Institute of Transport Economics
Norwegian Centre for Transport Research

**Summary**

# BYTRANS: Large changes in the Oslo transport system – what have we learnt?

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*The research project BYTRANS has empirically investigated how different road transport system user adapted to major, planned changes in the urban transport systems in Oslo, what effects and consequences they experienced and what effects and consequences could be observed in the transport systems. The aim was to develop knowledge that can be useful in the work of developing the more efficient and environmentally friendly urban transport systems of the future. The results showed that the road users adapt in various ways, resulting in significantly less effects and consequences of reduced accessibility by car in the urban transport systems than many believed. This opens opportunities and room for manoeuvre in the development of the more efficient and environmentally friendly urban transport systems of the future that are greater than often assumed. The project also revealed knowledge gaps that remain to be covered.*

## The BYTRANS project

The research project BYTRANS was initiated to create knowledge that is useful when aiming at developing the more efficient and environmentally friendly urban transport systems for the future. The project took advantage of a unique opportunity to develop knowledge when several major changes were planned to the urban transport systems in the Oslo area in the period 2015-2019, which the project understood as 'natural experiments'. The project collected and analysed data related to selected cases: temporary capacity changes in the Bryn, Smestad and Granfoss main road tunnels, the closure and reopening of Østensjø Metro-line, the opening of the new Løren metro station, and changed accessibility to and in Oslo city centre. See Figure 1 for the timeline of these interventions. We have also analysed the totality of changes in the transport systems during the period.

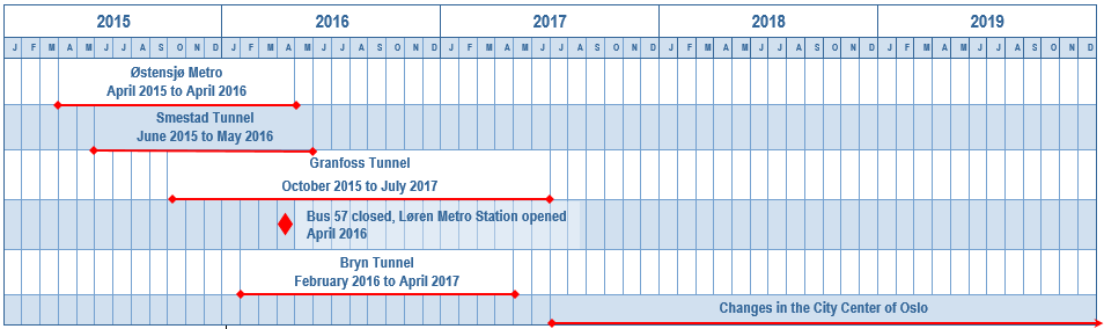


*Figure 1: Timelines for the changes in the Oslo transport system investigated in the BYTRANS project.*

Using a longitudinal case study design, the project has examined what adaptations different transport system users (commuters, freight transport, taxi, public transport passengers, city centre visitors) made, how these changes affected different parts of the urban transport system, and what effects and consequences users of the transport system experienced. Moreover, how information and mitigating measures worked out. Key data were traffic data, together with surveys to and interviews with rod transport users collected before, during and after the changes. As part of the project, new types of data were tested, such as mobile data, GPS tracking and data from toll-, public transport- and freight transport

companies. It turned out that the availability or quality of the new data types was too poor for these to be used for analyses and reported as findings. The testing yielded a lot of learning, but no usable results. The project has contributed to the development of methods, including examining the accuracy of the transport models in deviation situations.

## Results

**The metro line Østensjøbanen** was closed for rehabilitation from April 2015 to April 2016 and substituted by bus during the period. It was reopened with significantly higher frequency and upgraded stations. Surveys showed that most (82-87 per cent) had continued to travel by public transport on their commutes during the closure. 62 per cent reported spending longer time on their commute, averaging 19 minutes. This was the main drawback, followed by increased crowding and more transfers. Commute satisfaction was significantly lower when there was bus for subway (31 per cent) compared to after reopening (79 per cent). Løren metro station was opened in April 2016 and immediately got many passengers. Our survey showed that 80 per cent of passengers had used other public transport on similar journeys before, while 8 per cent had been car-drivers.

Temporary reduced main road tunnel capacity resulted in less effects and consequences than many expected. In the **Bryn tunnel**, the capacity reduction resulted in significantly increased delays through the tunnel, despite traffic volumes through the tunnel being reduced by 24-41 per cent during rush hours. After reopening, traffic volumes and delays changed to about the same level as before. Figure 2 shows changes in traffic volumes during the capacity reduction period in the morning rush hours.

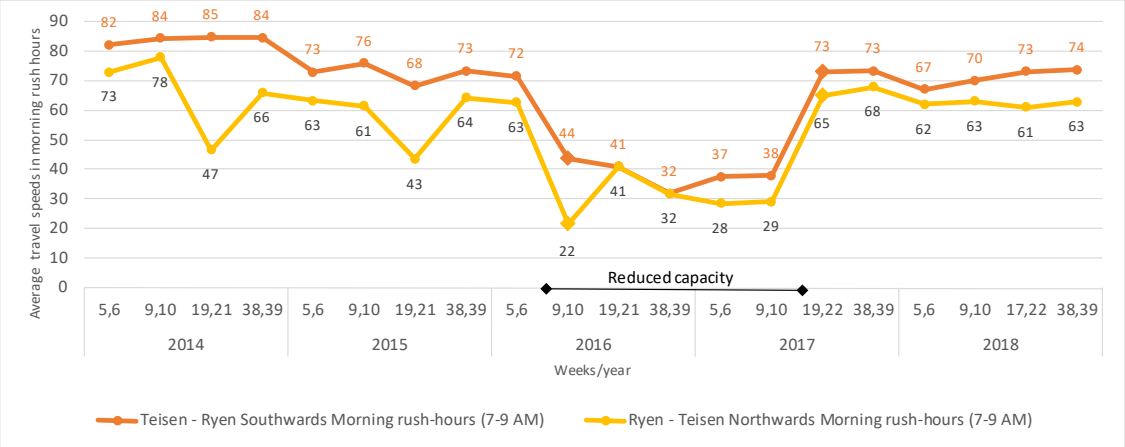


*Figure 2: Average speeds of the Teisen–Ryen road link including the Bryn tunnel in the morning rush-hours (7:00–9:00) in selected weeks in 2014, 2015, 2016, 2017 and 2018. Facsimile from Tennøy et al. (2019).*

Surveys showed a sharp reduction in car shares on commutes among employees in businesses located close to the tunnel in the Bryn area, from 39 per cent in 2015, to 29 per cent in 2016 (when capacity was reduced), to 27 per cent in 2017 (when the tunnel gained full capacity) and 21 per cent in 2018. Cycling and public transport increased significantly. The capacity reduction seems not to have resulted in significant consequences. Truck drivers reported increased delays and some more stress. In the **Smestad and Granfoss tunnel**, we hardly found adaptations, effects, or consequences. Information about the capacity changes reached the transport system users.

The surveys in 2017-2019 included questions related to changes in accessibility to **Oslo city centre**: removal of all ordinary street parking, driving restrictions, new bike lanes and larger walking areas. We found low shares driving their car when going to the city centre, 5

per cent on commutes and 9 per cent on other trips. Respondents answered that accessibility to the city centre is good (see Figure 3), they visit often, and they enjoy visiting, and there were small and positive changes in this from 2017 to 2019. Questions related to the experience of walking downtown show an improvement from 2017 to 2019.

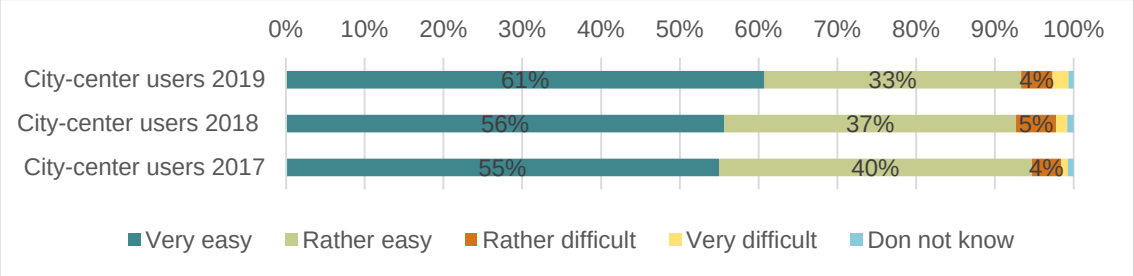


*Figure 3: Responses to the question `How easy is it to travel to the city center at this time of the year? ` Number of respondents varied between 4958 in 201 to about 5506 in 2018. Facsimile from Hagen et al. (2020).*

Analyses of changes in **the transport system in Oslo in general** show a reduction in car shares on commutes to enterprises located within Oslo from 21 per cent in 2015 to 16 per cent in 2019, and an increase in bike shares from 14 to 16 per cent, measured in May/June, see Figure 4. The share who are very satisfied or satisfied with their commute increased slightly, from 72 per cent in 2015 to 75 per cent in 2019, see Figure 5. This indicates that the changes in the transport systems and in how people travel have not affected commute satisfaction negatively.

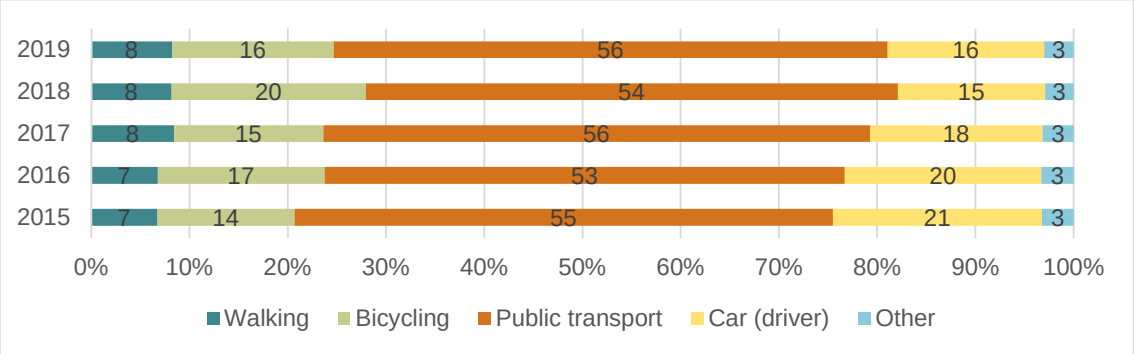


*Figure 4: Modal shares among respondents, 2015-2019. Number of respondents varied between about 4300 in 2015 to about 6800 in 2016.*

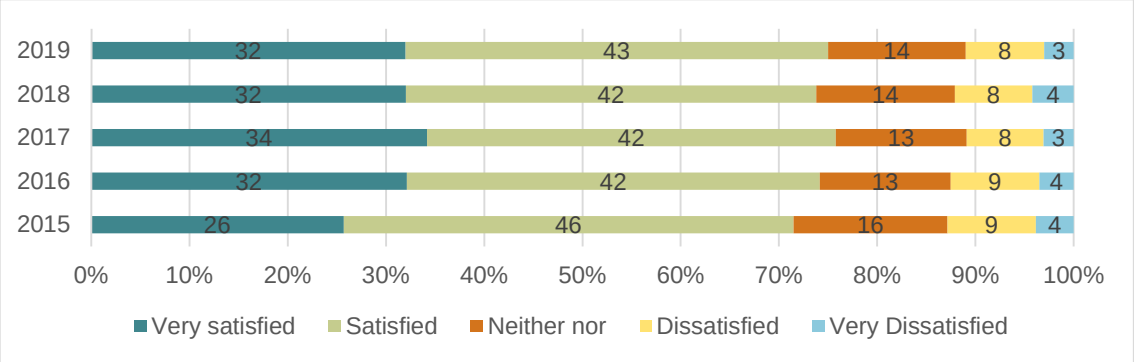


*Figure 5: Satisfaction with commutes among respondents, 2015-2019. Number of respondents varied between about 4300 in 2015 to about 6800 in 2016.*

The BYTRANS-project has, hence, found that the effects and consequences of reduced accessibility by car in urban transport systems are significantly less than many believed.

## So what? New opportunities!

The findings show that the possibilities and room for manoeuvre are greater than often thought for those striving to develop the more efficient and environmentally friendly urban transport systems of the future:

- The recipe works - we know how to do it!
- Facilitating environmentally friendly commutes provide satisfied commuters
- Reallocation of space from cars to other users and uses is a feasible intervention
- Replacement capacity is often not necessary, this opens for faster realization of efficient and sustainable urban transport systems
- Better insights in commuters' adaptations can reduce investments counteracting goal achievement
- Improved public transport data availability could improve planners understanding and media coverage
- Insights provides opportunities for better handling of future non-conformance situations in the transport systems
- Documentation enables authorities to plan and handle future deviations in the transport system
- Inputs from the empirical studies give opportunities for improving planning, analyzes and methods
- Testing of new data demonstrated opportunities and some challenges
- Developing more knowledge about congestion in urban transport systems could provide opportunities for handling congestion in more efficient ways
- Developing more knowledge about freight traffic could provide opportunities for interventions that are helpful for the business and the drivers
- Scientific publications give opportunities for researchers, planners and policymakers in Norway and elsewhere to use the knowledge produced

For more detailed descriptions of the project and the results in English, see Tennøy and Hagen (2020)[1] and the published articles from the project.

[1] Reallocation of Road and Street Space in Oslo | ITF (itf-oecd.org)