

THE TRONDHEIM TOLL RING SYSTEM

Tore Hoven
Public Roads Administration Norway
tore.hoven@vegvesen.no

For a number of years, Norway has financed new road infrastructure by charging tolls. Initially this was done on bridges and tunnels outside built up areas, but in recent years toll rings have been introduced around major urban centres including Bergen, Oslo and Trondheim. The original legislation under which these tolling schemes were introduced restricted the use of the money collected through tolls to the provision of new road infrastructure, but now it is also possible to use a proportion for infrastructure for the transit system and urban environmental improvements.

Trondheim is the third largest city in Norway having a population of 150000 and the centre for an area with 250000 inhabitants. The main traffic problem in Trondheim was the lack of a main safe road system with sufficient capacity to handle the traffic demand. This caused traffic problems in the city centre and the nearby residential areas. As much as 50 % of the traffic in the city centre was just going through the centre without any stops. In the years between 1983 and 1987 a traffic growth of 25 % was registered. Although the growth decreased from 1987 to 1990, it was easy to predict a total collapse in the near future if nothing was done to improve the transport system.

The solution of the problems was found to be the following :

- A new and better main road system outside the city centre
- A safe and better road network for pedestrians and cyclists
- Intelligent priority to public transit

This solution was worked out in a development plan for the future infrastructure. It became a plan for extending the present main road system, building new roads around the city centre, an extended and new road system for pedestrians and cyclists and different ways of giving priority to public transport. The transportation investment plan was estimated to a cost of NOK 2.2 billion and should be financed by toll revenues (60 %) and national funding (40%).

The following goals were emphasised both of the local and central authorities:

- The toll or road pricing system should have very low operating costs
- The system should be use as a traffic regulation tool, the user should pay a higher rate during peak hours in order to distribute the traffic in time.
- The system should be based no stop electronic payment system
- The justice of the system should be emphasised in order to avoid refusal of users and/or subscribers
- The necessary equipment should be compressed in such a manner that it was possible to place it everywhere, even in the streets of the city centre

The toll ring was aligned so that about 60% of the inhabitants in Trondheim live outside its boundary but that the majority of jobs, shops, recreational and other public services lie

inside, at or near the city centre. The consequence is that a majority of the inhabitants have need to cross the toll ring at some stage in the performance of their normal activities.

In contrast to other Norwegian toll ring schemes, the Trondheim toll ring was designed from the outset to make full use of automatic debiting technology. The operation of the toll ring is based on the use of an electronic tag which enables vehicles to be detected and charged as they cross the toll ring at any speed. The core of the toll ring consists of 12 toll plazas, 10 of which are unmanned with two, located towards the south and east of the city, having provision for both automatic and manual payment. The toll ring operates Monday to Friday, from 06: to 17:00, and collects revenue from inbound traffic only.

The basic toll level was set at NOK 10 per crossing for light vehicles (with total weight < 3.5 tonnes), and NOK 20 for heavy vehicles. Today, 12 years later it is NOK 15 and NOK 30. Public transport vehicles and motor cycles are exempt from tolls. (10 NOK = \$1.5)

The discount structure is such that crossings after 10 AM receive a larger discount, thus introducing a small measure of peak/off-peak price discrimination. There is also a limit to the total number of crossings per tag each subscriber must pay for - maximum one per hour and up to 60 per month. For households with more than one car, two tags are allowed on the same subscription.

The Trondheim Toll Ring was opened the 14th of October 1991. The acceptance of the electronic tolling system was a key factor for the unmanned solution. The marketing of the system was very successful, and from the very first day more than 40.000 electronic tags were in use. This has increased to 120 000 tags today, and during the morning peak hours, more than 95 % of the cars are using the no stop lanes. The income the first year after the opening was NOK 80 mill, and the operating cost was only NOK 6 mill. The total cost of the 12 toll plazas, including the electronic tolling system was NOK 50 mill.

THE USERS ATTITUDES TO THE TOLL RING

The Public Roads Administration has carried out several inquiries in order to check the users view of road pricing and their attitudes to the introduction of the Toll Ring. These inquiries took place in the period before the opening of the Toll Ring, in the autumn of 1991, and also several times just after the opening.

In November 1991, one month after the opening of the Toll Ring, an inquiry was performed among motorists entering the Toll Ring once or several times a week. 90% stated that they were satisfied with the toll system. The result also confirmed the impression that the users were satisfied with the chosen automatic collection system. In April -91, before the opening of the Toll Ring, 72% of those questioned stated that the Toll Ring was a negative action, while 8% were positive. Considering the inquiry from December 1991, 2 months after the opening of the Toll Ring, the sensational result was that only 48% were negative while 19% had a positive attitude. The inquiries of June -92 and June -93 state further changes in attitude. Today 36% are negative to the Toll Ring while 32% are positive. 27% are indifferent to the question.

Explaining the substantial change of attitude is difficult. Partly, the reason might be that people to a considerable extent opposed as long as the Toll Ring was not yet put into operation. In April 91, a lot of people still hoped that one would change the plans of introducing a Toll Ring if public resistance got big enough. After the Toll Ring was in fact established, they resigned. Another factor explaining the change of attitude, is that the

motorists to no great extent are delayed by, or notice the plazas. Most motorists are subscribers, and therefore registrations and payments do not cause delay (they accept and settle with the situation).

CHANGE IN TRAVEL BEHAVIOUR

Car use

In the period of 1990 to 1992, there was a decrease of 5,6 % in the number of car travels in the Trondheim area. This was less than the total decrease of travels (12%), something that indicates that the Toll Ring has led to no significant decrease in car use for the Trondheim area as a whole. When it comes to the change in the total number of car travels through the Toll Ring, the decrease is registered to 3,8% (which is less than the general decrease). Thus, the Toll Ring has not led to any exceptional decrease in the total number of car travels through the Toll Ring. There are, however, great variations depending on when the travel took place.

During Toll Ring opening hours (6. a.m. to 5. p.m. during weekdays), a 10% decrease was registered in the period from 1990 to 1992, while an 8 - 9% increase was registered during the period when there was no collection (that is from Monday - Friday between 5 p.m. and 6. a.m. and all Saturday and Sunday). It seems that the Toll Ring has caused a move in time for car travels, from the periods of collection towards the nights and week-ends without collection. Data, based both on the travellers habit inquiry and the traffic censuses, show variations between different parts of the Toll Ring. Moreover, statistics concerning traffic development of the toll plazas indicate that the change in travelling attitudes were larger during the first period after the opening of the Toll Ring compared to the data from the travellers habit inquiries. The duration of the adjustment period seems to have lasted from 3 - 4 months from opening day.

Change in Transit Use

Registrations show that the number of transit travels through the Toll Ring have increased with 7 % compared to transit travels for the city seen as a whole. This indicates that the Toll Ring may have been a contributory factor to the increase. However, several improvements in the transit offer has been carried out in the same period (increased route frequency etc.) which one must expect will increase the popularity of transit use.

The increase in transit travels through the Toll Ring, was particularly significant on weekdays between 10.a.m. and 5.p.m., while no changes were found between 6.a.m. and 10.a.m. This implies that working travels only to a little extent are influenced by the Toll Ring. Transit travels in the afternoon that carry other purposes, are however transferred from other means of transport.

A SECTOR PRICING SYSTEM FROM 1998

A need for higher revenues and equity reasons lead to a redesign of the toll ring system during the spring of 1998. The new system has 18 charging points in a sector pricing system. After the change Trondheim might qualify as the first application of area congestion pricing. The fare structure still provides disincentives to car use in business hours and especially during the morning peak hours. The revenues last year was 150 mill NOK.

A NICE CITY

The Trondheim Toll Ring System has changed the city. The toll revenues have made it possible to improve the transportation system, including road investments, a safe road network for pedestrians and cyclists, and better public transport system. The traffic situation in the city is significantly better than ten years ago.