

# **ASSESSMENT OF SOCIAL IMPACTS AND ROAD PRICING EFFECTS**

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## **TECHNICAL COMMITTEE A.3 ROAD SYSTEM ECONOMICS AND SOCIAL DEVELOPMENT**

### **INTRODUCTORY REPORT**

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## EXECUTIVE SUMMARY

The TC A.3 session will address the two issues that the PIARC Executive Committee asked the Committee to deal with: on one hand, the review of approaches to assessment of social impacts related to road projects and, on the other hand, the identification and evaluation of road pricing effects.

Concerning the approaches to assessment of social impacts resulting from road development and usage, the Committee decided from the very beginning not to limit itself to appraisal methods but to look also at ex-post practices. Furthermore TC A.3 focused not only on “new” approaches, but started its work by collecting experiences with existing approaches in the countries represented in the Committee.

The distinction of which impacts have to be considered as “social impacts” has not been evident. TC A.3 decided to “open” the scope of its review and look at any impact on, or perceived by, non-road users. Such impacts include, for example, those on accessibility, barrier effects, air pollution, climate change (CO<sub>2</sub>), energy consumption, noise and other environmental related impacts, health of human beings, employment, social cohesion, local development, or transport cost/price.

The review focussed on systematic approaches to ex-ante evaluation that are used in the countries represented in the Committee. Soon, two different situations were made clear: on one hand, there exist some developed countries where innovative methods are being developed and implemented; on the other hand, the appraisal of social impacts in developing countries is basically done following the requirements and practices promoted by international funding institutions. Together with said review of existing systematic approaches to ex-ante evaluation, the Committee followed a similar process to identify and describe ex-post evaluation practices amongst the Committee members’ countries. It is worth noticing that the review did not mainly address the outcome of social impact assessments but rather the methodology of the appraisal.

The second objective of the work carried out by TC A.3 was to deepen the road pricing effects and the approaches for their assessment. Pricing schemes to look at in this analysis include those for which the primary goal is to finance the construction and/or maintenance of road networks, as well as pricing schemes (also) used as traffic-management and/or environmental-protection tool. Single road as well as area or region wide charging schemes have been considered, as well as urban and inter-urban road-user charging schemes.

To accomplish this second objective, the Committee organised its work through the collection of information from several case studies, either implemented or envisaged. For each case study, the reporter focussed its research on the identification of (1) the effects that have been considered/analysed when the pricing scheme has been evaluated, (2) the significance/magnitude of these impacts, and (3) the evaluation methods/approaches used to determine said significance. In order to facilitate the identification and selection of the case studies, the Committee did in advance a review of the existing and envisaged pricing schemes worldwide. Taking as starting point a general overview of worldwide progress of road pricing, the TC A.3 session will propose a reflection on its effects, based on the material compiled by the Committee and its main findings.

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### **1. APPROACHES TO ASSESSMENT OF SOCIAL IMPACTS**

The first half of the TC A.3 session will deal with the review of approaches to assessment of social impacts related to road projects. First, some members of the Committee will give an introductory state-of-the-art presentation; then, an open discussion will follow with all the participants in the session on the state-of-the-art presentation and the conclusions drafted in this Introductory Report.

The introductory presentation will look at existing advanced systematic approaches, which are basically encouraged in developed countries, and how such social impacts can be incorporated into more traditional socio-economic evaluation approaches. A reflection on the specific efforts that international funding institutions (IFIs) are doing – and still need to do – in developing countries will also be provided. Lastly, a review of ex-post evaluation practices will be presented.

#### **1.1. Systematic approaches for the ex-ante evaluation**

The TC A.3 report “Approaches to evaluation of social impacts of road projects” and its Appendix I give an overview of implemented approaches for the ex-ante evaluation of social impacts of road projects. Ex-ante evaluation assesses the changes that can be attributed to a road project. The evaluations should consider both changes: the intended ones (like the improvement of living conditions or generated jobs), as well as ideally the unintended ones (e.g. negative impacts on the environment).

The need to better assess and manage the effects of road projects is well recognized in all countries represented in TC A.3. However, the practice of cumulative effects assessment is often constrained by a project-based approach (and not by a strategic approach). Examples from different countries (New Zealand, France, Japan, United States, Austria) are outlined in the report.

## 1.2. International funding institutions practices

The Committee reviewed the practices promoted by several IFIs, namely the World Bank (WB), the African Development Bank (ADB), the European Commission, and the European Investment Bank (EIB).

The WB practices in terms of socio-economic projects assessment are still nowadays under the strong influence of cost/benefit method, despite the fact that the cost/benefit method shows limitations when it comes to fighting poverty especially in rural areas, as it doesn't take enough into account the social dimension. This is why projects assessment by the WB is more and more based on methods combining the cost/benefit method and a multi-criteria analysis. These methods often face difficulties related to the quantitative estimation of social impact.

Given the relevance of the road projects contribution in the poverty reduction process and given the difficulties to assess (quantify) real social impacts, the WB has chosen to:

- Design a steering document to define a full social impact assessment framework ("The social analysis sourcebook").
- Start several studies to define a solid working background that will enable to take sufficiently into account the impact on social benefits and poverty reduction in road projects assessment in general and specifically regarding rural road projects, which are usually low traffic roads.
- Experience, in certain countries, methods for valorising social impacts of road projects (e.g. through building or rehabilitating socioeconomic facilities such as schools, health centres and markets; or carrying out awareness raising campaigns on social plagues like HIV/AIDS).

The ADB has designed for its specialists and its consultants, procedures and guidelines for an integrated assessment of environmental and social impact. These procedures and guidelines are mainly aimed at making these reference documents, for improving decision making and projects' outcome, available to the ADB staff and its regional member countries, in order to make sure that the projects, plans and programs financed by the ADB are environmentally and socially viable and in accordance with the ADB's policies and directives. These documents propose methods to better take into consideration, during the assessment of projects environmental and social impact, transversal topics defined as inter-sectorial or general challenges critical to the implementation of sustainable development. These transversal topics prioritized by the ADB are poverty, population, environment, gender and participation.

In spite of the predominance of economic assessment in the choice of projects development, studies of environmental and social impact play a relevant part in defining the last set of road projects financed by the ADB.

Within the European Union, EuropeAid Development and Co-operation (AIDCO) is the Directorate-General responsible for designing EU development policies and delivering aid through programmes and projects across the world. AIDCO has not yet developed specific guidelines or other tools for the appraisal and evaluation of social impact on road projects. However, AIDCO has prepared terms of reference for pre-feasibility studies and feasibility studies of road projects, which make reference to social issues. For guidance, AIDCO delegation staff may consult the Operational Handbook for Road-Project Managers in Delegations. This Handbook identifies a list of possible socio-environmental accompanying measures (e.g. awareness-raising campaigns for STD/AIDS prevention, or building social infrastructure) to maximise the project's benefits and minimise the drawbacks.

In 2009, the EIB Board of Directors approved the EIB Statement of Environmental and Social Principles and Standards; environmental and social sustainability according to this Statement is a condition for projects to receive support from the Bank. The EIB Environmental and Social Handbook translates EIB's policies, principles and standards into the routine practices of the EIB and provides advice on planning and managing the environmental and social appraisal and monitoring. It describes the steps for determining the scope of the environmental and social review process throughout the project cycle that the EIB shall carry out for all projects in all regions. It must be noted however that these are general orientations applying to all sectors of EIB activity. For the time being, there is no sector-specific guidance, although EIB is learning from the individual cases the Bank is working on.

### 1.3. Contribution from ex-post evaluation

The practice of ex-post evaluation of projects of road infrastructure is scarce and limited internationally.

Different approaches are adopted for the ex post evaluation. It is rarely systematic or mandatory (as in France, and after some vicissitudes). It may correspond to a standard methodology, thorough and proven, or instead to ad hoc studies, applying specific or simplified methods. It can be done with or without a baseline or reference scenario (most common in the United Kingdom). It can be part of an ongoing process as the strategic assessment.

One of the fundamental challenges that faces project management lies in the multiplicity of objectives - heterogeneous and sometimes contradictory - that the evaluation is in itself: verification of "good use of public funds", assessing the achievement of outcomes/impacts expected or desired, highlighting the effects/impacts not anticipated, comparison between the real effects/impacts and expected/anticipated effects, public disclosure on projects, etc. Recipients of assessments do not feed the same expectations of such exercises, and will always regret their weakness in relation to a specific objective.

But management of road projects continues to suffer from a lack of transparency in the explanation of the determinants of public choices related to infrastructure development. So it is at an upstream level that road administrations should organize and strengthen the evaluation process, through better allocation of resources (new skills, staffing, budgets). Formal guidelines of the Ministry of Finance or any other state institution competent in the evaluation of public policies can supervise project appraisal, thereby making ex-post evaluation mandatory. It is a primary guarantee for monitoring and updating the basic elements of road project economies: traffic levels, costs (construction, maintenance, operation) and accidents.

Moreover, accumulating a critical mass of ex-post evaluations, roads managers gain better knowledge of correlations and links between infrastructure and socio-economic and environmental phenomena. In this regard the observance of certain analytical premises and principles of simple action is the most important point: temporal and analytical distinction of "objects of evaluation" (inputs, outputs, outcomes, impacts), strict classification of intervention status, identification of assessment beneficiaries, upstream consultation on projects, focused analysis on qualitative parameters related to crossed territories...

Finally, the "rise in generality" of public debate around infrastructure argues for a renewal of expertise on emerging issues, such as social impacts of urban sprawl, biodiversity, land use, indicators of environmental quality in general, or the deepening of expertise on issues more "traditional" of transportation economics, changes in time budgets and traffic induction firstly.

## **2. ASSESSMENT OF ROAD PRICING EFFECTS**

The second half of the TC A.3 session will deal with the identification and evaluation of road pricing effects. As for the previous part, some members of the Committee will give an introductory state-of-the-art presentation and afterwards an open discussion will follow with all the participants on the state-of-the-art presentation and the conclusions drafted in this Introductory Report.

The introductory presentation on road pricing will start with a description of worldwide progress of pricing. Such road pricing schemes seek to achieve a variety of objectives (funding of new/existing infrastructure, road demand management, mobility management), either in urban or in interurban areas. An overview of the impacts that have occurred in schemes that have been implemented or likely to occur in planned schemes will also be discussed. Those impacts – which typically refer to travel time, mobility patterns, the environment, the economy, accessibility, equity issues, etc. – together with public attitudes towards pricing are key issues for decision makers in planning and implementing road pricing schemes.

### **2.1. Worldwide situation of road pricing**

The TC A.3 report "Worldwide situation of road pricing and assessment of its impacts" reflects on some major trends in road pricing through an international review of recent pricing experiences within the countries represented in the Committee as well as other countries particularly innovating in terms of road pricing. In particular, the following trends have been identified:

- Toll in road infrastructure (main roads, structures) or on networks are still widely spread. These relatively simple pricing systems grant revenues for road investment and/or maintenance. In countries with strong tradition of road or highway concessions, opening new toll highways has continued in recent years. Also some countries historically rarely inclined to tolling road infrastructure have chosen this solution. It is also worth to notice that several developing countries choose to charge for their infrastructure too, including for roads already built, in order to guarantee their maintenance. In some countries we also find some experiences called "asset development"; they consist in implementing a toll, through a concession or through a public-private partnership contract, on existing infrastructures that might need some overhauling or remodelling.
- National vignette systems payable for accessing all or part of the trunk network and for all vehicles (licensed in the country or abroad) are also widely spread, especially in Europe. This vignette can vary in order to favour certain vehicles compared to others, for instance the less polluting ones. It can coexist with other types of road pricing, namely tolls on specific roads or structures. This pricing system is simple to manage but commonly criticized for its rigidity and incapacity to regulate traffic and, more generally, the demand of road transport. It tends to decline (more for heavy goods vehicles, HGV) and gives way to the emergence of distance based pricing schemes.

- Since the beginning of this century, distance based toll systems are increasingly being developed in parallel for one single vehicle category: heavy vehicles, and in most cases HGV. In Europe especially, distance based toll collecting for heavy vehicles is slowly generalizing from Central European countries to peripheral countries, favoured by European legislation that encourages this kind of system and not so much the vignettes, and maybe due to a greater acceptance from the public. These systems are based on electronic toll collection, which enables their implementation on the existing network without heavy adjustments of the infrastructure, like tollbooths.
- Some vignette or kilometre-based toll systems previously mentioned may aim at encouraging the use of less polluting vehicles (price variation depending on vehicle's emission standard) or at regulating traffic congestion (especially by proposing variable rates depending on the period of the day/week/year). In these cases, fares are pre-determined and fixed for each period; they encourage users to reduce their trips on the infrastructure during rush hours, but they do not adapt to the real load on the network and they don't enable optimizing in real time the use of the total road capacity, even if in some systems, tolling levels are regularly revised.
- To meet these optimization needs, dynamic electronic pricing systems have steadily been tested and then introduced, essentially in the US. American experiences have specifically led to a system that consists in tolling High Occupancy Vehicle (HOV) lanes with variable electronic toll and in real time, depending on the traffic, and thus transforming HOV-lanes into High Occupancy Toll (HOT) lanes; this solution was proposed after observing that some HOV-lanes were underused. A similar tolling system has also been used in the US to finance the construction of extra lanes to increase the capacity of existing highways.
- Another type of pricing scheme, area pricing, also called urban toll, is more and more often considered an option to reduce congestion problems in cities. In recent years, many municipalities – basically in developed countries - have studied the opportunity of implementing such city tolls. However, despite of several successful examples, urban tolls still raise today strong debates in many countries.
- Apart from the above pricing approaches, other more comprehensive initiatives have been or are still being studied, although they have not been implemented. These initiatives lead to fully revise road transport pricing and taxation, still in most countries nowadays based on fuel taxation. In the Netherlands, for example, the entire road transport taxation system was thought to evolve towards mobility taxation through the implementation of a kilometre price system. On the other hand, the US is also seeking how to stabilize income for roads that come from fuel taxes nowadays by means of a distance-based toll collecting that could vary based on congestion for traffic regulation.

## 2.2. The impacts of pricing

With regard to the impacts of pricing, the following are the main findings:

- All pricing schemes (vignettes, toll facilities, urban pricing, mobility pricing) include an analysis of the new mobility characteristics when they are evaluated.
- The study of the new mobility characteristics focuses first on the changes in (or in the new) travel demand in the priced facility/area:
  - Road pricing schemes in urban areas for congestion management may likely lead to a 10-20% reduction in traffic demand, based on experiences from implementations in Singapore, London and Stockholm. Traffic studies for Helsinki also show similar expected reductions.
  - Traffic studies for the Dutch nation-wide mobility pricing scheme also show expected reductions of around 15%.



- Tolling schemes (vignettes, toll facilities, HGV tolls, HOT lanes and dynamic toll lanes) have been found to be less effective in lowering total traffic demand. Traffic may divert to alternative routes, and total traffic demand for the corridor remains similar. In some cases the travel demand may even grow significantly, due to induced traffic (e.g. new toll motorways built parallel to existing free roads).
- Other relevant mobility characteristics that are often considered during the evaluation of a pricing scheme include:
  - Traffic diversion: potentially significant in some specific cases of HGV tolls and toll motorways, although rarely in practice.
  - Transport mode change: transfer from private road use to public transport, cycling and walking is a key issue for urban pricing (annual increases of 5%-10% in public transport use is referred, depending on the city); on the other hand, some studies foresee a transfer from road to rail in the case of HGV tolls that existing experiences have not confirmed.
  - Time of travel: it is an issue for urban pricing schemes and other schemes when they want to manage congestion.
- Environmental impacts are – after mobility characteristics – the second group of pricing effects most commonly evaluated. Environmental impacts are typically a direct result of travel impacts, and they usually concern emissions of key air pollutants and noise. Air pollutants can be an important issue for some schemes, especially in urban areas (their drop can be approximately in proportion with the vehicle-km driven) or for schemes in regions like Europe (very environmentally sensitive). Noise is never an issue, because people would require changes in traffic flows of around 50% to perceive a decrease or an increase in noise.
- The results of the evaluation of pricing effects in road safety are inconclusive in urban pricing, although could lead in general to a (limited) reduction of personal injuries. In the Dutch kilometre price a more significant reduction of injuries has been estimated. In other cases, the impact is not clear, or even has not been considered as an issue.
- Most of the potential negative impacts of pricing that some people envisage on the economy have not been confirmed through experience.
- Urban pricing is recognised to have some impact on land use and on commercial and residential location. The risk of a ‘boundary effect’ seems greater in a single-cordon model. These effects are however rarely considered, probably because they are difficult to assess and take place in the long term.
- Effects on accessibility are basically considered in nation-wide pricing schemes studies, particularly in countries with strong sensibility to territorial issues (e.g. Switzerland, Spain).
- Equity issues typically arise in planning and implementation across all pricing schemes, although they have rarely led to project termination, probably because experience shows that the perception of unfairness may be sometimes exaggerated.
- Social acceptability is probably the most critical determinant of the prospect for successful pricing project implementation. This is particularly true for urban pricing schemes (especially if alternative public transport is not sufficiently considered), the Dutch kilometre price or toll facilities with no alternative free route.

## BIBLIOGRAPHICAL REFERENCES

- Approaches to evaluation of social impacts of road projects. TC A.3 Technical Report. PIARC, 2011.
- Worldwide progress of road pricing and assessment of its impacts. TC A.3 Technical Report. PIARC, 2011.

## DRAFT CONCLUSIONS

### ON THE APPROACHES TO ASSESSMENT OF SOCIAL IMPACTS:

With regard to systematic approaches for the ex-ante evaluation:

- The «ex-ante evaluation» has to come up to high expectations: it should help to answer key questions for evidence-based policy making (what works, what doesn't, where, why and for how much) and has received increasing attention in policy making in recent years in both developed and developing country contexts.
- The need to better assess and manage the social effects of road projects is well recognized.
- There is no clear distinction of which impacts are to be considered as «social impacts». There is no (international) standard definition of “social impacts” that allows a clear distinction of «social» from «economic» and «environmental» aspects. Such distinction is the basis for advanced approaches for the appraisal of social impacts.
- The concept of social impacts is a “dynamic” notion that may be also dependent on the economic development.
- It may thus be important to distinguish between social issues in developing and developed countries, that are to be assessed: while, for example, in developing countries the accessibility to health and education services is of highest interest, the situation concerning fine particulate matter (PM<sub>2,5</sub>) might play a minor role in the «social» context; the other way round, economic vitality in a country tends to lead to the fact that «major» social challenges are missing and therefore comparatively «small» issues tend to be pointed out as «big» or relevant social issues.
- The evaluation of social impacts is normally done within the framework of “common” tools like the environmental impact assessment (EIA) or other established strategic assessments. Within the case studies there is no example for an assessment dealing exclusively with social impacts; at least these assessments are “socio-economic” or “social-ecological” assessments.
- All examples illustrate that in no case the ex-ante appraisal of social impacts is explicitly grounded in law/legal acts. Either the assessment of social impacts is covered by other (legally required) instruments like the EIA or the assessment is done due to self-commitment of the road administration.

With regard to IFIs' practices:

- Financial institutions' experience regarding road projects' social impact assessment appears as a very relevant input to change the methods used to assess the social impact of a road project and its use, specially in developing countries.
- Analyzing IFIs' practices in assessing the social impacts of road projects, we see a clear evolution in assessment methods that tend to pay more attention to social impact of projects implementation.

- One notices that most IFIs have enacted directives aiming at providing their staff, consultants or borrowers, with a logical framework for assessing projects' social impacts.
- The evolution in assessment methods has meant for some IFIs to put into place approaches that better take into account road projects by supporting them all the way from the design process, through the construction and/or rehabilitation of socioeconomic facilities (health centres, schools, etc.) located along the route of the project. One also notices the implementation of monitoring processes based on certain indicators for a post-assessment of the project by the IFI.
- Nevertheless, one sees that the aspects regarding populations' access to social services (markets, health centres, schools, etc.) are still insufficiently explored by those financial institutions, especially concerning the definition of criteria and accessibility rules that could be used in the socioeconomic assessment of road projects. In that context, there isn't any criterion or reference standard yet allowing to fully appreciating the socioeconomic justification of a road project. This situation leads IFIs to leave aside the impact of social aspects in the socioeconomic assessment of projects.

With regard to contribution from ex-post evaluation:

- Ex-post evaluation – either through a systematic approach or not - is far a way of being a common practice in the member countries of the Committee. In most cases in which ex-post evaluation is done, the assessment focuses on impacts that are not necessarily “social”.
- However, the Committee recognises the strong added value of such ex-post evaluations and encourages members of PIARC to promote their practice.
- The ex-post assessments should focus on two main objectives: public information, and improving methods of assessment by learning the differences that may be identified between the initial assessment of the project and the reality observed after completion of the project (assumptions made, methods used, estimates obtained...).
- Simplified interim ex-post assessments (like practiced in Scandinavia, England and France) could be produced and published shortly after opening (one to two years). In developing countries these interim assessments should focus, by monitoring key social data (cost of travel, effective access to basic services and goods...), to determine the most immediate impact on social change (poverty reduction, fight against diseases, effective participation of most disadvantaged/poor social groups). They should focus on functional slices in a single project. These interim assessments, for which borrowing countries and in particular their statistical services collaborate actively, could then be submitted to different donors and in some cases be able to justify the need for a program reorientation.
- The development of these ex-post evaluations could be monitored by audit and evaluation institutions independent from road managers. Road managers and owners should nevertheless remain solely responsible for the production of ex-post assessments.
- Consistent training sessions on the methodology of ex-post assessment and general concepts of evaluation could be offered in many PIARC countries. They should aim primarily the hierarchy of road administrative structures.
- Substantial resources should also be allocated to the dissemination and communication of ex-post assessments.

## ON WORLDWIDE SITUATION OF ROAD PRICING AND THE ASSESSMENT OF ITS EFFECTS:

With regard to worldwide situation of road pricing:

- At present, fuel taxation is still the most common mechanism to charge road users, probably because it's easier/cheaper to implement than road pricing and more "invisible" to road users.
- An analysis of the evolution of pricing systems for road infrastructures worldwide shows a wide range of implemented schemes depending on the particular situation of the countries and the intended objectives.
- Tolls on major roads, certain structures or road networks to finance new and existing infrastructures are still widely used and their use will expand in the future. We observe that they are increasingly implemented on already existing infrastructures to guarantee the necessary funds for maintenance, particularly in developing countries, but also in developed ones, especially in Europe, and for heavy vehicles in particular.
- Congestion charges are progressively developing especially in urban zones and, to a lesser extent, over major roads, even on infrastructures subject to a toll. They may adopt different forms: static pricing (predefined pricing tables) or dynamic tolling.
- Urban pricing is gaining popularity mainly among local governments, although the ability of local authorities to regulate may determine the development of said schemes.
- Implementation of nation-wide mobility schemes still present many doubts/obstacles that will have to be overcome before they are implemented, particularly taking into account the difficulty for the public to accept them.

With regard to the assessment of pricing effects:

- Facility-based pricing – basically used in interurban road networks – is not effective in lowering total traffic demand and, consequently, in reducing environmental impacts. Its main advantage is revenue generation. Certainly, from the environmental point of view, tolls applied only to HGV may favour the modernisation of the vehicles fleet (with higher environmental standards), although never lead to a significant diversion from road freight transport to rail transport. HOT-lanes and other toll tariff adjustments practised in facility-based pricing are relatively effective to manage road congestion. Social acceptability is not, in general, a critical issue, probably due to the existence in most cases of alternatives to the priced facility (e.g. free roads parallel to toll motorways, non tolled lanes for HOT-lanes).
- Urban pricing – either cordon or area pricing - has significant reductions in travel demand (10-20%) and air pollutants. Impact on noise is negligible, and the effects on safety are contradictory. Expected negative impacts on local economy have not been proven in most cases. Land use effects, although recognised, are hardly studied. Acceptability is a critical determinant for a successful implementation of the urban scheme: revenue neutrality or its use to improve alternative public transport may mitigate the social repulse.
- Nation-wide pricing based on distance-based fees are expected to have significant positive impact on travel demand (15% reduction), air pollutants and injuries. Social acceptability remains however a critical issue.