants as e-bikes make it easier for the users to cycle longer distances, and more often. Similarly, another study from the UK shows that after participating in a workplace travel intervention, which allowed the employees to borrow an e-bike, free of charge, for up to 5-months duration, employees reported more positive affect, better physical health, and more productive organizational behavior outcomes compared to those who did not (Page & Nilsson, 2017).

### **3. Employers' perceptions and role in the implementation of sustainable mobility plans at the workplaces**

Although the effectiveness of mobility plans and interventions for changing the travel behavior of employees has been examined widely, fewer studies are focusing on the role of employers' willingness and approach to implementing mobility plans at different organizations. Implementing successful mobility plans requires the involvement of both employers and employees and an organizational culture that supports sustainable mobility (Rye, 2002). This section will focus on the role of workplace characteristics, organizational factors, and employers' approach and willingness for developing and implementing mobility plans in the workplace.

The summary of research in the previous section clearly indicates that mobility management policies and measures in an organization have an important role for



changing employees' travel behavior in a more sustainable way. Common mobility management measures can be grouped as 1) promoting sustainable travel modes, such as cycling, carpooling, and public transportation use 2) implementing parking policies that discourage private car use, such as charging parking fees or cash-out programs 3) providing alternative work schedules (e.g., flexible working hours) and telecommuting (working from home) opportunities for employees 4) location strategies (e.g., choosing more accessible locations) 5) appointing an employee transport coordinator (Vanoutrive et al., 2010). A review of these management measures applied in a large number of workplaces in Belgium shows that low-cost measures, such as cycling and public transport facilities, are implemented more often than expensive initiatives and the type of the measures vary significantly depending on the location (central vs peripheral) and size of the workplace (Vanoutrive et al. 2010). Another study from Belgium that reviewed good practices of mobility policies approximately in 5000 companies based on two large-scale surveys points out that in many cases having a mobility plan in a workplace leads to increases in the number of people who are using green modes of transport; however, rather than adopting individual policy measures companies need to adopt more integrated mobility policies for better results (Van Malderen et al., 2012). Also, the study indicates that company characteristics, such as size, influence which measures work better; for example, in small-size workplaces promotion of bicycle use is more appropriate while in larger workplaces located in the city centers promotion of public transport is more appropriate.

Employers' perceptions and willingness to implement specific mobility plans are critical for the success of work-place based interventions. An interview study with senior managers of employers located in peri-urban areas of Bristol in south-west England shows that employers who felt a particular need for improving sustainable travel options and perceived the highest benefits with implementing interventions, such as increasing employee well-being and productivity, were most willing to engage with public authorities in introducing new workplace-based mobility measures (Bartle & Chatterjee, 2019). On the other hand, another study from Austria has shown that in rural areas the costs of sustainable mobility interventions tend to be higher than their benefits, thus, employers have little incentive and willingness to implement such measures (Soder & Peer, 2018). Also, employers are more likely to be willing to promote the use of alternative modes of transport to their employees when they think these travel modes could be an adequate alternative to car use and they are more willing to implement the aspects of travel plans that are relatively low-cost (Rye, 1999).

#### **4. Summary of findings from the healthcare sector**

Although the previous studies examining mobility plans and interventions in workplaces cover different job sectors, such as education and finance, there are relatively few studies from the healthcare sector. The seven reviewed studies that focus on mobility plans, issues, and interventions for staff and visitors of the hospitals/healthcare facilities are presented in Table 1 as they are of specific relevance to the SALOMON project. Overall, findings indicate that workplace-based interventions, especially parking interventions, have a positive effect on changing the

travel behavior of the staff at healthcare facilities. Most of these studies focused on staff of the healthcare facilities, while there is a lack of studies focusing on the travel behavior of patients and visitors of healthcare facilities. It is likely that especially mobility interventions targeting visitors, such as limiting parking facilities and arranging visit times outside of rush hours, will help to reduce traffic congestion around the healthcare facilities.

Table 1. Studies from the health-care sector

Authors (Year)/Title	Sample	Method	Key findings
<i>Aittasalo et al., (2012)/</i> Promoting walking among office employees—evaluation of a randomized controlled intervention with pedometers and e-mail messages	Employees of occupational health care services in Southern Finland	Survey & intervention	- The pedometer intervention had a modest effect on increasing walking for transportation purposes among the participants
<i>Blake &amp; Bate (2015)/</i> Employee perceptions of a pedometer walking intervention in a hospital workplace	Hospital staff in the UK	Intervention	- Participants found the competitive, team-based element of the pedometer intervention motivating and useful - Predominantly female employees participated to the intervention
<i>Loo &amp; Lam (2012)/</i> Geographic accessibility around health care facilities for elderly residents in Hong Kong: A microscale walkability assessment	Elderly citizens walking to/from healthcare facilities in Hong Kong	Case study & microscale walkability assessment	-Continuity of the pedestrian walkways was one of the most critical factors influencing walking, the more crossings a walkway had, the less walkable it was for elderly people.
<i>Khandokar et al. (2017)/</i> Healthcare representatives' perspectives on hospital travel plans in England	Travel plan coordinators in the UK	Survey	- Shift working patterns, personal circumstances, high car use, and staff attitude towards car use were reported as the key barriers to change travel mode choice behaviour among the NHS hospital staff - The provision of off-site car parks around 10–15 min walking distance away from the hospital site is likely to encourage the car users to walk
<i>Petrunoff et al. (2015)/</i> Carrots and sticks vs carrots: Comparing approaches to workplace travel plans using disincentives for driving and incentives for active travel	Hospital staff of two adjoining hospitals in Western Australia	Survey	- Implementation of a parking management plan led to 42% reduction in employees driving alone in one of the hospitals -Combination of pull and push measures work best for decreasing private car use among the staff
<i>Petrunoff et al. (2013)/</i> Developing a hospital travel plan: Process and baseline findings from a western Sydney hospital	Hospital staff at Liverpool hospital in south-west Sydney	Survey & interview	- People living 5–10 km from the hospital and male employees were more likely to be active travelers - Strategies to engage staff and raise awareness of the benefits of active travel are needed to change travel behaviours
<i>Rodríguez et al. (2019)/</i> Future direction of sustainable development in private hospitals: general similarities and specific differences	CEO of private hospitals in Spain	Interview	- The actions or initiatives undertaken in the hospitals are determined ultimately by the costs - The communication of initiatives and actions of sustainable development differs between the hospitals - Sustainable development is related more to management than to the rest of the hospital

## 5. Key findings and good practices from the existing sustainable mobility projects

In this section, some key findings, and good practices from a selected group of research projects and programs on sustainable mobility and mobility management which might be relevant for the SALOMON project are summarized.

### 5.1. Smarter Transport Bodø (<https://www.smarteretransportbodo.no/>)

Smarter Transport Bodø (2020-present) is an ongoing research project which is run in cooperation between Nordland County Council, Bodø municipality, Avinor and Telenor, in Norway (for English information about the project see [https://static1.squarespace.com/static/5b68390de74940b2c83a8101/t/5dcbf5ec37b5697e37471bbe/1573647872659/Smarter Transport Bodoe English Edition.pdf](https://static1.squarespace.com/static/5b68390de74940b2c83a8101/t/5dcbf5ec37b5697e37471bbe/1573647872659/Smarter+Transport+Bodoe+English+Edition.pdf))

The main aim of the project is to help reduction of climate emissions by changing the travel habits of travelers with different socio-demographic profiles (e.g., students, employed people, retired people). Self-going buses and patient mobility are among the ten sub-projects that have specific relevance for the SALOMON project. The target of the self-going buses sub-project was to test the effectiveness of autonomous buses which can be a better alternative to existing public transport services, especially for patients and visitors traveling to/from the Nordland hospital. In 2022 summer, self-going buses were started to be tested on a certain route between the city center and the hospital in Bodø. In her thesis, which aims to examine citizens' responsiveness and acceptance of autonomous buses in Bodø, Borkamo (2022) indicates that safety and performance attributes of the autonomous buses are important factors that influenced user acceptance and positive social influence (i.e., seeing other people using autonomous buses) increases willingness to try the buses among the citizens. The target of the patient mobility sub-project was to make it easier for patients and people who need assistance to travel by improving the coordination of information between the patient and the parties involved.

### 5.2. Home-Work-Home (<https://www.hjemjobbhjem.no/>)

Home-Work-Home is another local project from Norway (Nord-Jæren) that aims to reduce car traffic in urban areas by facilitating more people to choose to walk, cycle or travel by public transport to and from work. Within the project, the firms can sign up to get benefits for the staff on public transport. It offers several tools, such as renting e-bikes and city bikes, for travelers. Participants also must respond to travel surveys. It is co-funded by urban growth funds.

### 5.3. MOVECIT (<https://www.interreg-central.eu/Content.Node/MOVECIT.html>)

MOVECIT (Engaging employers from public bodies in establishing sustainable mobility and mobility planning) (2016-2019) was an Interreg Central Europe project that is highly relevant to the SALOMON project. The target of the project was to increase sustainable mobility and mobility planning in workplaces by engaging employers from public bodies. It included six partner countries including Slovenia. A pilot action including the installation of 1 bike shed, purchasing of 3 e-bikes (plus 2 helmets and 1 pump) and development of 3 personalized mobility plans was

implemented in the Slovenian municipality Ljutomer between March 2018 and November 2018. The report on this case study shows that the interventions were successful as the employees have changed their commuting behavior in favor to sustainable commuting from 10% to 20 % and saved 94 kg CO<sub>2</sub> and 584 km made by car (see <https://www.interreg-central.eu/Content.Node/Movecit/CE25-MOVECIT-O.T3.2-Slovenian-Pilot-Jan.-19.pdf>). The project developed a toolkit on developing, monitoring and evaluation the workplace mobility plan, which includes methodology, online tools (including online mobility survey), measures, and good practices from other projects (see <https://www.interreg-central.eu/Content.Node/TOOLKIT-FOR-DEVELOPING-WORKPLACE-MOBILITY-PLAN.html>). A staff travel survey (see <https://docs.google.com/forms/d/e/1FAIpQLSck9xK4JuVOZ1i4MArKCgdOeFuiSiydALlkrwzLKiRT9UrWGA/viewform>), which was developed to collect data from the employees within the project, could be a useful reference to use while developing the survey for the SALOMON project.

#### 5.4. *COMMUTE* (<https://www.uia-initiative.eu/en/news/commute-project-collaborative-mobility-management-urban-traffic-and-emissions-reduction-0>)

The COMMUTE project (Collaborative Mobility Management for Urban Traffic and Emissions Reduction) (2017-2021) was a European project awarded within the framework of the “Urban Innovative Actions” (UIA) program of the European Commission. The target of the project was to implement a collaborative public and private governance of mobility at the airport and aeronautical zone of Toulouse, in France, and to reduce the impact of individual car use for home-work trips. The project was successful in designing a digital tool (digital platform) to support decision-making and the governance of urban mobility by taking the users as the main part of this digital tool. Their behaviours were escalated and analyzed by the decision-maker (local authorities and employers) to propose appropriate alternative modes to employees and to promote them to use these modes more efficiently.

#### 5.5. *CIVITAS* (<https://civitas.eu/about>)

CIVITAS (Sustainable and smart mobility for all) is a flagship program helping the European Commission achieve its ambitious mobility and transport goals. It has an urban mobility tool inventory which includes an online database with over 200 tools and methods that can be used by the local authorities to make informed decisions on the right tools to use in their local context (see <https://civitas.eu/tool-inventory>). Urban traffic monitoring with crowdsourcing (see <https://civitas.eu/tool-inventory/suits-urban-traffic-monitoring-with-crowdsourcing>), multimodal route planner (see <https://civitas.eu/tool-inventory/smart-ways-to-antwerp-multimodal-route-planner>), smart surveys (see <https://civitas.eu/tool-inventory/smart-survey-easy-and-accurate-travel-surveys-with-smartphones>) and positive drive ( gamification tracking platform and app that positively rewards preferred behaviour in traffic) (see <https://civitas.eu/tool-inventory/positive-drive>) are among the CIVITAS tools that could be relevant for the SALOMON project.

#### 5.6. CYCLEWALK (<https://projects2014-2020.interregeurope.eu/cyclewalk/>)

CYCLEWALK (2017-2021) is an Interreg Europe project that aims to support the shift from car usage to cycling and walking mobility patterns over shorter distances, improving the accessibility for pedestrians and cyclists. It has seven partner countries including Slovenia and Italy. An action plan was implemented to integrate new cycle and pedestrian paths with the existing ones to create a cross-border cycle network that aims to increase both mobility of citizens and cycle tourism between two cities, Gorizia (Italy) and Nova Gorica (Slovenia).

#### 5.7. DEMO-EC (<https://projects2014-2020.interregeurope.eu/demo-ec/>)

DEMO-EC (Development of sustainable Mobility Management in European Cities) (2017-2021) is another Interreg Europe project that aims to integrate mobility management in city development/planning by analyzing, exchanging, and dissemination of good practices to improve the effectiveness of policies in the field of low-carbon in transport. There are six partner countries, including Slovenia. The findings from the project indicate that different actors and user groups, such as companies, inhabitants as end users, need to be involved for the successful implementation of mobility management, and lack of instruments and unclear responsibilities in the city administrations are common challenges towards having a successful management plan ( see [https://projects2014-2020.interregeurope.eu/fileadmin/user\\_upload/tx\\_tevprojects/library/file\\_1577716234.pdf](https://projects2014-2020.interregeurope.eu/fileadmin/user_upload/tx_tevprojects/library/file_1577716234.pdf)).

#### 5.8. SPROUT (<https://sprout-civitas.eu/>)

SPROUT (Sustainable Policy Response to Urban Mobility Transition) (2019-2022) is an EU-funded project that aims to provide a new city-led innovative and data-driven policy response to address the impacts of the emerging mobility patterns, digitally enabled operating & business models, and transport users' needs. The project presents reports on multiple deliverables, such as the urban policy system dynamic model (see <https://sprout-civitas.eu/wp-content/uploads/2022/09/SPROUT-D5.2-Urban-policy-system-dynamics-model.pdf>) that could be useful for the SALOMON project.

## 6. Conclusions

Based on the present literature review following conclusions could be made:

- Achieving sustainable mobility goals at the workplace requires the participation of multiple parties, such as employees, employers, transport providers, and governmental agencies.
- Overall, mobility/travel plans implemented in the workplaces are effective for reducing private car use and increasing more sustainable transport modes among the staff, although the size of their effect varies depending on the type and scope of strategies used.
- There is limited number of studies focusing on mobility planning at healthcare institutions.

- To change the travel behavior of commuters in a more active and environmentally friendly way, it is essential to focus on improving both hard factors (e.g., transport infrastructure, facilities, and services) and soft factors (e.g., travelers' attitudes, habits, and awareness).
- Most successful mobility plans combine both pull (incentives) and push factors (disincentives).
- Having a more integrative and holistic approach to workplace mobility works better than having individual policy measures.
- Parking interventions, especially charging parking fees and limiting parking places, are one of the most influential interventions for reducing private car use in workplaces.
- Employers' perceptions and willingness play an important role in implementing successful mobility interventions.
- Cost is a critical determinant of what type of mobility interventions are implemented by the organizations, low-cost measures are implemented more often than expensive ones.

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