



# The impact of Universally accessible public transport—a before and after study



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## ABSTRACT

The article studies the effects of universal design measures in public transport. It is based on an evaluation conducted by the authors in 2010–2012 - a before and after study of measures partfunded by a Norwegian government funding program for improved accessibility in six different cities. The article employs a two-pronged empirical approach; quantitative surveys of all passengers on the affected routes (supplemented by interviews with drivers and personnel), and qualitative case studies with individual public transport users with disabilities. The first part of the article describes how universal design measures are perceived by and affect passengers in general, and discuss whether such measures may lead to an increase in the number of passengers. The second part considers how such measures influence the experience of travelling for passengers with disabilities, and what it takes for disabled passengers to be able to use public transport on par with other citizens. We conclude that previous surveys, which have not included control cases and questions, have probably overestimated passenger effects of universal design measures, as the results are affected by demographic factors. We still find that the measures have a positive impact on patronage. Like earlier studies, we find that the majority of respondents having trouble using public transport, report that this is due to bringing a pram or heavy luggage. We hypothesize that positive effects on passenger numbers due to reduced expulsion, (i.e. that certain groups are able to continue using public transport for a longer period when it is universally designed) may mean that effects on passenger numbers can increase over time. We find that in terms of social economics, universal design is profitable even with fairly low passenger numbers. The case studies demonstrate that although universal design measures contribute to enabling persons with disabilities to use public transport, such measures should be analyzed as parts of a transport system, not separately. The various elements of the system, including the people employed in it, must continuously work together to maintain universality. This goes for maintenance as well as for services provided by drivers. To secure mobility for people with disabilities, it is also essential that the system is predictable and that accessibility is from door-to-door, not only from bus-stop to bus-stop.

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## 1. Introduction

With changing structures of work and family life, mobility has become an increasingly important precondition of being a fully functioning citizen. Recent years have seen an interest in how mobility restrictions can be a cause of *social exclusion* (Cass et al., 2005; Preston & Rajé, 2007; Preston, 2009; Priya & Uteng, 2009) – a situation where individuals cannot participate in the normal activities of their society, even though they would like to do so (Burchard et al., 1999). People with disabilities are frequently identified as one of the groups (along with women, low-income groups, the elderly, and others) that may suffer from social exclusion as a result of reduced mobility (Barnes & Mercer, 2005;

Casas, 2007), and problems using public transport are among the causes (Field, Jette, 2007; Kenyon et al., 2002).

Providing access to transport for people with disabilities is not a marginal problem, and it is expected to grow in the future. In the UK, it has been estimated that one in five adults has a disability, and that two-thirds are at least 60 years of age (Hanson, 2004). In a Norwegian survey, 15% of people of working age described themselves as having some level of disability. For the group aged between 50 and 65 years, the share is 30% (Samfunnsspeilet nr, 2004). Not all disability will be relevant when it comes to public transport, but such high numbers indicate that accessibility is an important issue. With populations ageing, there is reason to believe that an increasing number of people will have difficulty using public transport in the future. In many Western countries, the share of the population aged above 65 is now approaching 15% (Crews and Zavotka, 2006) and in Norway this has already been

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passed, with the figure expected to rise considerably (Folkhelseinstituttet, 2013).

The classic conception of disability is often referred to as the “medical model” (Shakespeare, 2006). According to this model, disability is caused by impairment and is a characteristic of the individual. It has to be cured or ameliorated (Hanson, 2004). The so-called “social model” of disability, however, claims that disability is a social construction produced in the interplay between the individual and society (Shakespeare, 2006). “Disability”, thus conceived, is not necessarily a permanent feature of the individual, and passengers travelling with a pram or heavy baggage might be seen as temporarily disabled. A society where attitudes, standards and technologies are adapted only to the needs of the young and healthy thus produces a large number of disabled people, whereas one where solutions are adapted to the abilities and requirements of a larger group will produce fewer. The proponents of this model concede that there is a medical reality underlying disability, but emphasize that society contributes to marginalizing the disabled through its implicit endorsement of a certain norm. This approach is to draw attention to how physical design may create barriers to participation. From this perspective, poorly designed public transport may produce disability through excluding certain groups from using the public transport system, and thus from full participation in society.

The concept of *universal design* in reference to a strategy to counter such effects was first coined by the architect Ronald Mace, who defined it as “the design of products and environments to be usable by all people, to the greatest extent possible, without the need for adaptation or specialized design” (Mace, 1997). Early efforts to render environments accessible were frequently dependent on segregated measures which were “more expensive, and usually ugly” (Story et al., 1998). The objective of universal design is an environment where persons with disabilities can function as natural members of society, and a guiding notion is that accessibility solutions benefit everyone, not just those with disabilities.

Universal design or accessibility is a feature of legislation in many countries (Tennøy & Leiren, 2008), with government and transport providers often obliged to make public transport available to most groups of passengers. This does not in itself guarantee accessibility, however, since implementation is often sketchy. Herriot (2011) points out that one reason could be user consultation frequently taking place at too late a stage in the design process. Even if efforts are made to make systems accessible, this does not in itself guarantee that the measures work as intended. Despite this, and also the fact that large sums of money are spent on making transport systems more accessible, very little research has been done on how universal design and accessibility measures work for people with disabilities, or indeed for passengers in general (Øksenholt et al., 2014). Studies such as those of Fearnley, Hauge, 2010 and Odeck et al. (2010), however, indicate that accessibility measures have positive side effects in facilitating travelling for passengers with prams or heavy baggage, effects that contribute significantly to a positive valuation of universal design elements.

This article is about the effects of a set of universal design measures introduced in public transport in Norway. It is based on before and after studies, and describes how such measures are perceived by and affect the travel behaviour of passengers in general, and how they influence the travelling experience of people with disabilities. The structure of the paper is as follows: In Section 2 we present the methodology of the study and in Section 3 the findings from quantitative surveys of public transport users in general and their perception of universal design measures. We discuss: whether the measures have an effect on passenger numbers; the most widespread accessibility problems; and the economic effects of accessibility measures. In Section 4 we take qualitative data from case

studies and assess how these measures influence the experience of individuals with disabilities travelling on public transport. We discuss factors that enable disabled passengers to use public transport on a par with other citizens, and also that deter its use, before drawing some conclusions in Section 5.

## 2. Methodology

The empirical material for the article is from an evaluation study conducted by the authors in 2010–2012 (Aarhaug & Elvebakk, 2012).

Evaluation took the form of before and after studies of measures part-funded by a Norwegian government funding programme for improved accessibility. The programme defined universal design as “infrastructure and vehicles [should be] designed in such a way that public transport solutions to the greatest possible extent can be used by all people, of all ages and with different abilities” (Ministry of Transport and Communications, 2006).

The study dealt with universal design measures introduced in six cities in Norway in the period 2011–2012. Measures on selected routes had to be sufficiently comprehensive to affect all travellers; for instance, only in cases where all or almost all stops were to be enhanced were bus routes to be included. Four of the improvement schemes focused on bus stops, one on a ferry terminal and one on a combined train/bus terminal. The study employed a two-pronged empirical approach: quantitative surveys of all passengers on the routes affected (supplemented by interviews with drivers and personnel) and qualitative case studies with individual public transport users with disabilities.

The survey was distributed to passengers assumed to be 16 years or older – before and after measures were introduced, and was nearly identical in all cities except for local modifications where these were deemed logical. Surveys were distributed either on board buses/ferries or at selected bus stops and terminals, and in the before and after studies were identical in order to preclude any effects of survey design. For example, a question about the situation 12 months earlier was used in both studies. The questionnaire comprised background questions on age, gender and occupation; questions on purpose of the travel, whether they had a pram with them or heavy baggage, alternative modes of transport, travel frequency, and how the respondent would have conducted the reference trip a year previously. Finally, some case-specific questions were included on whether passengers were aware of specific changes in the public transport system and what their opinion was of specific proposed changes.

One-thousand-nine-hundred-and-twelve surveys were distributed in the before study and 1,361 in the after study.

Table 1 indicates that of the six cities in the before study only three were included in the after study. In the case of Stavanger this

**Table 1**  
Number of responses and response rates in the before and after studies.

City	Respondents in the before study	Response rate in the before study (percent)	Respondents in the after study	Response rate in the after study (percent)
Fredrikstad	165	63	208	65
Kristiansand	96	55	116	60
Stavanger	31	6	–	–
Trondheim	348	46	694	81
Steinkjer	18	23	–	–
Harstad	41	49	–	–
Sum	699	37	1018	75
Surveys distributed	1912		1361	

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