USERS' ATTITUDES TOWARDS ROAD TOLLS – A CROSS SECTION ASSESSMENT

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ABSTRACT

In this paper we investigate the extent to which users acknowledge tolling as a good practice.

Users' attitudes across 5 toll projects from Norway are examined using a questionnaire survey. The results should be of interest to countries considering tolling and hence may consider user attitudes rigorously in their planning processes. Specifically we consider whether users really understand the assumptions made by planners and experts; do they really know or acknowledge that tolling is for their own benefit? Two alternative answers are readily available: (1) users do not know or understand the aim of tolling in which case they are likely to be negative towards tolls; (2) users understand and appreciate tolls due to the benefits that accrue to them, in which case they will be positive towards them.

Using 5 Norwegian tolled projects our findings are as follows: (i) in situations where tolls are still in place and in situations where tolls are being considered, the percentage of support for tolls are all below 20 percent, (ii) however, in situations where tolls have been removed the percentage of those in support is higher than in situations where tolls are yet to be removed and, (iii) in situation where tolls are not yet implemented, the percentage of those against is the highest. Finally, we find that negative attitudes is highly correlated to the level of information given to users a priori on the motives with tolls; less information lead to higher negative attitudes and vice-versa. Other factors explaining these attitudes are also investigated.

INTRODUCTION

Tolling of road projects are initiated on the basis that users will receive benefits earlier than is possible with the scarce governmental funds. It is a common practice that planners and researchers conduct feasibility studies on the viability of such projects. The results are then presented to the decision makers who take them for granted and therefore sanction tolling on that basis. In the process, roads users are often ignored at least as far as their attitudes are concerned. Yet

an informed planning process requires full information to all involved parties, users and decision makers alike.

The failure to involve users in the planning process by for example informing them before hand on the intentions with tolling and how benefits will accrue to them may explain why several planned charging schemes throughout Europe have failed in the past. The rationale is clear; decision makers will be more likely to sanction projects that the users are in support of. Ideally road users should understand and support tolling as it brings forth benefits at an earlier stage than would be possible with state funds alone. If people really understand the reason for tolling, people might be more positive towards tolling and make it easier to sanction toll projects for the politicians.

In this paper we address what the user attitudes towards tolling are, and whether users understand and appreciate the ideas behind tolling. We use Norway as a case example, where tolling has been practised for over 60 years. Our point of departure is a questionnaire survey conducted at five different toll projects. Specifically we consider whether users really understand the assumptions made by planners and experts; do they know or acknowledge that tolling is for their own benefit? A special emphasis is set on how information influences the attitudes towards tolls. Other explanatory factors for the prevailing attitudes are also investigated.

It already exist several articles where attitudes towards and acceptability of user charges is analysed (see for instance, Jones 1991, 1995 and 1998 and Schade and Schlag (2003) where they conduct a wide literature review). However, the focus in these studies has been situations where tolls or charging schemes have not yet been implemented. This study analyse attitudes in situations before and after implementation of toll charging systems. Perhaps the only already available studies about this are the ones by Odeck and Bråthen (1997, 2002 and 2004).

The paper is organised as follows: Section 1 provides the description of data and methodology, Section 2 presents the empirical results and Section 3 the concluding remarks.

THE DATA AND METHODOLOGY

Data was collected from 5 different toll projects with different characteristics, and situated in different regions. Table 1 gives an overview of the projects studied. Two of the studies (E6 Leirfjorden and E18 Lierbommen) were conducted after the toll charging scheme had been removed and the new road already was financed and built. In two studies (E18 and E6 Østfold), the toll charging scheme had just been introduced and the road construction was in progress. In the last study (Tønsbergpakken), the toll charging scheme was yet to be implemented,

but the scheme was already sanctioned by the parliament to start the following year.

Table 1: The characteristics of the project:

Name of project	Type of toll scheme	Availability of alternative toll free route	Status of toll charging
E18 Østfold	Single toll	Yes[1]	Tolls just implemented
E6 Østfold	Single toll	No	Tolls just implemented
E18 Lierbommen	Single toll	Yes	Tolls just removed
E6 Leirfjorden	Single toll	No	Tolls just removed
Tønsbergpakken	Toll Ring	No	Tolls about to be implemented

[1] Alternative road in only one direction

Data was collected by means of a standard question survey of roads users. Questions raised to the respondents addressed issues of public concern about the imposition of tolls.

The data collected was analysed in the two following ways:

1. A descriptive analysis with respect to attitudes, information and understanding of tolling.
2. A multivariate analysis where attitudes are related to the overall characteristics of the individuals as well as the information and understanding of tolls.

About 21000 responses were received, however not all respondents responded to all questions. One of the studies (Leirfjorden) had only questions about attitudes and not about information or understanding of tolls and is therefore only included in the analysis of general question about attitudes.

The multivariate analysis was built on a binary probabilistic model (see Ben-Akiva and Lerman 1987 for description) because of the discrete nature of the two possible outcomes of attitudes. The question posed to the respondents about their attitudes was classified as positive or negative. This is the same as a discrete choice situation where people choose to be negative or positive. Logit-, probit and other limited dependent variable models could all be chosen to model this choice situation. For the sake of convenience, a binominal logit model was chosen.

This model can in general form be written as:

$$P_{ij} = \frac{e^{V_{ij}}}{\sum_{j} e^{V_{ij}}}$$

Where P_{ij} is the probability that respondent i choose to have j as an attitude. V_{ij} is the respondent's satisfaction by choosing attitude j and is written as:

$$V_{ij} = bX_{ij} + e_{ij}$$

Where X_{ij}= a vector of measurable characteristics that define utility, (e.g. age, gender, income, trip frequency, information, etc.);
ß= a vector of parameters to be estimated and
e_{ij} is an error term that accounts for unobservable factors influencing individuals' utility choosing attitude type j.

In the model, all variables are ordinal; hence only statements about the effect of a particular category in comparison to some other categories can be drawn. For example, in this analysis the estimated "information parameter", represents the influence little information (information 1) has on attitudes in comparison to "sufficient information". This is explained further under the description of the estimated model.

EMPIRICAL RESULTS

The findings from this study are divided in two: (1): attitudes towards tolls and how the level of information received influence attitudes (2) how overall characteristics of individuals influence their attitudes towards tolls.

Attitudes towards Tolls and Influence of Information and Understanding of Tolls

Knowledge about users' attitudes towards tolls is important for those who advocate tolling as a useful means of financing road infrastructure investments. An interesting question to address is if and how attitudes vary. Table 2 shows the variation in attitudes towards tolls across the 5 projects studied.

Table 2: Attitudes towards tolling

Toll project	Time of study	Positive (%)	Negative (%)	Observations
E18 Østfold	Tolls just introduced	14	86	785
E6 Østfold	Tolls just introduced	19	81	2293
Tønsbergpakke	Tolls about to be introduced	11	89	11865
E18 Lierbommen	Tolls removed	32	68	5006
E6 Leirfjorden[1]	Tolls removed	75	25	893
Weighted average		30	70	20842

1 The question posed about attitudes to respondents was to what degree the respondent found tolling useful. Useful is interpreted as positive and not useful is interpreted as negative.

The vast majority (70%) are negative towards road tolling. This is not surprising, considering the fact that the people in principle are accustomed to free use of roads. Few will be positive to paying for a service that prior was free!

The results indicate that people are most negative towards tolling in places where tolls were yet to be introduced. In Tønsbergpakken, 89% was negative towards tolling. At E18 Lierbommen and E6 Leirfjorden, projects where tolling has been removed, 68% and 25% were negative towards tolls respectively.

Also in projects where the tolls have just been introduced (E6 and E18 Østfold), people are more negative towards tolls than where the toll charging has been removed (e.g. E18 Lierbommen and E6 Leirfjorden). The reason for this might be that where tolls have been removed the users have seen the road being built and completed by the use of toll funds. They have in other words seen the results and benefits of the toll charges. Users of roads where tolls have just been introduced have not experienced the full benefits of the charging scheme (e.g. E6 Østfold and E18 Østfold).

Users of projects where a fast link replace a ferry tend to be more positive towards tolling than users of other road projects. Tolls charged at Leirfjorden were used to build a road that replaced a ferry. Users were used to paying a ferry fee before toll charges were introduced. A great demand and requirement locally for a new road in this area may also be the reason for why the majority of the users are positive to the toll fees.

In a well functioning planning process, all involved parties should be informed; both users and decision makers alike. An important question is then to what extent users feel they were informed about the objective of the project and tolling before it was implemented. If they have been well informed, it is possible they will be more positive towards tolling, since they would know they are paying for the infrastructure they most likely will be using in the future. In the following, the extent of information received by users on the intentions with tolls and how this might influence attitudes is analysed.

Table 3 shows to what extent the users feel they have received enough information about the use of tolls and alternatives to tolls.

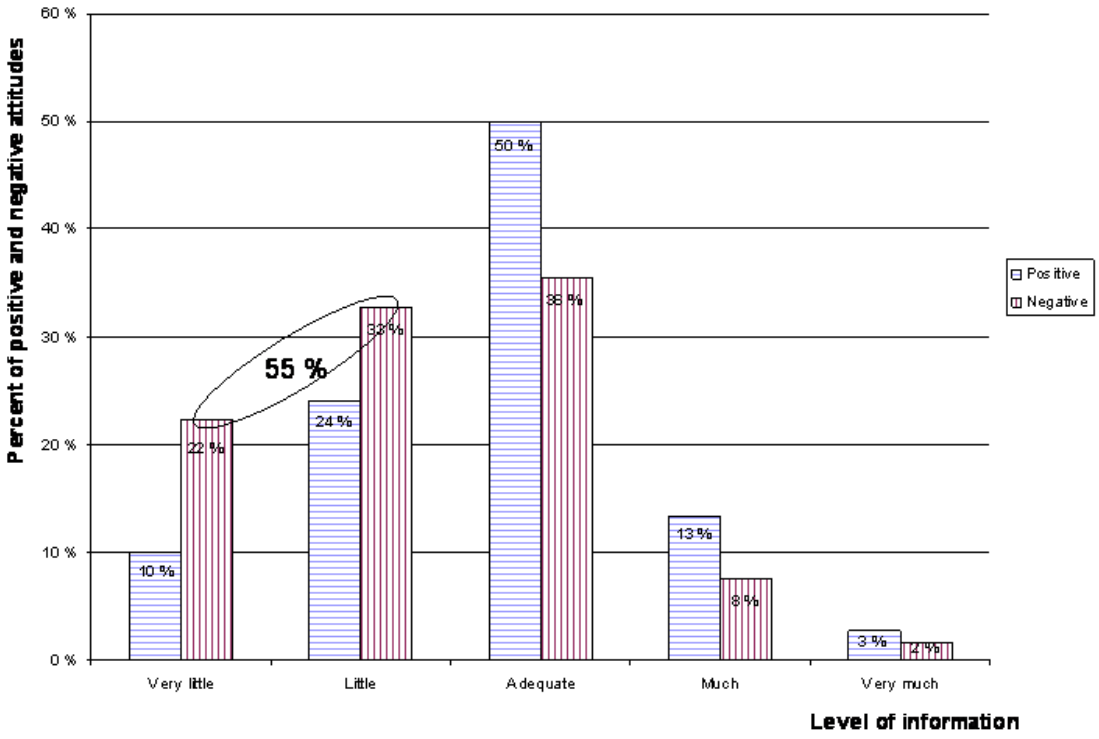
Table 3: Level of information at the different toll projects

	Very little (%)	Little (%)	Adequate(%)	Much (%)	Too Much (%)
E18 Østfold	22	31	35	9	2
E6 Østfold	22	33	35	9	2
Tønsbergpakken	19	31	38	10	2
E18 Lierbommen	21	32	40	6	1
Total	21	31	37	8	2

A clear indication is given from the results; the users of the toll projects are not given sufficient information about the reason for toll charging and alternatives to toll charging. On average, only 37 % thought that they received adequate information, and only 47% thought they received adequate or more than adequate information about the reason for toll charges. The later result varies between 46 to 50 % depending on the project considered. As much as 52 % think they have received less than adequate information.

Another issue worth consideration is if the level of information influences the attitudes towards tolling. Figure 1 show how positive and negative users categorise the level of information received.

Figure 1: Percent of positive and negative attitudes by level of information



The result indicates that the level of information does influence the attitudes towards tolling. People who have received adequate information tend to be more positive towards tolling than people that have not received adequate information.

66 % of the respondents that are positive towards tolls have received adequate or more than adequate information about the reasons for tolling. Only 45 % of the respondents who are negative towards tolls mean they have received adequate or more than adequate information.
55 % of the users with negative attitudes towards tolling feel they have received less than adequate information about the tolling at the same time as a higher percentage of the positive ones have received sufficient information. This makes it tempting to conclude with the following:

- There is truly a need for information about the reasons for tolling and alternatives so that people understand what the potential benefits of financing by tolling are.
- By improving the information strategy, planners might receive more support for tolling as a mean to finance the project.

The objective of tolls in Norway is to raise funds for road infrastructure. People pay for the road they probably will use in the future. Tolls bring forth benefits at an earlier stage than would be possible with governmental funds alone. Do people really understand the reason for tolling? What do they believe is the reason for toll charges?

Table 4 shows why the users think toll charges have been/is introduced

The majority (68%) know the reason for road tolls in Norway is to finance an improved road infrastructure network.

Table 4: Reasons for tolling

	Environmental initiative to reduce traffic growth (%)	More money for the government (%)	Financing a Better Road System (%)
E18 Østfold	0	31	69
E6 Østfold	1	33	66
Tønsbergpakken	5	28	67
E18 Lierbommen	1	30	69
Total	3	29	68

There seem to be no large difference between projects on what the users believe is the reason for tolling. On average, 68 % believe financing a better road system is the reason for tolling, 29 % thinks “More money to the government” is the reason and 3% think tolling is an environmental initiative to reduce traffic. Although it should be encouraging for road planners that the vast majority understand the reasons with tolling, there is still work to be done in terms of informing users.

An interesting question to look at is whether there is a difference between people with positive and negative attitudes with respect to what they believe is the intentions with tolling.

Table 5: Attitudes and the reason for tolling

	Environmental initiative to reduce traffic growth (%)	More money for the government (%)	Financing a better road systems (%)
Positive	4	7	89
Negative	3	34	63

An interesting finding is that when comparing users with positive attitudes to users with negative attitudes, a higher percentage of the users with positive attitudes towards tolling know that the intention with tolling is to finance a better roads system. 89 % of the positive respondents believe the reason is to finance better roads systems, whereas 67% of the ones with negative attitudes believe

the same. Thus, we are tempted to conclude that appropriate information probably will help increase positive attitudes towards tolls.

An understanding of the reason for attitudes might be of help when designing information to the users. The questionnaire made it possible to see how the respondents themselves explain their negative and positive attitudes.

Table 6: Explanations of negative attitudes

Explanations	**%**
Expensive way of collecting money	9
Money is used for other things than building roads	11
People are obstructed from travelling	2
The toll plaza is never removed	3
We already pay enough in taxes	75

The main reason (75 %) for the negative attitudes is that people think they already pay enough taxes. This is not surprising. Car users do pay quite a lot of taxes for the use of roads and cars. A national road tax is levied on the car users. In addition the car users face taxes on the purchase and use of cars. Some of these taxes (The CO_2 and SO_2 tax) are taxes to internalise environmental impacts of using fuel, whereas the others are general taxes. Planners do not have the possibility to change the level of general taxes; however they are in the position to use this information in a strategy for implementing tolls.

A surprisingly high share (11 %) of the respondents thinks that the money is used for other things than building roads. In the Lierbommen survey, as much as 18 percent of users with negative attitudes towards tolls are negative because they believe the money is used for other things than improving the road system. Lierbommen is however, a special case where the toll plaza was not removed after the road project had been built and fully financed. The toll funds were also used to finance another road project which was not directly beneficial to all users. This indicates that it is important that tolls benefits the direct users; otherwise should be explained to users *a priori.*

Some of the users are negative towards tolling because they think that toll is an expensive way of collecting funds. In Norway the cost of collection toll funds vary with the charging system. For instance, in Tønsbergpakken, a fully automatic charging system has been built. Some other toll plazas have lanes where users can pay manually while there are optional lanes for tag users. On average the cost of collecting toll funds within projects in Norway is about 10% of the total funds collected. An alternative to financing new roads by tolls would be to finance projects with general taxes. This is not cost free either and needs to be explained to road users! In Norway the cost of funds is set to 20 % by the Ministry of Finance and reflects the administrative and distortion costs associated with collecting funds through taxation. Thus, tolls may in some instances be

considered as a cheaper way of financing infrastructure especially where the additional deadweight loss, which should be added to collection costs, is less than 10 %.

A low percentage of users, about 2 %, state that “the toll fees obstruct people from travelling” as reason for being negative towards tolls. It thus seems as if tolls have relatively low elasticity. In fact, this finding conform to previous studies on toll elasticities which have shown elasticities to vary between 0.3 and 0.8 (See for instance, Goodwin 1992, and Odeck and Bråthen 2004)

Table 7 shows how the respondents explain their positive attitudes. The majority, about 72 %, are positive towards tolling because it gives them a better road system. The benefit from paying is thus the reason for being positive. A quite large percentage (21%) is positive because the users of the road are paying themselves, which might indicate that paying for a benefit you will receive yourself is positive. Paying tolls for something you will not receive the benefits from is negative (ref table 6).

Table 7: Stated reasons for positive attitudes

	(%)
Financing a better road system	72
The users pay themselves	21
People are forced to travel by public transport and the environment is thereby improved	5
Others pay road tolls- why not us?	2

How overall characteristics of individuals influence their attitudes towards tolls

We now turn to analyse the determinants of attitudes towards tolls using a multivariate logit analysis, where we combine factors described above with overall characteristics of respondents as explanatory variables.

Table 8 shows the variables in the model. The 0 categories are the reference category which the estimated parameters are compared to.

Table 8: Variables in the model

Variables	Codes
Attitude	1: Negative; 0: positive
Information	1: Too little information; 0 otherwise: sufficient or more than sufficient information
Understanding	1: Tolls are used to reduce traffic/tolls are there to increase the money to the government in general; 0 otherwise: toll charging is implemented to finance an improved road system
Age	1: under 25 years, 2: 25-44 years, 3:45-64 years; 0 otherwise: > 64 years
Income	1: under 150' NOK, 2: 150'-300'NOK, 3: 301'-500' NOK; 0 otherwise: >500'NOK
Gender	1: Man; 0 otherwise: Woman
Trip frequency	1: >7 times a week, 2: 4-7 times a week, 3: 1-3 times a week, 4: 1-3 times a month, 5: 4-8 times a year; 0 otherwise: less than 4 times a year
Trip length	1: < 5km, 2: 5-19 km, 3: 20-50km; 0 otherwise: > 50 km

The result of the estimation is presented in Table 9.

In the model, variables with positive signs should be interpreted as having a negative impact on attitudes and those with negative signs a positive impact.

As mentioned earlier, an estimated parameter (here e.g. information (1)), represents how one category of information influence attitudes in comparison to another information category. If the estimated parameter for information (1) is positive, it will mean that people that have received too little information have a higher probability of being negative towards tolling than people who received sufficient or more than sufficient information. If the estimated parameter is negative, it will mean that they have a lower probability of being negative.

Table 9: Results of the model

Variables	B	S.E.	df	Sig.
Information(1)	,697	,043	1	,000
Understanding(1)	1,301	,060	1	,000
Gender(1)	-,073	,045	1	,106
Income			3	,000
Income(1)	,284	,120	1	,018
Income(2)	,386	,060	1	,000
Income(3)	,309	,047	1	,000
Age			3	,002
Age(1)	,487	,140	1	,000
Age(2)	,241	,080	1	,003
Age(3)	,226	,078	1	,004
Trip length			3	,000
Trip length(1)	,592	,086	1	,000
Trip length(2)	,610	,057	1	,000
Trip length(3)	,221	,054	1	,000
Frequency			5	,000
Frequency(1)	,539	,100	1	,000
Frequency(2)	,580	,082	1	,000
Frequency(3)	,246	,086	1	,004
Frequency(4)	-,003	,087	1	,972
Frequency(5)	-,014	,101	1	,885
Constant	-,053	,115	1	,644

R^2= 0,09

The first issue to address is whether the level of information received by the users significantly influence attitudes towards tolling. Users who received too little information (information (1)) had a higher probability of being negative than users who had been given sufficient or more than sufficient information. This indicates the importance of supplying sufficient information as a means of combating negative attitudes. Results from earlier sections in this paper, where a higher percentage of users who received sufficient or more than sufficient information were positive than those who received too little information, is verified.

Next, to what degree people truly understand the intentions of tolling and how this influences the attitudes is of interest. Here, only people who stated that the reason for tolling is “to finance a better road system” were coded to have understood the intention with tolling. The result shows that understanding of tolling is a significant explanatory variable. People who misunderstood the reason for tolling had in other words a higher probability for being negative towards tolling than people who understood the reason. In an information strategy, it is thus important to design the information in such a way that the intention with tolling is easy to understand. This might change negative attitudes.

There seem to be no difference in attitudes with respect to gender. Gender is not a significant explanatory variable for attitudes.

Looking closer at the influence income has on attitudes; we see that income is a significant explanatory variable. People in the lower income group have a higher probability for being negative towards tolling than people in the group with the highest level of income (more than 500' NOK). This seems plausible; the higher income group will be less affected by the tolls. Table 9 also shows that the two medium income groups are more negative than the lowest income group, all compared to the highest income group.

In terms of age groups, the youngest car users seem to be the most negative towards tolling. This is no surprise as this age group dominates the lower income group.

There is also a difference in attitudes with respect to the length of trip and trip frequency. The model shows that users who do the shortest trips are more likely to be negative as compared to those who do the longest trips. The total cost of a short trip will be more affected by the introduction of tolling compared to the cost of a long trip; hence people who do short trips are more likely to be negative towards tolling. Respondents who travel frequently have a higher probability for being negative than people with the lowest trip frequency; the more often you pass the toll ring, the more you will be affected by the toll charges. It is thus important that especially these groups understand and see the benefits of tolling. Note that the parameters for the frequency groups 4 and 5 are not significant. One might also expect attitudes to vary with travel purpose. However, travel purpose was not included in the model, since trip frequency and travel length would explain much of the same as travel purpose.

These findings show that attitudes vary with the level of information, understanding of tolling and the overall characteristics of the respondents. For policy makers, our results can be used in a marketing strategy for toll financing. A marketing strategy should involve informing the public a priori on why roads are financed by tolls and which other options are available. The information should target the lower income groups, younger people and groups that travel frequently.

IMPLICATIONS OF FINDINGS AND CONCLUSION

The above findings lead us to conclude that planners need to take the road users seriously when planning tolls. It is important to inform the users about the intention and benefits of tolls ex ante. This is because most road users are negative towards tolls and the fact that it is a tendency for people to be more positive towards tolling as the benefits of tolling arises. This has also previously

been shown in Odeck and Bråthen (1997), where the attitudes toward the toll ring in Oslo became more positive as the benefits of the tolling arouse.

The findings in this study have shown that:

- When tolls have been collected for some time and has been removed there is a tendency for the users to be more positive towards tolling (E.g. E18 Lierbommen and E6 Leirfjorden). An explanation may be that people become positive when they see that their toll money actually is used to build new and better roads for their own benefit.
- Once tolls have been implemented and road works are started (e.g. Østfold E6 and Østfold E18), people will understand over time the reason for tolling, and people will tend to be more positive towards tolling than in situations where the toll plazas is yet to be introduced.
- In situations where tolls are to be implemented (e.g. Tønsbergpakken), people tend to be more negative towards tolling compared to situations where the tolls have been removed. A reason for this can probably be that they do not foresee the benefits of tolling prior to the implementation and hence consider the tolls just as an extra tax levied on them.
- In a situation where people are accustomed to paying for transport in some ways (e.g ferry), people tend to be more positive towards tolling (e.g. E6 Leirfjorden). This can also be explained by high local pressure to see this kind of projects to be realised.

Both information about the intentions for tolls and the users' understanding of tolling is important to consider in a planning process and information strategy. Although most people understand why tolling is implemented, still about 30% states that they believe there are other reasons for tolling .The findings showed that:

- A large percentage of the users has not received sufficient information about the toll project and the intentions with tolls.
- Information has an influence on attitudes. People that have received sufficient information are more likely to be positive towards tolling than people that have received little/too little information.
- People that do not know the reason for implementing tolls are more likely to be negative towards tolling than people that know the intentions with tolls.

The results show the importance of improving the information strategy. By improving the information strategy so that people understand the reason for why toll charging is introduced, the planners might influence the attitudes towards tolling and might make it easier to sanction the toll projects.

Attitudes vary with respect to social-economic characteristics, which means that tolling affect different categories of individuals differently. This has also been shown before (Odeck and Bråthen 1997 and 2004). This information can be of importance when designing the information strategy. The information strategy

should be designed so that particularly groups which are more likely to be negative towards tolling truly understand the intentions and benefits of tolling.

There is no reason to believe that users fully will be accepted by users since tolling will mean more taxes. Still it is important to focus on information in the planning process to get the best result. It is important to demonstrate and explain the advantages of toll schemes in relation to other options both for users and politicians. This means that the tolling should be compared to the use of general taxes. It is important that the politicians together with the planners assess the impact of financing the project in another way before sanctioning the toll project.

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