

**Summary:**

# Public Transport Users of the future

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*Travel trend analysis highlights that the Norwegian population on average is travelling longer and using more time on their daily trips. Car usage has also risen and the share of population using car as their primary mode of transport has risen quite considerably since 1985. However, the increase in traffic in the cities and adjacent urban regions seems to be primarily influenced by population growth and to a lesser degree by a modal shift to car usage in the last decade. Results from Delfi-survey conducted among the Norwegian Transport, Communication and Urban Planning experts highlight that there exists a consensus on the fact that Information and Communication Technologies (ICTs) will reshape public transport (PT) usage by attracting more trips on the PT in the Norwegian cities by year 2050. If the desired trend of increase in PT usage is adhered to and achieved, then all the Norwegian cities and urban regions can expect an explosive growth in the number of trips taken on public transport by 2050. The percentage increase for 2050 is the highest for the neighbouring municipalities of Bergen, Trondheim and Stavanger.*

The Norwegian society faces a complex set of challenges in form of striking a balance between the varied aims of protection of its environment, balanced population growth, immigration and sustainable urban growth. A common factor underlying all these growth trends is the urban transportsystems, which needs to be filtered out and presented as one of the most important keystones for a balanced growth in future. This necessitates a long term strategy which is aligned both with the transport structure and needs of future transport users.

This report gives a systematic outlook on the relations that is considered important for make informed decisions on the design and supply of public transport in the future. Analysis of societal growth patterns and travel trend analysis from 1985 – 2009 have been linked to future scenarios and a statistical model based prognoses to build the aforementioned outlook. The report primarily deals with public transport users of the future, their volume in the different urban areas, their perceived preferences and the kind of requirements they will have from the public transport system. An urban focus emanates from the fact that majority of the challenges related to transport will be most plausibly in the cities and areas in the vicinity of cities, along with providing an economies of scale to restructure the existing system with an adequate insertion of the needs of the future public transport users. The perspective year for analysis has been set to 2050.

## **Developmental Trends 1985-2009**

Historical trends are a reliable source for understanding the trends which can possibly continue to impact the travel behavior of the population. Travel trend analysis of the past 25 years reveal that even though the Norwegian population on average has had an extremely good access to car, the trip rate or trip purposes has not had any dramatic shifts. Albeit the trip purposes which did have noticeable shifts between 1985 and 2009 are related to shopping and escort trips. The most noteworthy change relates to the length of the trips – we are on average travelling 23 percent longer and are using slightly more time on our daily trips. Not surprisingly, car usage has gone up compared to 1985. In 1985, 45 percent of the daily trips were taken as car driver which raised to 52 percent in 2009. But a cursory look at the past decade highlights a relatively stable pattern for car usage. The primary shift over a 25 years period has taken place with regard to the length of the trip - we are travelling longer even though targeting the same trip purposes. Access to car explains this increased length of daily trips.

Work trips have risen in length, especially for men, which can be explained as a combination of the localization of employment centers outside the city centers and an increased access to transport resources. The gender differences in the travel length has risen, which seemingly indicates that men have had a better opportunity to travel longer to access jobs of their choice. Another plausible explanation could be that men dominated employment centers have changed their location patterns in a format other than that of women dominated employment centers. Structural changes related to other politically motivated decisions than the transport sector alone also has had high impacts on daily trips.

Analysis of travel behavior surveys (RVU) indicates a rather stable pattern for the number of daily trips, approximately 3 trips per day on average for the entire population, excluding holidays and excursion activities. The average number of daily trips has remained relatively stable but it varies depending on the area, life situation, gender and income. Increase in access to car has primarily remained stable and varied little in the years. Women have an increased access to cars, which holds true for elderly as well.

An increased time opportunity in combination with new shopping areas seems to have increased shopping trips. This indicates that shopping has over the years evolved as more than merely meeting the basic needs, and more of becoming an active pastime activity. Results from the travel behavior and preference surveys also indicate that the population on average is ready to accept longer work trips on public transport if the travel time can be utilized for work or entertainment. The possibility of including travel time in its entirety or even partially as work time will give much higher chances to accept longer commute time to work.

Analysis of the Norwegian youth's delay in procuring driving license indicates that the priorities for this group in 2009 has changed compared to 1985. The social context and perceptions over acquiring a driving license from 1985 – 2009 have worked towards a diminishing interest in acquiring driving license in the early years. Higher education for a high share of the Norwegian youth, concentration in urban areas and the preference to establish family at a later age can be attributed to this diminishing trend.

## Delfi-survey

In order to lay a foundation for further evaluations, a *delfi-survey* was undertaken among the experts in the area of transport, communications and urban planning to filter out the trends which are perceived to bear strong influences on the future public transport users in the Norwegian urban areas. Results from delfi-survey show that there exists a high consensus on a future scenario and there is a high weightage on the Information and Communication Technologies (ICTs). ICTs are perceived to change people's travel behavior, which might result in a scenario where public transport will take over the major share of the traffic growth in the urban areas. It is a technology-oriented future scenario which surface to be the most dominant, bearing strong resemblance to a scenario often nomenclature as "technopolis-scenario".

There are small regional differences related to perceptions. On a closer look at the underlying structures of the opinions related to the projections, we find that there are three different orientations within the panel: an environmentally driven attitude that emphasizes public transport, environment and restrictive measures to bring down the use of private cars in cities; a technology oriented attitude that places great emphasis on the use of new mobile technology; and a group that emphasizes sharing of transport resources (car and bike) in combination with better public transport supply.

## Forecasts for transportation needs in 2050

In order to assess the specific load on the public transport sector in future, it was necessary to reflect on the interlinkages between central development trends and the forecasts for population growth available from the Norwegian Statistical Bureau ([www.ssb.no](http://www.ssb.no)). To get a better insight into this, we have developed a model based on SSB population projections for the period 2014 to 2050 and modal share for different groups and regions for public transport from the Norwegian travel survey of 2009 (RVU 2009). The model analyzes the forecasts for population growth, immigration, urbanization and travel within six geographical areas. In addition to a Business as Usual (BaU) scenario, we have presented forecasts based on expectations for transport distribution in the urban areas established in the Delfi-survey.

The analyses shows that the growth in the number of public transport users will come mainly as a result of increased demand among the age groups 25-65 and 65+. The foremost difference between regions will take place in Oslo where it is expected a high growth in the number of trips in the "economically active" age group (25-65 years). The results indicate that future urban transport policies should target fulfilling the demands and requirements of both the elderly and economically active population. Examples of possible measures can be increased supply of pick-and-drop services, feeder mechanisms connecting to the public transport hubs which is connected through a high-speed transport ring or radial structure, and an increased focus on densification of areas close to the public transport hubs.

The main results highlight that achieving the ambitious targets for public transport usage by 2050 as set out in the Delfi survey will entail supply challenges for the public transport providers. Table i presents a summary of the anticipated percentage growth for different urban regions in the Delfi-scenario, along with the actual increase in the number of public transport trips.

Table i shows that when measured in number of trips, the increase will be greatest in the urban areas, but when the change relative to the current situation is measured, the relative growth will be greatest in the suburban areas where the public transport system is restrictively used. Table i also shows that the growth in use of public transport will come as a result of increased demand among both the elderly (65+) and among the economically active population (25-64). In order to achieve the target set in the Delfi survey, public transport design and supply needs to be collectively assessed for both groups.

*Table i: Percentage increase in the number of public transport trips per day 2014-2050 for the different age cohorts, and the absolute increase in number public transport trips per day, different urban regions for the Delfi scenario.*

	<b>Growth 2014-2050 Oslo</b>	<b>Growth 2014-2050 Oslo Omegn</b>	<b>Growth 2014-2050 TrBrSt</b>	<b>Growth 2014-2050 TrBrSt Omegn</b>	<b>Growth 2014-2050 Øvrige 6 Byer</b>
<b>13-24</b>	<b>74 %</b>	<b>114 %</b>	<b>133 %</b>	<b>259 %</b>	<b>200 %</b>
<b>25-64</b>	<b>118 %</b>	<b>373 %</b>	<b>406 %</b>	<b>822 %</b>	<b>686 %</b>
<b>65+</b>	<b>274 %</b>	<b>531 %</b>	<b>431 %</b>	<b>750 %</b>	<b>736 %</b>
<b>Total growth</b>	<b>116 %</b>	<b>281 %</b>	<b>293 %</b>	<b>580 %</b>	<b>487 %</b>
<b>Absolute increase</b>	<b>492617</b>	<b>508049</b>	<b>616127</b>	<b>289755</b>	<b>657521</b>

The main results of the Delfi scenario is in stark contrast to the main results of the BaU scenario given in Table ii. As it emerges from Table ii, the BAU scenario is primarily dominated by the elderly wave in shaping the future demand for public transport.

*Table ii: Percentage increase in the number of public transport trips per day 2014-2050 for the different age cohorts, and the absolute increase in number public transport trips per day, different urban regions for the BaU scenario.*

	<b>Growth 2014-2050 Oslo</b>	<b>Growth 2014-2050 Oslo Omegn</b>	<b>Growth 2014-2050 TrBrSt</b>	<b>Growth 2014-2050 TrBrSt Omegn</b>	<b>Growth 2014-2050 Øvrige 6 Byer</b>
<b>13-24</b>	<b>13 %</b>	<b>13 %</b>	<b>13 %</b>	<b>13 %</b>	<b>13 %</b>
<b>25-64</b>	<b>19 %</b>	<b>20 %</b>	<b>21 %</b>	<b>20 %</b>	<b>20 %</b>
<b>65+</b>	<b>86 %</b>	<b>87 %</b>	<b>87 %</b>	<b>76 %</b>	<b>78 %</b>
<b>Total growth</b>	<b>22 %</b>	<b>24 %</b>	<b>26 %</b>	<b>24 %</b>	<b>25 %</b>
<b>Absolute increase</b>	<b>94450</b>	<b>43725</b>	<b>54410</b>	<b>11847</b>	<b>33384</b>

These results indicate shaping of the future public transport system faces a crossroad. If one wishes to achieve the high modal share on public transport as the Delfi scenario requires, the introduction of incentive systems to shift private car use to public

transport will have to be augmented through an expansion of the public transport system so that it has the ability to absorb the tremendous increase in the number trips.

Should we however be content to continue with the current modal share on the public transport (BaU scenario), analysis shows that the public transport system should primarily be designed to meet the needs of the growing elderly population.

## **Implications for the design of future transport**

An important challenge emanating from the analyses is that the future public transport will need to ensure that sufficient capacity is available to handle the future growth of the users. As the largest share of trips are work trips, businesses and organizations should be encouraged to design mobility plans for their employees. Plans should be sufficiently flexible so that they can either be seamlessly integrated into the existing public transport services, or new public transport options can be designed for the company employees.

"Trip chaining" can be expected to increase in the future. For trip-chaining, travel by car is assumed to continue to be the dominant mode of transport. Should use of public transport be increased in the future, supply should be designed to capture the needs of the group performing trip-chaining. Planning, coordination and promotion of scheduled public transport systems should be reconsidered in light of the rapid pace of development in Information -and Communications Technologies.

Results from the Delfi survey exhibit a high degree of consensus around a future where great emphasis is placed on communication technologies, leading to change in people's travel habits, while public transport will take over more of passenger in the major cities in Norway. Inter-city travel statistics show that the proportion on public transport rises steeply for trips over 45 minutes, and correspondingly falls for trips under 45 minutes. This difference in travel time between public transport and car use can be crucial for people's choice of travel mode. In light of this, the future of public transport to a greater extent needs to evolve to cater to the needs of the group indulging in short journeys in order to ensure a significant increase in the use of public transport.

Aging will most likely result in a need for more flexible public transport systems. This flexibility should be aligned with the new communications technology. Instead of all routes that run on fixed schedules and ends up in the center, it will probably be a better idea to develop a high-speed ring / corridor that connects all major urban centers through public transport hubs. These hubs should ideally be placed in walking distance to amenities such as libraries, restaurants, nurseries, shops, football pitches, sports halls etc. This type of a "dynamic" transport will ensure a better adaptation of the public transport in addressing multiple user needs.

Feeding mechanisms to the central grids and nodes should be done by providing infrastructure like (electric) bike sharing schemes, dial-n-ride schemes, walking and the likes. This provides the opportunity to develop flexible connectivity systems allowing public transport to better address the user needs. The case of Trondheim has been used to highlight this aspect. The finished public transport system must seamlessly integrate walking, cycling, car sharing, taxis and all forms of public transport. It must

be supported by an efficient communication system that provides real-time information on timetables and simple payment solutions.

In the future we can assume that the mobile ICT systems will be more accessible and easier to operate. This development means that public transport becomes an arena where mobile ICT will be used more than today. Aligning user needs in terms public transports capacity and preferences with regard to comfort, connectivity, time saving and better integration with new technologies seems to be the way for increasing public transport usage in the future.