The social balance of road and rail transport in Hungary

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Abstract

Scientifically based correct information about the social balance of transport is indispensible for the national and local governments in order to make the right decisions concerning transport investments and pricing (taxation etc.) of transport. However, different experts often express greatly differing opinions on the content and size of the costs and benefits of transport. This has been the case in Hungary, too, where environmental economists on the one side and the majority of transport economists on the other side often produced results which differed from each other in some cases even by several orders of magnitude.

This situation prompted the Hungarian Ministry for Economy and Transport to commission experts of the two schools of thought to commonly prepare a study bringing the two views as close as possible. The study includes the following items concerning transport:

1. Budget relations (government revenues and expenditures, and the budgets of local governments)
2. Non-budgetary subsidies (specific elements in regulations and the tax system which distort prices)

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3. Environmental, health and other external costs with special attention to climate change costs
4. Positive externalities

The most discussed issues were as follows:

- Which items should make part of the social balance?
- Do significant positive externalities exist at all in the transport sector?
    a. Could the spreading effects of transport be considered as positive externalities, or they were regular effects conveyed by the market mechanism?
    b. Could transport value added be an expression of positive social effect, or it could not be considered as a counterpart of negative externalities?
- Could CBA be used for the whole transport sector or only for separate projects?

During the work it became evident that in practically all cases the views of the two sides could be reconciled.

The final purpose of the work is to provide a handbook for a better evaluation of investments in transport as well as for providing a better foundation for taxation of road and rail transport.

Contents

Below the Contents of the study are given in order to inform the reader about the whole scope of the study and its main items. However, in this paper we will describe only the first part (Chapter 2) of the study. Even this part is subject to change until the final version is prepared, the deadline of which is the 30 September 2009. The further chapters will also be available after that date.

1. Introduction

Everybody has experienced the phenomenon when different organisations evaluate the same measure, investment differently. This results from the natural variegation of the viewpoints, which *per se* cannot be considered as rejected yet.

However, those directly concerned, and even those simply interested in the topic, rightly resented that remarkably different figures have been presented, and due to this fact the same transport measure (e.g. an investment) has been judged quite differently by the different stakeholders. Orientation has been made difficult since each piece of information resulted from sources, workshops or highly appreciated civil organisations considered authentic. Due to this condition not only the lay outsider but the contractors also became doubtful of the situation.

The transport sector was especially hard hit by this. The growth of mobility, on the one hand, was presented as the requirement of the everyday life, its concomitant, moreover representing a special value, while on the other hand as an activity causing serious damages that should be profoundly changed in its tendencies.

Not contesting the necessity of variegation of opinions, the Hungarian ministry of transport[11] considered that the very moment has come when those domains should be revealed where apparently irreconcilable antagonism can be dissolved and the viewpoints drawn near to one another. To this end, the ministry invited experts of the Institute for Transport Sciences Non-profit Ltd. (KTI), Via Kárpátia Ltd. and of the Clean Air Action Group (CAAG; Levegő Munkacsoport) to overview the direct budgetary and social costs and revenues of transport. The task has been to find the elements in which agreement can be developed, and where this is not possible, to determine the different standpoints finding their roots.

Work was started in spring 2008. Already on the occasion of the first sessions it was obvious that the task means a serious challenge for both parties. For possible approximation of various views in the different fields, the other party's way of thinking had to be understood, integrating into his logical order. This required much time and energy, and above all the participants' will and their belief that this is possible.

At the same time it was a severe criterion that consensus in itself is not a goal. In general it can be said, that the change of opinions – that could be observed on both sides – did not result from the modification of professional conviction, but the appearance and acceptance of the new aspects adjustable to the already existing system of arguments.

The different items of the research plan were discussed during sessions lasting 5-6 hours. Their minutes are presented in an annex of the Hungarian version of the report. However, these documents, succinct and keeping to essentials, do not reflect that struggle, in many cases that hard debate, not once heated by passion in the course of which the results were born. Be-

[11] Ministry of Transport, Telecommunication and Energy (KHEM); www.khem.gov.hu/en

yond facts that could be documented in figures and methods, the process of enrichment of the scales of values and mentality experienced by all participants can also be regarded as achievements. Chiefly the latter should be made common property, notwithstanding that this is by far more difficult than putting the findings into guidelines and regulations. To this end, either consensual or further dissimilar, the participants assumed to publish and represent later in the form of lectures, articles and information the commonly achieved views.

As a criterion, it was imposed on the work to embrace as comprehensively as possible those factors and components, which influence the budgetary and social balance of transport in monetary terms. To make it possible to take these into consideration for practical purposes, the different elements were distributed into the following vehicle categories: cars, trucks (separately for those with less than 3.5 tonnes, between 3.5 and 7.5 tonnes, between 7.5 and 12 tonnes, and over 12 tonnes of permitted maximal weight), buses, passenger rail and freight rail.

The most simple presentation form of the results is the table, which contains the components reflecting the economic and social costs and revenues of transport; in monetary sense giving the elements of its economic and social balance. The lines and the columns of the table presented in the Conclusions contain the components and the different vehicle categories, or the combined groups thereof, respectively. In the different fields, the economic and/or social factor is indicated in money terms of a given vehicle category (group) shown in the component concerned. If these are not unambiguous, then in addition to the mean value the expected minimum and maximum values are presented as well. This variance may be the result of:

- methodological peculiarity, when different ways of calculation are accepted for the given indicator, and they are bringing different results about;
- input data differing from each other;
- not arriving at successful understanding, and the different standpoints of the two groups are reflected by two values.

In each case it will be indicated what it is precisely.

Since at the time when the work started the latest available data were those of 2006, this was selected as the year of reference. Later we managed to expand the range of referring years regarding to public balance from 2004 to 2007 in order to receive a more authentic balance. **We consider the clarification of the methodological questions the main value of the work, consequently, further on the quantitative data can be updated without great difficulty.**

The Hungarian Central Statistical Office (KSH) was considered as the primary data source. In the absence of this source, we used data deriving firstly from national, secondly from foreign (as widely accepted, and as competent as possible) sources.

There are several components, which are not influenced by external restraints, economic regularities but by short-term decisions. In these cases, e.g. in the reconstruction costs of roads,

sometimes there is a very high annual fluctuation. Here, the observance of a year's value may result in disfigurement in the negative or positive direction alike. Therefore in the case of these components, the average value of several years – if possible of five years – is shown or simply values are shown of more years (2004–2007).

To different lines of the table, where in our opinion it was justified, a detailed description belongs to values, indicating their origin. In the second column of the table the number of the given line's explanatory chapter can be found.

Two factors determine the continuation of the work. On the one hand, the missing elements of the table, which require partly the discussion of further components, and partly the breakdown into vehicle categories of the already collated aggregated values. On the other hand, there are and will be such elements in case of which the discussions highlighted that here, beyond the present work the methodological and data deficiencies need further research.

In the evaluation of different components, as far as the data of the table are concerned the national and the foreign literature and research results were equally taken into consideration. In the adaptation of foreign findings we applied the necessary modifications (e.g. purchasing power parity). The source of the data was always indicated, which makes it possible to update the results more easily.

The participants agree that they made the first steps on a way that partly is untrodden; partly it may lead to the goal set, to the more uniform evaluation of transport with less contradiction and misunderstanding.

As mentioned before, conceptual, methodological clarifications were considered outstandingly important. One important element of that is the notion of social balance, what is meant by it and what are its elements.

Due to the reasons above this material should be regarded as a version for consultation.

2. The public balance of transport

Essentially the **expanded public balance of transport** or, in other words, **the social balance of transport** consists of the following:

- "classical" public balance of transport (budgetary revenues and expenditures),
- the balance of the change of the transport infrastructure assets in public property,
- external balance (basically from the changing circumstances of natural environment and certain other elements relating to unjustified competitive advantages of disadvantages).

Financially realised revenues and expenses arisen in the institutions of the public budget are parts of the public balance.

2.1. Methodology

2.1.1. Delimitation of the scope of transport

Delimitation of the scope of transport can be one of the most important questions of the balance and a determinant of its value. The KTI in its earlier study[12] interpreted the balance of transport in a very wide sense: partly

1. the tax payments of the subjects of taxation (income-producers) and the services provided to them by the budget, other transfers, the divided expenditures were considered as transport-related, partly
2. the tax and other revenues emerging from the use of transport services, as well as the expenditures directly supporting the budget's transport spending were regarded as transport concerned.

These two interpretations have certain overlapping, which have been eliminated. At the same time, in this interpretation, important budgetary and other divided, overhead costs of the state have to be assigned to transport either on the basis of tax revenues or GDP contribution, the transport sector having no influence whatsoever on it. Accordingly, by necessity, the balance turned into some tautology, because, the balance or imbalance of the budget determined the balance of the transport, too, because the facts-based index numbers of transport in the incomes side also determined those of the costs side – not based on facts. Consequently, it was difficult to estimate the different numbers, whereas they influenced significantly the final result of the balance.

Though our new methodology determined the payments imposed on transport-providers with general and proportionate sharing in taxation (income side of the item group 1), but **the public balance of transport is solely determined by item group 2, i.e. on the one hand, the tax and other public revenues coming from transport, and on the other hand, the public expenditures in the interest of transport**.

All this means that in our study the income type taxes and social contributions were eliminated from the revenue side, as well as the expenditures, which could be assigned to transport as an income-producing sector in other areas (state administration, national defence, education, etc.). In this way only the amounts spent specifically for transport were taken into account.

2.1.2. Source and evaluation of data

Our task is to prepare the balance for a given area, the budgetary balance of transport, or its budget-like balance. Since to this aim the data are decisively taken from the public budget – in

[12] Research of the balance of maintenance, operation and financing of the modern transport network, Közlekedéstudományi Intézet Rt., Budapest, 2005. (in Hungarian)

the absence of other data – the **cash flow-based** methodology of the budget has also to be used, i.e. as a main rule only the financially realised revenues and expenditures are taken into consideration.

The main data source is the annexes submitted to yearly bill on final accounts of the public budget prepared by the Ministry of Finance, in which there are presented many closing statements.

The **closing statements** include the **public budget balances as subsystems and aggregated** in economical (according to revenue and cost types) and functional subdivisions, the expenditures *aggregated in gross or consolidated* forms, i.e.

1. **central government budget,**
2. **social insurance** (Health Insurance Fund and Pensions Insurance Fund)**,**
3. **other state funds** and
4. **local governments,**

as well as the expenditures and revenues aggregated for **the entire public budget**.

From these statements the **consolidated functional balance has been taken as the reference**; we are supposed to find out whether its cost items are transport-related or not, and the aggregated value of the indicated budgetary revenues must be unfolded, and out of them the transport revenues of our balance separated.

Gross values of the headings, items of the state budget[13] can be found in **detailed statements**; these items are detailed according to economical classification in the heading volumes and the net values, consolidation can be implemented by an itemised calculation here.

The **budget items related to transport have to be calculated in a net form**, meaning, that the movement of the items inside the budget should be „out-consolidated" from the system and they should be taken into consideration only at the point when the expenditure leaves the public finance system or just when it emerges first. From the net price calculations very common in the budget, the example of the support given to local governments is probably the easiest to understand, when state government budget allocates some subsidy for a given objective (e.g. underground construction) to local governments, which also belong to public budget, then they spend it as targeted; therefore the same expenditure is indicated in two places.

Instead of functional classification of expenditures, earlier we proceeded from the closing statements of the budgetary headings (ministries, other state organs and headings), which however have no summary available in a consolidated mode possible to break down, and there is no information about such a classification at the local governments either. On the other hand, as their name suggests, the public budget functions also imply the purpose of the expenditure and this is exactly what we need.

[13] State budget: central government budget + social insurance (Health Insurance Fund and Pensions Insurance Fund) + other state funds (i.e. includes all public budgets, except the local governments' budget „only")

2.1.3. Public revenues from transport

Keeping an eye on the necessity of the consolidation of revenues, with some conversion of the aggregates accessible in gross mode, the budget revenues were grouped as follows:

1. Tax revenues
2. Own revenues of government budget organisations
3. Own revenues of government budget chapters
4. EU funding (according to CAAG this item must not be listed here, see below)
5. Other local-government revenues
6. Revenues of state and local government assets (according to CAAG privatisation revenues of this item must not be listed here, see below)

Next as a part of the methodology, the main transport items belonging to these revenue-types are listed, described with brief reasoning, without concrete quantification for the time being.

(1) Tax revenues

Those tax categories are regarded as the tax revenue from transport, which impose tax only on transport „consumption" or consider a transport-related product the object of taxation:

- Value added tax (VAT) – according to CAAG this item is inappropriate apart from non-refundable VAT of corporate car costs, see below,
- Excise tax (fuel excise),
- Registration tax,
- Motor vehicle tax and excess weight charge,
- Environmental product fee on tyres, car batteries and lubricating oil,
- Mining annuity,
- Eco-taxes (energy tax and environmental load charges),
- Duty on motor vehicle property acquisition,
- Customs duties – according to CAAG this item is inappropriate, see below.

The state and local government revenue deriving from income taxes and social contributions are not regarded as tax revenues from transport – not even if they are generated at companies engaged in transport, because they can be explicitly considered as contributions to the operating expenditures of the state, the social insurance and the local governments.

Featuring of the value added tax (VAT), the customs duties on transport products and services, and in fact of all non-discriminative taxes in the list of revenues can be disputable in a way, because in these cases not only transport, but practically all consumptions of products and services are taxed, even if not always to not the same extent, and the tax also serves the general operation of the national budget. That is the reason why CAAG does not agree with KTI listing value added tax of transport products and services as revenue from transport and claims that as a general tax it should contribute to general government expenditures. CAAG

only accepts a special part of VAT revenue to be listed. This is the VAT of the personal car expenses of companies that are non-refundable for companies, even if they are real costs of their activities.

KTI says that from the taxpayers' side **the amount of the tax payments can be strongly influenced by the composition of consumption**, and KTI regards as a basic principle that the **tax revenues of transport consumption are featured in the side of the tax revenues.** Nevertheless, the average VAT rate of transport products and services is higher than the average level of all products and services, and in the case of products and services related to passenger cars operation, notwithstanding the enterprise-related use, the tax refund is much limited to the other enterprise costs. (According to CAAG custom duties revenues must not be listed in the transport balance. The argument is similar to the one described above at VAT. In this case the different views do not result huge difference in the balance, as customs duties is marginal revenue of the state government budget.)

This example shows that making a sector balance is by necessity strongly influenced by the experts' philosophy on taxes and other issues, who prepare the balance and there are more than one standpoint to consider.

On the same grounds the featuring of the charge on the acquisition of motor vehicle property is also disputable by advancing the argument that whether in terms of economics this is about a special form of the general taxation tailored to vehicles property taxation or, on the contrary, it is a discriminative tax opposed to the property acquisition of other groups of products, property form. (The annual amount of the tax category in the previous years was around 19 billion HUF and in addition to the vehicle transfer duty it is imposed on the transfer of real estate, on donations, inheritance and on different other procedures.) Our basic principle is valid in this case also, i.e. taxes arisen in the course of transport consumption are regarded as transport tax revenues.

According to budget statistics, the excess weight charge is not tax revenue, but the revenue of the government budget chapter of the ministry of transport, however due to its tax nature, it is referred to as tax revenue here.

(2) Own revenues of government budget organisations

Out of the own revenues of the government budget organisations, the revenues deriving from the operations of the following organisations (partly ceased to operate) are considered as transport revenues:

- National Transport Authority
- Transport Inspectorates
- Hungarian Railways Office
- Civil Aviation Authority

- HungaroControl Hungarian Air Traffic Service

As a result of the changes, from the above organisations only the National Transport Authority established on 1 January 2007 has been left, which as a single transport supervisory organisation has taken over the scope of activity of several earlier authorities of the sector. Of course, the expenditures of these organisations are featuring on side of expenditures of the balance.

(3) Own revenues of the government budget chapters

Since 1 January 2006 the external revenues of the Road Fund belong to this category, i.e. these are the revenues deriving from sales of motorway fee stickers and from excess weight fares.

Government expenditures related directly to the revenue cover the equivalent values of maintenance and operation activities paid by the Directorate of Road Management (ÚKIG) and since 2007 by its successor the Coordination Center for Transport Development (KKK) to the State Motorway Management Co. Ltd. (ÁAK).

(4) EU grants

EU grants to Hungary are spent through the central government budget (except supports for agriculture). The budget receives the EU grants, adds to it its own budget contribution, and in the course of implementation these are expenditures of the central government budget.

According to CAAG EU grants of transport projects must not to be listed as transport revenue, because funding is deriving from EU taxpayers (including to a large extent Hungarian taxpayers), i.e. from their general taxes paid to their governments. It was the decision of Hungarian Government to spend this money on transport projects in such amount instead of other activities like education, health care or environment protection.

On the other hand KTI's methodology is based on the government finance system, which list both EU transport revenues and expenditures to F12.abd activities and that is why KTI treats EU transport revenues as external contributions to the expenditures of EU transport projects.

About the source of these revenues: In the period investigated, in addition to other grants, the funding during the 2000-2003 pre-accession period, as well as the subsidies provided to the 1st National Development Plan due in EU budget period after the accession (2004-2006) are included. In 2007 no financial aid occurred from the funding of the period 2007-2013 indicated in the New Hungary Development Plan (ÚMFT).

The total EU grant of the following programmes is considered as transport revenues within the EU range:

- Transport projects implemented from ISPA and Cohesion Fund,

- Environment and Infrastructure Operational Programme (KIOP) Priority projects of transport infrastructure development
- PHARE programmes and the transport programmes sponsored from transitional supports
- Other grants (TEN-T tenders)

Revenues of the following EU grants are partly regarded as transport revenues:

- Regional Operational Programme (ROP) Priority of the development of regional infrastructure and the environment of localities
- Cross border co-operation (CBC) programmes of the border regions (Phare CBC, INTERREG IIIA)
- Technical assistance (TA) provided for all the above mentioned EU grants; expenditures in the framework of TA priorities

In the period of **2007-2013,** the transport projects covered by the Cohesion Fund, along greater volume and intensity of the EU funding are continued within Priorities 1 and 2 of the Transport Operational Programme (KözOP), where as an emphasised and new element the support given to urban and suburban transport (Priority 5) appear as well. Road projects belonging mostly to KIOP transport priority can be found in KözOP Priority 3, whereas the theme of port and logistics developments realised also in the framework of the KIOP, henceforth belong to KözOP's Priority 4.

Instead ROP engaged in the distribution of the resources in 2004-2006, for each region a separate programme was initiated for the period 2007-2013, along similar regional development priorities, where transport goals are subject to special measure, design or components. Whilst the operative programmes of border cooperation are achieved within the framework of the European Territorial Cooperation (ETE).

(5) Other local government revenues

These are such local government revenues, which are not the local governments' tax revenues and derive outside the national budget. We estimate that the overall revenue of this item is only some percent of the total budget, and it cannot be determined precisely. And only a fraction of this can be allotted to transport. Out of these we deem that the highest item is the net parking revenue (remaining part beyond expenditures of operation and development of parking sites) – within this mostly that of the Budapest Municipality and its districts.

(6) Revenues of state and local government assets

Revenues mentioned under this subtitle are typically deriving from dividends and assets sales, which in the period investigated emerged in a remarkable degree in 2005 only, but in a significant volume, because this was the time when the Budapest Airport and for 75 years, the

operating rights of the Ferihegy Aiport were vended for 400.9 billion HUF, while the company in the same year also realised 14 billion HUF dividend.
According to CAAG this item (privatisation) must not be included in the public balance of transport, while KTI says that it should be included in it because of the methodology of the government financial system based on money transferring. On the other hand KTI accepts, that these revenues are special because of its privatisation feature, and while keeping them in the balance they should be treated separately. KTI also claims, that when we will include transport infrastructure asset balance in the public balance of transport, this item will be offset, while the public asset of transport infrastructure will be as much lower as was the revenue from privatisation of transport infrastructure.
From the revenues of the local government assets no significant transport company revenue could be identified; depending on the form of the payment (e.g. dividend) the parking revenues can also be considered here.

2.1.4. Public expenditures of transport

Our starting point is the consolidated functional aggregation of total government expenditures, dividing the budgetary expenditures into functions of state operation, welfare, economy, debt management as well as into items which cannot be classified into the main functions mentioned; the first main functions (expenditures related to state operation, welfare and economy) are divided into further 14 main groups (16 in total) and subgroups, where under the main group code (F12) the transport expenditures can also be found.

(1) Public expenditures listed among transport expenditures

As follows, transport expenditures, aggregated, can be found under the function code F12 of the consolidated functional expenditures:

- **F12.a Road transport activities**
- **F12.b Railway transport matters and services**
- F12.c Telecommunication
- **F12.d Other transport and transportation**

Except point F12.c. – these expenditures partly being not considered as transport-related – all are transport expenditures, taken in 100% as transport costs.
Different aggregations and breakdown into items within are available in the case of the state government budget, which contains the transport resources of the local governments – the most important of them being the capital of Hungary, Budapest – mostly in the form of state funding given to local governments. While on the level of the national budget, the aggregation was performed in 100%, and this is taken as the starting point; a 100% itemised accounting could be presented only in the case of railways expenditures, as they are all reflected in the state government budget; itemised accounting can only be given in average on 80% of the

road expenditures classified under the code F12.a, through the statements of the state government budget, and on some additional percent through the budget of the Budapest Municipality (the overlapping is not taken into account).

Related to function codes, from the revenue categories listed before, under the transport function codes one can find the expenditures belonging to the transport revenue, consequently also the expenditures linked to

- own revenues of budgetary organisations,
- own revenues of budgetary headings,
- revenues of the EU funding and
- revenues of the state and local government assets

However this would be the case with any other revenue category, if some direct expenditure would occur in relation to it.

(2) Public expenditures not listed among transport functions

While studying the items of the state government budget, out of the governmental function-groups, in our methodology, some sub-items, in part or completely, have been declared as transport-related in addition to expenditures marked with the afore-mentioned F12.abd codes. The table below summarises these items:

Table 1: Transport expenditures of the budget marked as part of other functions

code	*Government function, (main)group*	*Transport item*
F01.b	Financial and budgetary activities and services	Transactions with relation to technical purchase of motorway companies (in period investigated)
F01.e	Technical development	Development of radar-system (Cohesion Fund project)
F03.b	Order and public safety	25 %
F06.a	Sick pay, maternity or provisional disability allowances	4 %
F06.c	Other social insurance provisions	3,12 %
F06.e	Family and children's allowances	Consumer price supplement
F13.a	Activities and services of multi-purpose development themes	25 %
F14	Environment protection	1 %
F15	State-debt management, public finance	15 %
F16	Items that cannot be listed in the main groups	Refunding of costs for public services provided by passenger transport performed by VOLÁN companies
F16	Items that cannot be listed in the main groups	Proportionate part of VAT-based union payment (approx. 14,2 %)

In the table above, in addition to the data not expressed in percentage, under any function code there may occur such local government expenditures, itemised and not making part of the national budget, which lacking the state government budget's similarly detailed statements, were not taken into consideration. It is assumed that their aggregated value influences our balance to a hardly demonstrable extent.

2.2. Methodological questions & answers

Our methodology raises several questions to be solved, needing explanation and, maybe, correction.

2.2.1. Revenues and expenditures of (transport) companies owned by state or local governments

These companies are not directly part of the national budget, but in practice they can be considered as such, due to majority state or local government proprietorship. However there exists an important difference as opposed to the national budget interpreted in a narrow sense: the product(s) and service(s) (e.g. use of the motorway or of public transport) provided from the revenues of companies in public ownership, which do not generate from the national budget, can be set directly against these revenues. The same cannot be said about the revenues of the national budget, because taxpayers obtain no direct service in the case of most taxes; whereas contributions can be weighed against services, but the mandatory feature of paying contributions and eventuality of services set against them gives also a tax character to the contributions-related revenues of the state. To overview the balances of several thousands of state and local government companies, their statements and their whole activity cannot be undertaken in the framework of our task. Solution rests in the public budget transfers, which shows that as an owner (and not as a contractor!) what transfers will the owner of the company in public ownership realise against the company, i.e. what support will be provided for, is the capital increased or decreased, the dividend drawn. These data are parts of the official public balance, therefore no correction is necessary. The operation of the companies must be investigated for other reasons; however, the necessary involvement of the state and local government companies will not influence the social balance of transport.

Nevertheless, there is a company, the ÁPV Rt. (Hungarian State Holding Company) which later still has to be involved in the analysis; this company, similarly to the public budget, performs several functions, its size is significant, and in addition to being engaged in the administration of the national entrepreneurial asset, *de facto* redistributes funds among the companies under its administration, these transfers also affecting the transport companies belonging to its portfolio.

2.2.2. Change of the assets of the transport infrastructure

According to our intentions we would like to complete our public balance of transport based on the turnover funds with the change of the assets of transport infrastructure which is indirectly or directly in public property. It should be immediately emphasised that asset change without money circulation is meant here.

As the increase of the state assets is not realised by its own, but by way of spending money, in this point one may definitely think about money loss, and as such, the external effects should also be ranked here, which, however because of other concerns will be highlighted in a separate paragraph.

The assets, in principle may increase without disbursement as well, when an asset is upgraded „by its own", as its value may also decrease, on the same ground, but since on the basis of costs, thinking of assets we count with cost value, therefore this possibility is not reckoned with (at most indirectly, when such an asset falls outside the scope of the national budget).

Resulting from spending on developments, new asset elements appear in budgetary accounting. Although this changes, increases the volume of national budget, it does not concern its balance in our approach. The opposite of it is also valid: when an asset becomes unnecessary, then it is not considered to be expenditure.

From the above, the conclusion can be drawn, that this point is primarily about **the change of assets resulting from the amortisation of the necessary transport infrastructure, used for the completion of our balance.**

All this means that the annual amortisation resulting from normal operation terms of the entire transport infrastructure shall be assessed, setting it against the „asset-restoration" effect of the maintenance costs, with the balance of which **the classical public balance is expanded,** i.e. the profit resulting from assets improvement is listed along the revenues, while the loss (asset compliance) caused by assets loss is indicated on the expenditures' side.

It is also necessary to mention here the effect of expenditures related to infrastructure investments, because here the expenditures are not spent on operation, but they generate value for transport. The new infrastructure increases the value of state property; simultaneously it can be treated as revenue. Moreover, currently, transport is in an expansive period, i.e. there is a permanent need for new infrastructure, all value of which ought to be produced by transport itself. However, in the period investigated, the transport investments have shown an even greater increase than this natural cycle had, and the difference either has to be introduced as a revenue into the balance or it has to become one of the explanatory factors of the more negative value of the balance. Likewise, here too, the problems of privatisation and nationalisation have to be dealt with, and in addition to these transactions it has also to be examined whether the national budget has gained ground or drawn back and submitted some parts of its role played in the sector's investments and operations to private investors, operators (e.g. public private partnership, PPP).

2.2.3. External effects

Essentially, in the assessment of the external effects the same procedures shall, should be followed. However, here the methods of evaluation are not so exact, they do not inasmuch rest upon accounting bases – and due to this, financial comparability is hurt –, consequently it cannot be introduced in the classical public balance, but it is always necessary to mention this „external balance" together with the public balance developed until now.

In our study we considered as external effects all the effects, which are not directly reflected in any of the items listed above. The external effects here include the environmental and health costs, accident and congestion costs as well as other factors, which distort the market. The latter include first of all tax evasion in the road sector.

Those who cause them must pay the external costs. If this does not happen, then the external costs must be considered as a state subsidy.

2.2.4. Social balance vs. public balance

During our work, problems resulting from the combination of different kinds of balances emerged continuously. The discussions on specifying the term "social balance of transport" and its relationship to the public balance of transport are still not concluded.

2.2.5. Status quo

The *status quo* is always considered as the starting point, and the balance of transport is also prepared on this basis.

However it is well known that the *status quo* – due to anomalies related to legislative rules or just emerging in the course of operation – indicates at the same time the operation of several deformed systems, one part of which, if viewed on real bases, can also be changed.

We tried to survey these effects, which can also be interpreted as some „derivatives" of the public balance. We made efforts to assess with adequate caution the volume of the damage these phenomena cause or to estimate whether with well-targeted and reasonably accomplishable measures to what extent could we fight them off and bring about a desirable change in the balance.

However, calculations performed in this way are not part of the public balance of transport, as according to our methodology's basic principle, the balance should be based on real finalised facts, processes – i.e. the *status quo*. Nevertheless, by surveying the different anomalies – also interrelated – we want our balance be inserted into appropriate environment.

3.2. Expenses

3.2.1. „Road damages" and cross-financing in freight traffic

The breakdown of road maintenance costs by vehicle categories is based on the „road damages"caused.

As introduction it should be highlighted that the axle load of heavy duty vehicles equals in the load of 100,000 – 1,000,000 passenger cars from the aspect of physical loading of roads, because the extent of the damage caused to the road is function of the fifth power of the axle load. In comparison with passenger cars, vibrations resulting from the traffic of heavy duty vehicles cause heavier damages to public works beneath roads, buildings located along roads, and other facilities.

Already several decades before, the experts developed clear views on road damages caused by heavy duty traffic. In Budapest, in 1971 Dr. Ervin Nemesdy, university professor, Doctor of Engineering Sciences published his book on "Structure of roads and motorways", which is still studied by professionals as a basic work. He says among others: *"... one has to consider not only the interests of road transport companies, but the situation of the national road network, too, the adverse process of the lifetime of pavements which as against to the annual profit of transport companies may cause losses of larger dimension on the road network of the country. (...) For these reasons, it is absolutely necessary to charge with significant road tax and additional transport premium the trucks with heavy axle load. "*

The European Union in its new transport policy adopted in 2001 also stresses that the heavy duty vehicles are damaging the roads very seriously: *"Maintenance of motorways would be six times cheaper had they been used by passenger cars only. No any acceptable differentiation of financial charges paid by trucks or passenger cars compensates this advantage."* Therefore, also the EU was and is urging the development of distance-related user charges.

This difference of at least 5 scales is not considered by the rates of road taxes and motorway tolls used in practice for passenger cars and trucks, therefore, immense *cross-financing* predominates in favour of heavy goods vehicle traffic.

The spillover effect of damages caused by heavy duty vehicles on roads and other facilities

which affect the passenger cars mainly, shall not be neglected either. According to calculations of the World Bank, 1 HUF damage caused by vehicles running on roads with 500 vehicles/day traffic bring about 3-7 HUF damages/year in the vehicles using that road. *(Sustainable Transport. Priorities for Policy Reform. The International Bank for Reconstruction and Development / The World Bank., Washington, 1996. p. 26)* But those involved in road maintenance compensate only for a fraction of it (only the provable one).

Further, in this section all such damages (resulting from roads' deterioration), including the damages caused in infrastructure and other vehicles, too, for simplicity are called road-damages.

The European Federation for Transport and Environment (T&E) in a study *(Bringing the Eurovignette into the Electronic Age: The need to change Directive 1999/62/EC to allow kilometre charging for heavy goods vehicles, by Per Kageson. European Federation for Transport and Environment, June 2000)* gives data on the loading of the German public roads by presenting the cost/heavy goods vehicles-ton kilometres, i.e. the rate of the road damage: on 1994 price is 0.093 EUR/tkm on motorway, on other road category 0.272 EUR/tkm. However these values appear to be highly exaggerated.
There are no corresponding data available for present Hungarian situation. Further research is needed to quantify the damages referred to, and to determine the extent of cross-financing.

4. EXTRA-BUDGETARY SUBSIDIZATION OF THE ROAD TRANSPORT

Those specific elements belong to this domain which appear in regulation and in the tax system and distort the competition in the market. In connection with these factors an OECD study is cited here which refers to the complexity of the topic and also describes the calculation methods applied by some countries.

„Perhaps no other subsidy element has been so controversial, and has no confounded attempts to measure it, than tax expenditures. The term itself betrays its origin in public finance economics, with its focus on government budgets. When a government provides a tax exemption, credit, deferral or other form of preferential tax treatment to an individual or group, its budget is affected in much the same way as it had spent some of its own money. Alternative terms, which reflect more the perspective of the recipient, are „tax relief" and „tax concession.

The (opportunity) cost of tax expenditures can be measured in any one several ways (OECD, 1996). The „revenue" foregone method measures the amount by which the revenues are reduced because of the tax provision. A related method, the „outlay equivalent" approach (used

by the United States), measures what the cost would be to the government if it were to provide through direct spending the same monetary benefit as the tax expenditure. Both of these methods ignore possible changes in the behaviour of taxpayers in the absence of the tax expenditure, The „revenue gain" method (once used by France) attempts to account for such behavioural changes. The majority of countries that measure tax expenditures seem to use the revenue-foregone method…"[14]

4.1 The passenger cars' use-related tax-frauds

4.1.1. Former calculations of the Clean Air Action Group

According to previous estimations of the Clean Air Action Group due to illegal cost accounting as company expenses for the private use of passenger cars annually almost 1000 billion HUF tax-frauds occur.[15] This means that users of the passenger cars should pay so much more tax, contributions to the budget, if they accounted for the use of their cars in compliance with the regulations. (It's another question that notwithstanding the most stringent checks on abuses we still would have to account for a much less public revenue from this source.)

Concerning the volume of the tax-frauds occurring in transport and national economy, the Clean Air Action Group comparing and collating the different accounting systems in these fields, has drawn the following conclusions.

The data on transport included in the **Household-statistics yearbooks** and since 2006 in the CD of the yearbook supplemented with household-statistics have significant role in KSH's data collection and processing. In the COICOP-grouping the several years systematic surveying of the effective, public financed **expenditures of transport services** proves their true nature by statistical methods.

The other important source is provided by the annual data given in the **National Accounts Hungary** 2005-2006, under the point "5.7. Household actual final consumption expenditure by purpose (COICOP) at current prices and at prices of previous year, 2006-2007". At present only the items on "07. **Purchase of transport and delivery vehicles and operation of vehi-**

[14] **Environmentally Harmful Subsidies: Policy Issues and Challenges**. OECD, 2003:

http://www.ine.gob.mx/dgipea/download/harmful_subsidies.pdf

The method for calculating the amount, and the way of tax frauds is described in the study **Tax fraud by passenger cars accounting and using other tricks**:
http://www.levego.hu/letoltes/kiadvanyok/adocsalas.pdf. See also:
http://www.levego.hu/letoltes/kapcsolodo_anyagok/szgkadocsalas-pm0710.pdf

cles engaged in passenger transport" has been highlighted as they were also collected and processed on the basis of COICOP, that is according to classification of individual consumption by purposes.

The data of the two systems were processed in a separate table, which, if so requested is available for inquirers. From these data we consider important to highlight the following key figures:

Total vehicle purchase and maintenance expenses (billion HUF)

	2006
National Accounts Hungary	1775
Household-statistics	744
Difference	**1031**

The difference on the basis of collated national economy balances shows the expenditures which were not paid by the households, i.e. the passenger car users, or the amount which was paid by society instead of them. In other words, the households in 2006, from 1,775 billion HUF social expenses paid only 744 billion HUF from their registered income, while 1,031 billion HUF was covered by the society, or this was in one form or another accounted for. In this way the wage charges were mainly "saved". Since in average the wage charges are 1.2 times higher than the wages, the extent of the tax fraud amounts at least to (1031 x 1.2 =) 1,237 billion HUF. Still at least, because the income of those realizing the fraud is often higher than the average, so the charge levied on their wage would be higher, too. Note that in both surveying systems the motor vehicle and the passenger insurance are separately presented in the insurance services, consequently the omission does not cause confusion during comparison. However, here, too, the difference of 80 billion HUF in 2006 indicates that this amount was paid by the society and not by the users.

4.1.2. Findings of recent investigations

During the preparation of this study further methods were used in order to estimate the extent of this kind of tax fraud.

a. Tax fraud realized through private use of company cars

In Hungary, in 2006 the number of passenger cars was 2 953 737. According to KSH data, these were in 60% owned by households. Consequently, the number of company cars was 1 181 495.

Experts estimate that about 75% of the company car users are company's owners or senior officers. In their case, when determining the tax fraud resulting from private use, the capital return tax was taken as basis, because for them this is the most favourable way of getting an income. Thus, 0.75 x 1 181 495 = 886 121 vehicles. The annual mileage of company cars in 2001 amounted to 21 717 kms, that of private cars operated this way equals 15 071 kms (according to a study by KTI). Assuming a constant mileage in 2006, the weighted excess mileage of a company car is 6700 kms per year. Taking into consideration also the counter effect of a number of factors, according to estimation, two-third of the surplus is illegally accounted for, i.e. 6700 × 0.67 = 4500 km/year. This means 4500 km × 886 121 passenger cars = 3.988 billion vehicle-kilometres.

In 2006 the average fuel consumption and the average weighted price of fuel was 7 liters/100 km and 265 HUF /litres, respectively.
Based on the above, 279 million litres of fuel are accounted for as company costs, while consumed for private purposes. Its value is 279 million x 265 = 73.935 billion HUF. So, this is the sum illegal fuel accounting amounts to.

The taxed part of this amount, calculated on a gross basis is ~ 42%, i.e. its non-tax paid element is 73.935 billion HUF × 0.42 = 31 billion HUF.
However, when related to the net income, the taxed element is 67%, its related unpaid tax amounts to 73.935 billion HUF × 0.67 = 49.5 billion HUF.

25% of company cars are used by people who are not able to obtain dividend-based income, so, in their case the taxation due for their wage income has been taken as a basis in order to calculate the tax-fraud. Nevertheless from 295,374 vehicle units 2 percent of the total company vehicle fleet (estimate) shall be deducted, because the public sector cannot use vehicles for private purposes. So, additional calculation refers to 23% (271,744 units) only.
Here, too, if 4500 km per year illegally accounted mileage is taken into consideration, the result is the following: 4500 × 271 744 km passenger cars = 1.223 billion vehicle-kilometres. The average consumption is 7 litres per 100 km, and the weighted average fuel price per litre is 265 HUF.
Thus, 85.6 million litres of fuel are accounted for illegally, its value equalling in 85.6 × 265 = 22.684 billion HUF.

If calculated on the basis of gross income, the tax content is ~ 79%, i.e. unpaid taxes amount to 22.684 × 0.79 = 17.9 billion HUF.
However, when related to the net income, the tax content is 123%, and the unpaid tax accordingly is 22.684 × 1.23 = 27.9 billion HUF.
Thus, if calculated on the basis of gross income, the illegally not paid public dues levied on fuel consumption of the company cars equals about 31 + 18 = 49 billion HUF. Calculated on net income, 50 +28 = 78 billion HUF is the value of the illegally unpaid dues.

Considering other operation costs (in addition to fuels'), the following conclusion can be drawn. The average lifetime of company cars is 5 years, the average mileage 21 717 km.
Other operation costs:

- Average rate of amortization: 30 HUF/km
- Compulsory insurance, full Casco average 190 000 HUF/year/car
- Repairing cost, operation, accessories on average per year 1 HUF/total mileage in km, i.e. in the fifth year: 5 years × 21 717 km = 108 585 HUF/year (On a yearly average, according to earlier surveys, the operation equals in the amount (calculated in HUF) equivalent to total mileage run in kilometres.)

Other total operation costs are twice as high as the fuel costs. Thus, the public dues not paid in this relation, if calculated on the basis of gross income are 98 billion HUF, while on the basis of net income144 billion HUF.

Consequently, illegally, total 49 + 98 = 147 billion HUF (gross) and 78 + 144 = 222 billion HUF (net) public charges due on the use of company cars are not paid.

b. Illegal company accounting of private cars

Company accounting in violation of the law of the private cars (personally owned passenger cars) can be classified in two main groups:

1. **The car use is accounted for as a company cost, but it is not used actually.** So, there is no real use behind it. However, to some extent this is an incentive to buy a car, and consequently to use it also (if there is already a car, the inclination to use it is evident as well). In addition, this item, too, by virtue of car use is accounted for, so on this basis, the amount illegally accounted for should be indicated under the heading of "Expenditure" in the summary table. However, since even an approximate estimate of this amount is not available (though this might be probably of a hundred billion large sum per year as well), and besides it does not reflect the actual car use, we decided not to list it in the summary table.

2. **The car use is accounted for as a company cost, but it is used for private purposes.** Here, the price of real mileage shall be determined.

Case 2 comprises two sub-groups.

2.1. A definite monthly amount is allocated for private passenger cars in order to account for trips on duty, however, in reality this amount is developed as a result of collective bargaining, and it can be considered an element of the wage, and car usage is only the pretext; real use is only partly realized by purpose. On the basis of statistical data and experts' assessment the following can be declared as far as its extent is concerned.

The annual mileage of an average passenger car is 12,750 km. One may calculate with an average of 500 km. The money obtained may amount to average 50 HUF/km. The passenger cars related costs in households' income average up to 10% (including also the households without passenger cars). (It can be determined as 13-14% of total transport expenses.) Therefore it may be assumed, that from the mileage limit, too, a sum equal to 10% will be appropriated to real (private) vehicle use. The remaining amount will be assigned to other consumer goods, articles of food, etc.

By estimation, from the 500 km vehicle use 10% can be considered to be spent on motoring, i.e. the surplus developed is 10% of the product: 500 km x 50 HUF = 25,000 HUF; equal to 2,500 HUF.

This is the mileage, or the amount, which is driven by, or given to the user of a private passenger car illegally and free of tax (by tax fraud) monthly.

Major part of the tax fraud can not be discovered in the first course, because this tax free provision is legal. The explanation for fraud is that only a fraction of the amount paid off is used for motoring, the other part is added to the family income, in fact free of tax.

And it cannot be placed to the debit of the passenger car transport, that this way the family obtains some tax free income, i.e. the fact of tax fraud is realized through road transport. It's a question how many passenger cars are in the country for which this extra mileage provision is to be paid. In principle, the base full population in 2006 was about 1,800,000 pieces. According to estimation, it may say that 75% of the passenger car-owners, i.e. 1,350,000 people for sure are employees, so full population is reduced to this size. It is also certain that at least a third of the workers is registered on minimum wage, and they're likely to receive non-wage compensation, mostly to cover their car-use. The minimum number of motor vehicle owners who receive the allotment is: 0.333 x 1,350,000 = 450,000. I.e. the value may be somewhere between 450,000 and 1,350,000. In the absence of further indications, taking the arithmetic mean of these two margins, the number of vehicles, which are holders of the quota can be estimated to 900,000.

A monthly illegal tax-free allowance is 2,500 HUF, calculated for a whole year: 30,000, which if multiplied by 900,000 and gives 27 billion HUF.

As mentioned above, it is not likely to be spent on car operation, but the remaining amount, i.e. 90% of expense allowance will also be paid by virtue of car usage cost-allowance, the amount of which according to the previous calculation is equal to 22,500 x 12 x 900,000 = 243 billion HUF.

The not paid, legally due defrauded amount in gross price in the first case is equal to 27 billion HUF x 0.79 = **21 billion HUF**, while in net price amounts to 27 billion HUF x 1.23 = 33 billion HUF.
Based on the above, the amount which in fact is not allotted to transport, but defrauded as such (243 billion HUF), if counting in gross income is 243 billion × 0,79 = 192 billion HUF, while the net income is 243 billion HUF ×1,23 = 299 billion HUF!

If the two items are added up, expressed in gross income the amount exceeds 213 billion HUF, while the net income gives 332 billion HUF.
Since in the case examined, the amount received free of tax which was paid to cover the vehicle use charges actually was considered as part of payment, therefore the case when the employee is using the car indeed in order to deal some office work with was not taken into account. In this case, it is our experience, that the employer pays extra cost to refund these trips.

2.2. Clearing of accounts for official commission
This is also divided into two parts:
2.2.1. Accounting of private use for business trip. In this case the individual indicates one part of the own property car's expense as company cost. This is virtually identical to those described in section 2.1; the only difference is that here the employer is not aware of the fraud that the employee commits all by oneself.
2.2.2. Accounting of official trip using the 9 HUF/km APEH tariff
The accountable amortization cost by kilometres should be 30 HUF instead 9 HUF. The difference is actually the sum the individual supports the company towards which the accounts should be settled.
If in a month such a trip of 75 km long is assumed:
12 months x 75 km x 250,000 = 225 million kms
225 million km × (30-9) HUF / km = 4,725 million HUF more could be accounted based on the mileage performed by privates for company purposes.

The former is defrauded of by the individual, the latter by the state. The two effects are assumed to balance each other.

In summary it can be concluded that according to these calculations the tax revenue non-payments related to passenger cars' private use are about 360 billion HUF (counted for gross receipts), or 554 billion HUF (counted for net receipts). The latter, 37 % larger than the Clean Air Action Group's previous calculations.
The source of this significant difference needs further examination.
However, attention should be drawn to the fact that the calculated "unpaid tax" means that those concerned ought to pay so much tax, if all passenger cars' use-related expenses in accordance with the rules were accounted (i.e. this result is obtained when we proceed according to the method of "non-collected revenue").

If, however, the possibility of fraud would be eliminated, the actual revenue of the budget would amount to much less. This in principle shall be calculated with the method of "possible tax revenue", however to do that we should be aware of the price elasticity factors, about which there are no sufficient information. However, it is unlikely that this amount would equal more than 30% of the value calculated with the help of the method of "not collected revenue". Further research is needed for clarification and the analysis of the spill-over of the effects.

4.2. Social costs of the storage of motor vehicles in public places

To store motor vehicles free of charge or not appropriately to the market terms against high tariffs in public places in many cases can be considered as subsidy granted for road transport, i.e. as the social cost of the road transport.

Therefore, the situation is examined as what tariffs drivers shall pay in case they want to park in public places.

The basic concept is that surveys shall be done on market bases. There are two elements here. In case of the first one there is an extra demand for the parking places. In this case the prices do not suit to the market conditions; therefore they need to be raised. The second element means those natural circumstances which disappear because the presence of motor vehicles. Only the first element is studied in this subsection.

Obviously, if the vehicle is stored on the area belonging to someone's own property this does not incur social cost as it is the land use of this area that is within the scope of the proprietor's decision.

According to presumptions the collection of parking fees is less characteristic for small – with population under 15,000 – settlements. Of course, there are exceptions, which on the one hand

are rare, on the other, in the case of the values estimated for other settlement sizes remain within error limits.

The applied unit prices of the parking fees may be considered balanced between market supply and demand, if the area provides an all day long, in 15-20% free parking capacity. Then it can be ascertained that the high tariff does not encourage the cheap, in all cases outstandingly favourable use of the area developed for parking.

The table below shows the average number of the parking places with payment in settlements of different size, as well as the currently applied average tariffs.

Moreover, there are indicated such rates estimated by experts, which if used, at least reserves of 15–20% would develop in all parts of the day.

For settlements with more than 60,000 population it is assumed that a certain part of the parking places with payment are situated in such – mainly downtown – areas, where the free, reserved surface of 15–20% can be provided subject to higher tariffs only.

In our calculations a special attention was paid to these aspects.

The calculations were usually developed for weekdays and Saturdays, with 10 and 6 pay-hours, respectively.

Pursuant to calculations the use of tariffs under the market value means a subsidy of 19.845 billion HUF, i.e. 20 billion HUF for individual transport by road.

Table 1.: Calculation of social costs of the storage of motor vehicles in public places

Size of settlement (1000 population)	*Number of settlements*	*Av. parking places/ settlements*	*Current tariffs (HUF / hour)*	*Optimal tariffs (HUF / hour)*	*Difference (HUF / hour)*	*Surplus tariff (bHUF / year)*
10 - 15	50	50	120	120	0	0
15 - 30	25	100	180	200	20	135
30 - 40	18	300	200	250	50	729
40 - 60	12	800	250	300	50	1.296
60 - 100	10	1.000	250	300	50	1.350
		200	300	400	100	540
above100	7	2.000	300	400	100	3.780
		400	350	600	250	1.890
Budapest	1	27.000	250	350	100	7.290
		3.000	400	750	350	2.835
total	**123**	**34.850**				**19.845**

4.3. Concealed economy in the transport of goods by road

4.3.1. Tax fraud reflected in wage accounting and personal incomes

In accordance with several expert appraisements the extent of black and grey economy amounts to 15–30 % of the GDP[16]. According to KSH and APEH surveys this exceeds by far the national economy's average in road goods transport. (So for example, pursuant to surveys of the KSH, and the Budapest Corvinus University almost half of goods transport by road performed for households is carried out without accounts.[17]) From the aspect of the present study this is especially important with concern to road goods transport, as in practice the railway, its greatest rival, is deprived of this opportunity. There is a very restricted system of invoicing and wage accounting in the railway sector, essentially excluding the possibility of this kind of fraud.

The data below show that there is an enormous tax evasion in road goods transport. At the railway the wage costs are accounted subject to strict observance of regulations. However, this is not characteristic for road carriers, also proved by the collation of the accountancy data of the two sub-sectors. According to KSH data there is a huge difference between the wages, and therefore the wage charges of the employees engaged in road and railway goods transport. Considering the difference in wages documented by the official data of the KSH only, on the basis of detailed calculations it can be stated, that in the road haulage sector in 2006 if calculated by staff, the paid out wage-cost was less than in the railways by **30 billion HUF**. (In KSH records the number of employees was 40 914 in road haulage in 2006, and 44 148 in the railways. The latter covers all railway activities as the data concerning the staff and the wages in goods transport are not recorded separately at the KSH.)

However, not only the competition distorting effect is implied here, but social problems of immense importance are also concealed. Due to unfavourable work conditions the drivers in road haulage become earlier incapable of work, i.e. they loose their job, or are compelled to retire. As a result of lower average wages and early compelling retirement, the amount of the expected pension will be below their subsistence costs. This means that short-term measures make impossible the living of 40,000 employees and their families, i.e. of almost 200,000

[16] See for example: **Kísérletek a rejtett gazdaság nagyságának meghatározására [Attempts to determine the volume of concealed economy]** http://www.ecostat.hu/kiadvanyok/modszertan/modszertan03.html; **A feketegazdaság, mint a nemzetgazdaság teljesítményének része [Black economy a part of national economy]** mkt.uni-corvinus.hu/request.php?107

[17] See for example: **Adócsalás és korrupció: lakossági érintettség és elfogadottság [Tax fraud and corruption: involvement of, and acceptance by population]** http://econ.core.hu/file/download/mtdp/MTDP_0813.pdf

people. This is also a significant social cost that emerges later on. However, its extent cannot be estimated.

All this shows but a small segment of reality, because the number of employees recorded in road haulage represents only a fraction of the real number of those working here. On the one hand, illegal employment is high, on the other, many workers are not registered as employees but as entrepreneurs, and besides, some of the people are recorded in another sector. If the 350,000 heavy duty vehicles registered in Hungary are taken into consideration, then one shall count for more than tenfold of the number of the above mentioned 41,000 people. Unfortunately, no relating wage data are available. However, the above mentioned amount of 30 billion HUF multiplied by 10 means at least **300 billion HUF** tax evasion per year.

It is important to note that road carriers according to the regulations of the law on the tax on personal income are allowed to charge fuel saving to tax free income. It was reported that the carriers sometimes pay 40 percent of the wages in this way - in principle legally, but tax-free. The resulting overall rate of the extra income obtained this way is difficult to estimate. According to our calculations in 2006 HUF 209 billion was spent on fuel in road haulage. Almost 21-42 billion HUF arises if 10-20% of this sum is accounted as saving. This is also a huge competitive advantage to other (sub) sectors, particularly as against railway carriage.[18]

The extent of tax fraud can be estimated by other means. In discussions with the accountants involved we were informed that in road haulage 10-15% of the revenues is paid out or received on the score of tax-free income. Since the total road freight revenue in 2006 amounted to HUF 1,100 billion, its 10-15% is equal to 110-165 billion HUF. [19] In compliance with the previous explanation, if these activities in all cases were legal, the amount of the tax and charges to be paid would be approximately the same. In the summary table out of the last two extreme values, HUF 165 billion is indicated, because it is closer to 300 billion HUF which was calculated above by using another method.

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[18] It is not incidental that the road transport organizations are protesting against the planned cessation of the tax-free payment of "fuel savings", see for example:
http://www.mkfe.hu/dokumentumok/pdf/hat_szervezet_miniszterelnokhoz_ua_megtakaritas_2009_03_17.pdf,
http://www.nit.hu/kepfeltolt/Bajnai_Gordon_level

[19] According to data from the Tax Authority the net revenues in 2006 of the TEÁOR (registered categories of activities) main group "Transport and auxiliary activity" amounted to HUF 2,762 billion. A more detailed breakdown of the sectoral components is found in the GDP elements of Hungary's National Accounts. Thus, the above net revenue can be divided by using the relevant GDP rates. After that, 68%, or 1,780 billion HUF remains for "Inland transportation"; minus the net revenues in passenger, railway and pipeline transports, remains 1,100 billion HUF.

4.3.2. Accounting of per-diems due for foreign mission

Another element of the wage and competition differences between road haulage and other (sub) sectors lies in **foreign missions' daily accounts**. (Although, concerning the order of magnitude, this is less significant than the case referred to in the item above.) Since EU accession, that is, since 2004, the performance of road haulage, mainly in the international transport, increased. Measured in goods ton-km from 7,540 million/year in 2003 grew to 18,077 million/year in the year 2006, i.e. 2.4-fold. Note that by 2005 the per diem was calculated in U.S. dollars, and the general tax rate was 15 USD / day. In contrast, in the road transport sector this was 25 USD / day, if not accounted for accommodation, which is a common practice in this field of activity.

The rate of domestic per-diem with tax-exempt: 500 HUF / day. **As of 2006**, the overall increased foreign tax-free allowance amounts to 15 euros per day. But, if accommodation is not accounted for, this rate is EUR 25/day in the sector of road haulage. As the data show, due to the change from USD to Euro with higher HUF exchange rates, the daily per-diem in road transport from 2005 to 2006 increased.

The extent of per diem benefits on national economy level can be determined in two ways:

- **a)** On the basis of the difference – i.e. 10 euros/day – between the general terms and the road haulage. In this case, according to our calculations in comparison to other (sub) sectors, as per day the accountable tax exempt cost can be by 2,641 HUF more which on the basis of the performances of 2006 corresponds to the amount of HUF **6.4** billion net wage. The related tax and fee implications are equal to **7 billion HUF**. Accordingly, if the previous train of thoughts is followed, **1.4 billion HUF can be considered as support granted to transport.**
- **b)** If compared to the railway workers, the wage gap corresponds to the total per diems' amount. Because railways' employees in general are not given international per diems, a reckoning with EUR 25 per day shall be applied. In this case, according to our calculations 6,607 HUF/day is the tax-free accountable cost, which on the basis of the performances of 2006 corresponds to **16.1** billion HUF net wages. Its related tax and fee implications are equal to 1**7.6 billion HUF.**

4.3.3. Further concerns of the black economy

Black economy, in other ways as well, gets significant role in road haulage. In addition to others, the smuggling of profitable goods (cigarettes, drugs, etc.) – even of humans – took a huge extent in road haulage. The competent colonel at VPOP (Hungarian Customs and Fi-

nance Guard) in 1998, said: "The following is characteristic for the situation. Our border station at Tompa is a modern building with appropriate control facilities. At Röszke, which is nearby, due to lack of technical and personal conditions, the trucks cannot be checked effectively. Usually, Tompa can be crossed within an hour, while a 36-hour waiting period is not rare at Röszke. Nevertheless, the vast majority of truck-drivers prefer to cross the border at Röszke …" (In the meantime, though the Röszke border crossing has been modernized, the information about truck-drivers is still valid.) In recent years the number of transports with value added tax-fraud increased immensely.[20]

As mentioned above, the situation in case of domestic haulage is not better either.

According to the "Flash report on the activities in 2006 of the Customs and Finance Guard" [21] the crimes and offences committed in 2006 and detected by VPOP were estimated to amount to 81 billion HUF [22]. (In this context it is necessary to know, that the price of the offences committed and detected by the customs and finance guard are approximately equal to two-third of the price of all offences committed and made known.) Detection rate is usually estimated by experts to 10-15 percent. This means that the real price of committed cases is about 540-810 billion HUF. It is difficult to estimate how much the road haulage can be charged with, but perhaps it is not an exaggeration to define it at 20 percent of this amount, i.e. 110 - 160 billion HUF per year. (In order to define the rate, it has to be taken into account also that in many cases the carriage would not be realized if it were not linked to black economy.)

Several aspects of the topic are analysed in detail in the report prepared by the Audit Office [23], pointing out the seriousness of the situation.

4.3.4. Violation of other legislative rules

[20] Interconnection between VAT-frauds and international haulage is objectively and comprehensively analysed in the following article: Because of unusual profit, organized crime and terrorist groups seem to be involved in VAT-fraud. Magyar Nemzet, 15 November 2006.
http://mn.mno.hu/index.mno?cikk=383229&rvt=9&s_text=forgalmi+ad%F3&s_texttype=1&norel=1&pass=3

[21] http://www.vam.hu/loadBinaryContent.do?binaryId=12504

[22] According to information received from VPOP the cost of committed crime is determined in the following way: "In case of the crimes of smuggling, customs-receiving the cost means the dutiable value of smuggled dutiable goods. For crimes against the Inland Revenue Acts in the case of abuses the reduced excise tax revenue, in the case of receiving stolen goods the value of legally manufactured products, while if abuse with excise duty is promoted the basic material, the quantity of the tax stamps, or the value of tax note should be understood. When the value of the product obtained lawfully is determined, it has to taken into account whether abroad the product belongs to some tax-free category, or whether at home has been produced free of excise tax, or against excise tax charges. "

[23] See for example: **Report on checking the efficiency and effectiveness of the realization of the annual excise tax revenues in 2001-2002 due to the central budget.** ÁSZ /State Audit Office of Hungary/ 0357, December, 2003.
http://www.asz.hu/ASZ/jeltar.nsf/0/53B4A0D1E1882961C1256E1C0048C875/$FILE/0357J000.PDF

Violations of the law committed by road users influence the costs and can distort competition in the market. This applies in particular to the carriage of goods. Government Regulation No. 156/2009. (VII.29.) contains the list of possible and emerging violations in road transport, the amount of fines that may be imposed in case of violation of certain provisions associated with road haulage, passenger transport and road traffic, as well as the penalization related administrative tasks. In the framework of the present study it was not feasible to examine and define the monetary value of the extent of these phenomena. It is also disputable the rate of occurrence of the costs of these violations in other cost items. Therefore, the topic needs further research.

4.3.5. Importance of taking into account the economy concealed

As mentioned above, the black economy, characteristic for road haulage, can be considered in fact a major support for this sub sector - the more so, because, the role of the black economy is negligible at its main competitor (the railway). More specifically, that part is negligible, which would put the railway in a better position. In contrast to road haulage, at the railway the illegal acts (such as major theft of diesel fuel) cause overwhelmingly significant economic damages to the railway itself. During the discussion of the topic, however it has been raised that the occurring damages are reimbursed by the state in the form of annual grants, but this argument is not grounded as far as the determination of competitive disadvantage is concerned. On the one hand, the state refunds only one part of the railway's deficit, therefore internal debt at the MÁV in 2008 exceeded 2,200 billion HUF[24]. On the other hand, the state subsidy provided to the MAV is included under the heading of expenditures of the summary table, so this amount can not be entered again.

4.4. The effect of bans on weekend and holiday traffic of heavy duty trucks

This transport mode is adversely affected by bans on weekend and holiday traffic of heavy duty trucks resulting in competitive disadvantage.

While the light duty trucks and goods transport by railways in principle operate all the 168 hours of the week, the traffic of heavy trucks is prohibited in a significant period of the year.

During the year the period of prohibition varies, and it is also different in some European countries.

[24] See http://piacesprofit.hu/magazin.html?mag_id=764&hir_id=3748

Since a higher proportion of these heavy trucks are engaged in international traffic, therefore, the parameters of the international bans play an important role in the selection of the periods of running on national road network, too.

As consequence the competitive disadvantage is reflected mainly in the fact that the carrier operating the heavy duty trucks cannot spend the said time to activities devoted to efficiency increasing and production of added value.

The restriction concerns the trucks over 7.5 tonnes gross vehicle mass.

The relevant, precise text of the regulation[25] is as follows:

> 1. § The scope of the Regulation applies to all trucks, tractors, agricultural tractors, slow moving vehicles, as well as to all vehicle combinations (hereinafter referred to as: trucks) consisting of these vehicles and semi trailers equipped with Hungarian or foreign registration and having a total permissible mass exceeding 7.5 tons.
>
> 2. § (1) The vehicles falling within 1. § above are not permitted to enter the traffic on the national public roads of the country
>
> a) from 1 July to 31 August
> aa) on Saturday – if not working day – from 15.00 pm to Sunday 22.00 pm
> ab) on days to be kept as holidays from 22.00 pm on the previous day to 22.00 pm on the day to be kept as holiday,
> b) from 1 September to 30 June from 22.00 pm on the previous day to 22.00 pm on Sundays and on days to be kept as holidays.
>
> (2) If the day to be kept as holiday is within the period specified under para. (1) item a) falls on a day before Saturday or Sunday, or within the period specified under para. (1) item b) on a day before Sunday, the ban on traffic shall apply to the first day from 8 am. to 22. am. on the last day continuously, uninterrupted.
>
> (3) The restriction specified under paragraph (1) point b) and paragraph (2) does not refer in the period between 4 November and 1 March to trucks having at least the number 7 environmental classification (EURO 3) – as specified in the rule relating to the technical conditions of registration and participation in traffic of road vehicles – and engaged in international traffic.
>
> Paragraph (3) refers to a limited number of trucks only.

Taking into account the time limits said the ban refers to 1,462 hours of the year, including also the bans on holidays in addition to Saturdays and Sundays.

However, this entered into force as of 2008 only.

Pursuant to the ban valid for the examined year 2006, the restriction lasted from 15 June until 31 August, and entered into force on Saturday at 8:00 am. In the remaining period, the restriction by hours is the same as currently.

[25] Government Regulation No 190/2008. (VII. 29.) on traffic limitation of the heavy duty trucks (former Government Regulation 111/1995. (IX. 21.))

Thus, for the year 2006 from the 8,760 hours of the year the restricted period consisted of 1,536 hours. This is 17.5% of the whole time. Taking into account the so-called transient losses (for example, not starting after 22.00 exactly) the lost time amounts approximately to 23% of the total available time.

Hence, transport companies because of the available 77% base-time have to keep in operation approximately 1.3 times as many means of transport, i.e. 100/77 = 1.298, as if they could have been transporting in every hour of the year.

In 2006 the country's vehicle fleet comprise 36,365 trucks over 5 tons bearing capacity. They roughly correspond to permissible 7.5 tons gross mass requirement. Taking into consideration some lighter duty vehicles, the ban for 7.5 tonnes gross mass hit some 40,000 trucks. The regulation, however, applies to trailers, and to vehicle combinations consisting of trucks and trailers, too.

Thus, besides the 40,000 trucks without trailers, additional – estimated – 3,000 motor vehicles should be reckoned with, which because of their coupled trailers would fall under the scope of the ban. This totals 43,000 trucks and vehicle combinations.

Pursuant to KSH records there are 61,025 trailers with 5 tonnes bearing capacity, i.e. of 7.5 tonnes gross mass in Hungary. Apparently the ban also applies to these vehicles.

It is assumed that because of the weekend standstills at the consigners' and receivers' places 40% of the trailers wouldn't operate anyway, so just 60% of the fleet mentioned above could be considered as extra freight capacity because of the ban.

A round 30 % of the remaining vehicles can be considered the surplus capacity.

For trucks this means 43,000 × 0.60 × 0.3 = 7,740 units, for trailers: 61,065 × 0.6 × 0.3 = 10,991, i.e. a round 11,000 units.

If the average purchase price of a truck and of a trailer is considered to be 40 million and 3 million HUF, respectively, the value of the unnecessarily kept capacity can be calculated.

The total purchase price of 7,740 trucks is equal to 3,120 billion HUF, which assumed a seven-year renewal period is 310/7 = 44.2 billion HUF / year.

For trailers the amount is 11,000*3/7 = 4.7 billion HUF.

The cumulative amount of such excess loss can be estimated to 48.9 billion HUF. This is the amount that the carrier companies should put up with in the form of competitive disadvantage with extra expenses because of the weekend traffic ban on heavy trucks.

5. NEGATIVE EXTERNAL EFFECTS CAUSED BY TRANSPORT

Transport related damages caused to society without compensation (external effects) are of several kinds. While taking into consideration the external impacts, the following social costs have been quantified: harmful effects of air pollution on health and climate, pollution of soil and water resources, noise pollution, the cost caused because for transport infrastructures and traffic areas are taken away from populated areas and natural habitats, as well as the closely related externalities. So, it was tried to assess the gross emission of all vertically related units. In the literature, among the external effects reference is made to the process of depletion of the stock of fossil fuels, however, since the possibility of quantifying the emerging effects is uncertain, this area is represented in a text form only.

As a guideline, for the quantification of the negative external effects the methodology approved by the European Commission, the CE DELFT (2008) study has been used that gives an overview of the previous, more important externality researches and aims for their synthesis. Accordingly, the values used in the study summarize the best grounded research results of the topic.

However, when speaking about the quantification of the values, the uncertainty of the calculations must also be mentioned, which involves from time to time even the possibility of miscalculation. Occasional inaccuracy of presented values result from uncertainty of the natural, health and social processes and effects, from the differences of the average and limit values of these effects, as well as from the problems of monetization, but it also depends on the mentality of the population concerned.

The figures used in our calculation reflect typically the effects characteristic for the average of the EU15-s, therefore, taking into consideration the literature recommendations, they were always corrected with the buying power parities (in Hungary, in 2006 it was 0.63 as compared to the EU; we calculated with the 2006 average euro rate: 264.27 HUF/€), which, assumable in some cases resulted in underestimation, while in other cases in overestimation. Detailed calculations on externalities can be found in the auxiliary-pages of the Excel table attached to the study.

5.1. Harmful effects on the climate

Transport with its excessive use of fossil fuels contributes considerably to global warming. From transport emissions, carbon dioxide has the most significant effect; the rate of CO_2 emissions is in direct ratio with the quantity of the fuel used.

Quantification of the effects on climate was carried out on the basis of the data given in the CONCAWE (2007) study referred to in CE DELFT (2008). In the calculations we used the lowest CO_2 emission's external cost-values of the year 2010. Due to the uncertainty of the effect, also the minimum, the maximum and the most probable loss-values were calculated separately.

In the CE DELFT (2008) study the negative externalities of the transport exerted on the climate were quantified by using two methods, on the one hand on the basis of the fuel used, on the other hand in relation to the distance run by different vehicle categories. Inasmuch as the former calculation (in case of the availability of the necessary data) provided more precise results, in the case of road transport these values were used, whereas in the case of the railway sector, in the absence of detailed data, the vehicle-kilometre values produced by units with electric and diesel drive were taken into account.

On the basis of the traffic census data the annual running performance in road transport can be estimated relatively precisely, specific fuel consumption by vehicle categories and road network elements can also be assessed. The social cost of the climate changes resulting from CO_2 emissions is uncertain. According to experts the harms which are caused if one tons CO_2 gets into the atmosphere increase from decade to decade; it's estimated to reach 25 €/t by 2010, however because of great uncertainties, the extreme values (7–45 €/t) have also been taken into consideration in our calculations. On the basis of the data mentioned, in the case of burning 1 litre petrol, or diesel, 6.9 €ct (1.9–12.4), or 7.8 €ct (2.2–14) social losses are produced, respectively.

According to our calculations the passenger cars as a whole cause about 33.8 billion HUF loss (because of estimation uncertainties the following extreme values can also be taken into consideration: 9.4, or 60.7) by burning fossil fuels. As for trucks this value is equal to 26.7 billion HUF (7.5, or 47.9), for buses 2.2 billion HUF (0.6, or 3.9).

Because causing an accelerated weather changing, the social loss caused by passenger railway transport – if performed by rail carriages with electric drive (production of electric energy also included) or with diesel drive – amounts to 11 (3.1–19.8) €ct and to 10.3 (2.9–18.5) €ct, respectively. In the absence of precise data, in the calculation of the national costs we reckoned with the above specific values, because it was assumed that the consumption of the shorter (and thus of potentially lower energy consumption) domestic rail carriages because of the infrastructure and of the poorer technical condition of the engines would not differ considerably from the west European results. Taking into consideration that 82 million kilometres was the performance achieved in passenger railway transport and the rate of electric traction was 87 %, the social cost calculated for the country amounted to 1.5 (0.4 – 2.7) billion HUF. In case of 18.9 million rail carriage kilometres of goods transport the external loss cause is equal to 0.3 (0.1–0.6) billion HUF.

5.2. Air pollution impacts detrimental to health

In many European regions, so in Hungary, too, air pollution even might reduce the lifetime of the population with several years, or might increase the rate of morbidity (mainly disease of respiratory organs, and of the immune and the circulatory systems).

The social costs calculated for Germany and presented in the CE DELFT (2008) study show that the air pollution (e.g. PM10, PM2,5, SO_2, NO_x) caused by passenger car traffic depending on the type of the motor vehicle and the place of operation changes significantly (between 0.1 and 14.1 €ct/veh.km). Since no summarized vehicle-kilometre data for the subcategories of the different vehicles were available, the assessments concerning the social impacts of the road users' emissions were made on the basis of the estimated summarized data (Magyar Közút, 2008) relating to the national vehicle fleet and the mileage rates. On the basis of domestic traffic data (classification according to fuel, road category, engine capacity and environment), the air pollution resulting from the traffic of passenger cars generates a total expenditure of 58.6 billion HUF in Hungary.

For road freight transport the social expenses amount to 108.6 billion HUF, for bus transport to 9.1 billion HUF.

In Hungary, the passenger transport by railways results in 1.7 billion HUF direct air pollution related expense calculated on the basis of 13 percent diesel traction with 90.7 €ct/veh.km, and 108.8 €ct/veh.km unit price, for inter- and inner locality transport, respectively. In case of freight services, on the basis of 305.8 €ct/veh.km, or 366.8 €ct/veh.km unit prices, 1.3 billion HUF external loss can be counted with.

The lower values relating to interurban transport, while the data calculated for local transport have been taken into account with 85 % and 15 % importance, respectively.

5.3. Noise impacts detrimental to health

The extent of the traffic noise related social problems varies completely in the different parts of the day, and its impact depends also on the size of the population of the area concerned. Accordingly, in the CE DELFT (2008) study, the volume of the marginal costs concerning the external expenses of noise emission in the daytime or night time or in the case of urban, suburban or country traffic is different. The volume of domestic traffic and its rates of distribution are indicated in the table presenting the results; the night time traffic flow (between p.m. 22.00 and a.m. 6.00) characteristic for some road network elements is estimated according to the data given in Magyar Közút (2006).

The CE DELFT (2008) study indicates the specific marginal costs instead of the average detrimental social impacts of the traffic generated noise. Failing available data, our estimates for the average cost and the marginal cost were the same. This can be taken as a properly precise approximation in the case of noise.

For passenger car traffic the social cost of noise, on the basis of international specific costs and national traffic forecasts amounts to 15.6 (14.5–35.2) billion HUF.

In case of goods vehicles and buses the social cost can be calculated to amount to 25.6 (23.3–56.3) billion HUF, and 0.7 (0.6–1.5) billion HUF, respectively.

As in the case of air pollution, for railway traffic we calculated 85 % for inter-locality and 15 % for inner locality traffic, i.e. on the basis of the values indicated in the CE DELFT (2008) study, according to our estimates for passenger transport and freight transport the external social costs were 0.8 (0.4–0.8) billion HUF and 0.4 (0.3–0.4) billion HUF, respectively.

5.4. Environmentally harmful effects of soil and water pollution

From emissions resulting from transport polyaromatic hydrocarbons (PAH) and heavy metals impair to the greatest extent the soil. These pollutants getting from the atmosphere into the soil in addition to being harmful to plants impair the soil's fertility as well.

CE DELFT (2008) relies on the OSD (2006) study in which on the basis of the values calculated for Switzerland the social cost of environmental impacts caused by the operation of pas-

senger cars is equal to 0.06 €ct/veh.km. In our calculations the values taken into consideration for light and heavy goods vehicles were 0.17 €ct/veh.km, and 1.05 €ct/veh.km, respectively; for buses 1.06 €ct/veh.km, while for passenger and freight rail services 0.29 €ct/veh.km and 1.02 €ct/veh.km, respectively. On basis of domestic traffic data all this in case of passenger cars equals annually to 6.4 billion HUF, for road haulage to 8.4 billion HUF, for buses to 1.7 billion HUF, whereas in case of rail transport in all 71 million cost can be assumed.

5.5. Devastation and fragmentation of natural habitats

When transport infrastructure is developed the living beings perish due to the construction of paved roads and as a result their ecological balancing role (ecological services provided for human society) ceases.

However, the construction of the road network impairs the environment not only by causing territorial loss but due to the fragmentation of the ecosystem in the remaining areas the damages caused increase, and the likelihood of disappearance of different species by the fragmentation of populations grows.

Detailed surveys were carried out in Switzerland (OSD, 2003), and the EU15-s (+ Switzerland and Norway) (INFRAS/IWW, 2004) concerning the impairments caused by transport infrastructure developments to natural environment, but these areas were also dealt with by EXTERNE (1999), NEWEXT (2004) and NEEDS (2005). From the studies referred to the CE DELFT (2008) mostly adopts the former two methodologies, consequently we also made our calculations accordingly. From the two mentioned calculations the data of OSD are more common, however, applicability in other territories is limited due to its Switzerland-related specific data. The INFRAS/IWW methodology is mentioned as alternative (CE DELFT, 2008).

The source providing two different data was dealt with as an extreme value, while as an average one their arithmetical mean was given.

In the calculation of domestic values, the different value of the buying power was taken into consideration (0.63), or the price index (1.137) lasting from the time of the original survey (2000) until the period examined (2006).

When taking into consideration the external damages deriving from land use we didn't calculate upon the basic infrastructure networks, because in our estimation their impact does not exceed the extent tolerable by nature. So, the influences of local roads couldn't be quantified,

and the estimation did not include the almost 26 thousand km long network of the national road system either, which existed already at the beginning of the twentieth century. The damages deriving from land use were assessed for the expressways and the almost 6 thousand km long network extensions implemented in the time of the previous decades. In our calculations the motor roads (129 km) and motorways (785 km) were considered as the same category, while from the main national road network 5,086 km-s were taken into account.

For the railway the role of the whole infrastructure was estimated. It is worth mentioning that due to this method of calculation, the road transport could have advantage over the railway.

The yearly appearing social losses due to the maintenance of the network elements of transport infrastructure were divided among the role players on the basis of mileage measured in vehicle-kilometres on the different network elements in case of the road transport, whereas for rail bound transport on the basis of axle-kilometres.

Data for the development of the rail bound transport in Hungary were available only for 2004 in relation with the main-, the secondary- and the narrow gauge lines. The rate of the passenger and the freight services (in the absence of other data) was divided among the sub sectors on double gauge lines and on single gauge lines according to the traffic volume of the main lines and of the secondary and narrow gauge lines, respectively.

The public road network – in all 6,000 km long – taken into consideration in the calculation based on the OSD (2003) data, due to the land use and the fragmentation of the natural habitats caused an external loss of 34.4 billion HUF/year, out of which 23.5 billion HUF was charged to passenger cars, 10.5 billion HUF to trucks, and 0.5 billion HUF to buses. According to our calculations the damage caused by railway passenger and freight services amounts to 18.3, and 1.2 billion HUF, respectively.

According to the INFRAS/IWW (2004) data appropriate for alternative assessment, the land use of the public road network and the fragmentation caused to the natural habitat imply 13.8 billion HUF/year external damage, out of which 9.4 billion HUF was charged to passenger cars, 4.2 billion HUF to trucks and 0.2 billion HUF to buses. The damage caused by railway passenger and freight services amounts to 2.0, and to 0.1 billion HUF, respectively.

5.6. Accident losses

In our work we are supposed to count with the losses caused by road and railway traffic accidents, and to divide these among different vehicle categories.

5.6.1. General description of road accident losses:

For road transport there are relatively precise records in the domain of personal injury accidents. The KSH data basis registers the most important data of accidents and injured persons, such as the severity of accidents and injuries, the number of persons involved, the accident type, the accident nature and its causer. There are no data available on accidents with damage only, because in this case information of the police is not obligatory.

Underreporting – meaning that not all the accidents are registered – makes problematic to determine the real number of accidents. This partly results from the insufficiencies of the administration system, and on the other hand, in case of minor accidents it may happen that the accident noticeably is not severe, consequently the parties omit to inform the police. The less severe the accident, the higher the rate of omission.

Table 21: the following values are recommended in the study HEATCO 2005 to be used as average European correction factors

Recommendation for European average correction factors for unreported accidents

	Fatality	Serious injury	Slight injury	Average injury	Damage only
Average	1.02	1.50	3.00	2.25	6.00
Car	1.02	1.25	2.00	1.63	3.50
Motorbike/ moped	1.02	1.55	3.20	2.38	6.50
Bicycle	1.02	2.75	8.00	5.38	18.50
Pedestrian	1.02	1.35	2.40	1.88	4.50

Source: HEATCO (2005).

Table 21 shows that in compliance with the assessments, whereas fatal accidents are underreported in 2% only, one-third of severely injured – recovery beyond 8 days – and two-third of slightly injured is not reported. In our calculations these values have been taken as references, since the compliance of the national results with the European standards is difficult to estimate .

It is the more important to pay attention to occurrence of underreporting, because calculation of accident losses may be influenced in merits by it; i.e. the specific accident loss (HUF/injured) determined for individual injury severity consequences refers to accidents recorded in statistics.

Underreporting is „even" for fatal accidents, i.e. estimated of having the same extent in different vehicle categories. At the same time, there are more remarkable differences in the case of accidents with serious consequences. Visibly, notwithstanding that for (passenger)cars the recommended correction factor is 1.25, this is 1.55 and 2.75 in case of motorcyclists and cyclists, respectively.

It is justifiable to presume that mainly those accidents are omitted from records where no police action is needed, and the injured is not hospitalised. Some of them are individual accidents, that is well illustrated by the factor which is much higher for more instable single-track vehicles, more endangered by falling and off road incidents.

In other cases, notwithstanding that the accident consequence is severe, the limit value is hardly reached, and the victim's injury, in some cases, is not noticed, or if it is, this happens only beyond 8 days. Even if a doctor is consulted, in most cases the relationship between the injury and the road accident is not recorded.

Therefore, it can be said that severity of unrecorded „serious" accidents in average hardly exceeds the limit value of the „serious" category, and besides, related vehicle damages are insignificant.

Different elements of the accident losses:

a) health expenses,
b) production falls,
c) property losses,
d) congestion losses,
e) non-property damages.

In accordance with the above mentioned, all the loss elements in the unrecorded cases are only fractions of the average value of the recorded ones. In practice there are no congestion losses, and due to predominance of less valuable vehicles (e.g. bicycle), the property losses are low as well. Obviously, amongst them one can find vehicles for which the total loss value remains under the recorded slight injury's loss value. Inasmuch as these accidents and injuries remain hidden, the estimation of their average loss value is uncertain. Nevertheless, it can be assumed that the average loss value exceeds the lower severity category's average value.

A similar train of thought prevails for damage-only-accidents, where, however, the proportion of the single-track vehicle accidents is even higher; so, the relative average loss value is even lower.

In addition to the above, it has also to be taken into account that the „administration loss" is presumably higher in lower severity categories. For fatalities it can be 1%, for serious injuries 2%, and for slight injuries 5%.

Table 22: the recently accepted specific loss values (2006 price level) are the following, as amended by the estimated average values (mHUF/injured) relating to unreported injured

	reported	***unreported***
Fatality	261,12	261,12
Serious injury	18,12	2,65
Slight injury	1,30	0,85
Damage only	0,60	-

It is interesting how the number of damage-only accidents develops. According to professional estimations this number exceeds six times the reported personal injury accidents. In this matter more precise data are not available in Hungary, because in these cases police is called only if the parties involved cannot agree with each other; and the data base of the insurance companies is not accessible. All this means that, here, in relation to the estimated value one cannot speak about underreporting, moreover the determined specific loss value also concerns the estimated number.

In the calculation of the external costs taken from KSH's accident data, among the accident losses only those expenses can be taken into consideration, which are not covered by real payments. Accordingly, the accepted loss values shall be reduced by parts to be paid for, these include the losses to be covered by the insurance company or the causer.

The railway accident loss and the losses involved by passenger and freight services form a separate question.

5.6.2. General description of the railway losses:

Recording of rail accidents is different from that of road ones. As a result of the change in methodology in statistics the limit value of significant accidents increased from earlier 10

million HUF to 40 million HUF, and personal injuries comprise the data of the seriously injured persons only. From raising the one year earlier value limit, only a probable information can be presumed concerning the real number of the accidents of the year 2006 with a loss value between 10 and 40 million HUF. However, it can be assumed that a significant amount of accidents with a loss value below 10 million HUF also occurred, but they were not included in the KSH data previously.

The KSH record is unique in the sense that the accidents occurring in railway crossings are indicated in sections relating to the road and the railway, too.

Table 23: KSH's last years' railway accident data

Year	***Total***	***In rail accidents***	
		killed	***injured***
2004	2355	94	357
2005	2242	91	322
2006	145	65	98

The data of Table 23 show that the yearly number of accidents with loss value from 10 million to 40 million HUF and with slight injuries is 2100.

In case of accidents occurring on the railway infrastructure, the damages caused during the incidents and the costs related to personal injury accidents are calculated separately.

5.6.3. Calculation of material damages caused by railway accidents:

Material damages arising on purely railway infrastructure can be divided into 3 major parts; experts' estimations have been carried out in order to determine the real value of these damages.

In the first case, for damage-only accidents indicated as such in the statistics and with a value limit over 40 mHUF, the average loss was set to 80 mHUF.

The amount in 4 cases totalled **0.32 billion HUF**.

In the second case, the value of the material damage arising from railway accident injuries is proportionally divided in accordance with the value categories included in statistics. Usually,

inverse proportion can be experienced between severity of accidents and their frequency of occurrence, i.e. the number of slight injury accidents is higher.

Table 24: costs of railway injury accidents on the basis of the value of the incurred material damage

Value category (mHUF)	***Average loss value (mHUF)***	***Number of estimated events***	***Total loss (mHUF)***
0	0	76	0
0–10	5	38	190
10–40	20	18	360
>40	80	9	720
	total	**141**	**1270**

This calculation will result in a value equal to **1.3 billion HUF**.

In the third case the loss value of incidents not included in statistics and estimated to 10-40 mHUF damage value and with slight injuries is assessed.

Because of the features of statistics, the cases among the events missing from, and estimated for 2100 are divided as follows:

Table 25: loss values of slight injury incidents not included in the KSH statistics and of 10-40 million HUF estimated damage values

Event category	***Average loss value (mHUF)***	***Number of estimated events***	***Total loss (mHUF)***
Damage only	15	2000	30000
Damage, with slight injury	5	30	150
Non damage, with slight injury	0	70	0
	total	**2100**	**30150**

The resulting cost equals to **30.15 billion HUF.**

If we assume that accident damages arising during railway service (because of the significant contributory masses) are generally high, notwithstanding it is assumed that at least as many accidents of 0-10 mHUF damage value could occur. So, if about 2,100 earlier accidents of average 5 mHUF damage value are presumed, then their combined loss will be 10.5 billion HUF.

Consequently, the loss of the accident *damages* occurred during one year railway operation can be estimated to total **42,17 billion HUF.**

5.6.4. Calculation of personal losses of railway accidents:

Out of the personal injury accidents deriving from railway vehicle - road vehicle collisions referred to in the publication 'The personal injury accidents in 2006' from 37 incidents 13 were fatal, 14 serious and 10 slight injury ones, and from the 59 persons involved 17 were killed, 20 were seriously, and 22 slightly injured.

Accidents in railway – road crossings have been indicated in both statistics, therefore the figures in the railway statistics were used.

17 was the number of fatal victims of the personal injury accidents arising from collisions between railway and road vehicles. If this value is subtracted from 23, which refers to victims of the collisions in road-railway level crossings to be found in the section comprising the railway accidents in the publication 'Traffic accidents – 2006', then the remaining 6 victims can be regarded as pedestrians, and as causers, they can be ranked, within road sector, in the cases: the pedestrian is guilty.

From the 145 railway cases taken from the publication 'Traffic accidents – 2006' 141 were personal injury and only 4 damage-only accidents.

In these accidents the number of killed was 65, out of them 4 were passengers, 61 unknown persons, and from 98 injured 1 person was a railwayman, 49 were passengers and 48 were unknown persons.

Since in the publication 'Traffic accidents – 2006' only the number of fatal victims is indicated in the accidents occurring in the railway crossing, the number of seriously and slightly injured should be formed.

The values are provided by a ratio formed on the basis of 2 statistical tables.

The number of persons injured in railway-road level crossings – taken from the Table: The number of accident railways on the basis of accident character and occurrence; and from the data of the railway related part of the Table: Traffic accidents and the number of killed and injured persons by modes – has been figured out in the following way:

98 persons injured severely in railway accidents, calculated in the following way from 35 accidents occurred in railway-road level crossings and from 141 personal injury railway accidents:

98*35/141=24,33 i.e. 24 seriously injured in railway-road level crossing.

As for the railway, in accordance with the methodology described, the seriously injured are recorded only, another method has been used for the calculation of their number.

From the ratio between the values determined in relation to severe injuries and the figures relevant to persons taken from the table comprising the personal injury accidents occurring in railway vehicle and road vehicle collisions we developed the following:

22*24/20=26,4 i.e. 26 slightly injured in railway-road level crossings.

The railway statistics include 65 fatal victims and 98 seriously injured, but there are no information on the number of slightly injured as a result of the recently introduced methodology, so the number of the victims injured this way is determined by estimation.

Making comparisons with statistics comprising the slightly injured of the previous years and presuming that no abrupt improvement developed during this period in the railway infrastructure, the number of slightly injured was estimated to 220.

If it is deducted from the total number of the persons involved in railway accidents with personal injuries (65 deadly injured, 98 seriously injured, 220 slightly injured) the number of the persons injured in accidents occurring in a railway-road level crossing (23 fatally injured, 24 seriously injured, 26 slightly injured), we obtain how many persons were involved in purely railway accidents (42 fatally injured, 74 seriously injured, 194 slightly injured).

From 42 fatal victims 4 can be considered as railway passengers, while the other 38 victims as passengers, and 4 of them (10%) can be regarded as potential passengers, therefore they are counted with in the railway category.

From 74 seriously injured 50 cases can be remitted directly to the railway's responsibility (1 railwayman and 49 passengers belong to those injured in railway traffic accidents) since these injured persons were staying with travelling intention in areas belonging to the railway's range of function. From the remaining 24 pedestrians 2 can be considered as potential passengers (90:10 sharing ratio between the pedestrian and rail modes), while the other 22 as pedestrians.

From 194 slightly injured (the number of slightly injured in relation to the railway has been determined in compliance with the ratios previously used, which were the following: 2 railwaymen, 97 passengers, 95 unknown persons) 99 cases can be accounted directly within the railway's sphere of responsibility (2 railwaymen and 97 passengers, from the number of the slightly injured involved in the railway traffic accidents), because these injured were staying with travelling intentions in areas belonging to the railway's range of function. From the remaining 95 pedestrians 8 can be considered as potential passengers, while the other 87 as pedestrians.

The following results are obtained if those involved in the accidents occurring on the railway infrastructure are divided as causers in two categories, pedestrian and railway:

Table 26: number of persons involved in accidents occurred on the railway infrastructure (2006)

Injury causer	***Number of fatalities***	***Number of seriously injured***	***Number of slightly injured***
pedestrian	34	22	87
railway	8	52	107
total	**42**	**74**	**194**

This year in 110 cases fatalities could be attributable to suicides on the railway network, but the incurred costs are not reckoned with, because they are not considered as traffic accidents.

In the table the costs between railway passenger and goods transport are divided on the basis of gross ton kilometres.

5.6.5. Description of methodologies elaborated for the calculation of road accident losses:

5.6.5.1. Determination of the average value of the number of accident injuries

The KSH's statistical database provides the division by causers relating to accident events only, therefore they should be recalculated on the persons involved in different accidents because the unit base of cost values were determined according to the severity of injury of the persons involved.

In the instruction (COWI_közút_21. táblázat) determination of the number of persons involved in various types of accidents can be found for each road category, therefore, in order to divide injuries according to causers the value relevant to the whole road network has been determined.

An average value was calculated for all accident types, and then, based on accident figures corrected subsequently, the following values were obtained:

Table 27: number of persons involved in different accident types

Accident outcome	*Number of killed*	*Number of seriously injured*	*Number of slightly injured*
Fatal	1,111	0,311	0,290
Serious	-	1,140	0,406
Slight	-	-	1,283

5.6.5.2. Determination of the average value of the number of injured in accidents

The figures relevant to vehicle categories not included in the HEATCO 2005 results were developed from the HEATCO 2005 values on underreporting:

Table 28: On the basis of accidents' underreporting (HEATCO 2005)

Vehicle category concerned (x)	*Accident with fatal injury*	*Accident with serious injury*	*Accident with slight injury*
passenger car*	**1,02**	**1,25**	**2**
motorcycle*	**1,02**	**1,55**	**3,2**
truck	1,02	1,25	2
bicycle*	**1,02**	**2,75**	**8**
moped*	**1,02**	**1,55**	**3,2**
bus	1,02	1,125	1,5
tramway	1,02	1,1	1,4
trolley bus	1,02	1,125	1,5
animal-drawn vehicle	1,02	1,35	2,4
pedestrian*	**1,02**	**1,35**	**2,4**
passenger	1,02	1,25	2
animal	1,02	1,125	1,5
other	1,02	1,25	2

** category values agree with HEATCO 2005 results*

The categories expanded correspond to the categories resulting from the distribution of later causers. For trucks, passengers and other categories the values applied for the passenger cars were used. In case of buses, trolley buses, animals and tramways for serious and slight cases the x value, i.e. the underreporting values by vehicle categories were calculated on the basis of the following formula:

$$x_{SS}^{autóbusz} = x_{SS}^{troli} = x_{SS}^{állatok} = (1 + (x_{SS}^{szgk} + 1)/2) = (1 + (1{,}25 - 1)/2 = 1{,}125$$

$$x_{KS}^{autóbusz} = x_{KS}^{troli} = x_{KS}^{állatok} = (1 + (x_{KS}^{szgk} + 1)/2) = (1 + (2 - 1)/2 = 1{,}5$$

$$x_{SS}^{villamos} = (1 + (x_{SS}^{szgk} + 1) * 0{,}4) = (1 + (1{,}25 - 1) * 0{,}4 = 1{,}125$$

$$x_{KS}^{villamos} = (1 + (x_{KS}^{szgk} + 1) * 0{,}4) = (1 + (2 - 1) * 0{,}4 = 1{,}4$$

where: $x_{KS}^{villamos}$ = *the value of underreporting in case of tramway accident with slight injury*

$x_{SS}^{autóbusz}$ = *the value of underreporting in case of bus accident with serious injury*

The value for pedestrians was used in case of animals-drawn vehicles.

These values were calculated according to vehicles participating in traffic. If values of different categories are liked to be calculated by causers, then new multiplier values (**y**) shall be formed depending in what proportion are the road users of the different transport modes injured during the occurrence of different accidents.

For fatal accidents values of multipliers are maintained:

$$y_{HS}^{szgk} = x_{HS}^{szgk};\ y_{HS}^{mkp} = x_{HS}^{mkp};\ y_{HS}^{kp} = x_{HS}^{kp};\ y_{HS}^{gyalogos} = x_{HS}^{gyalogos}$$

In case of accidents with different consequences the multipliers are formed as follows:

Serious injury accident caused by passenger car:

In such accidents in 30% the occupants of the causer car are injured, while in 70% the guiltless vehicle's passenger or a pedestrian or a cyclist get injured.

$$y_{SS}^{szgk} = (x_{SS}^{szgk} * 0{,}3 + x_{SS}^{kp} * 0{,}35 + x_{SS}^{gyalogos} * 0{,}35) = (1{,}25 * 0{,}3 + 2{,}75 * 0{,}35 + 1{,}35 * 0{,}35) = 1{,}845$$

Slight injury caused by passenger car:

In these accidents in 70% the occupants of the causer motor vehicle, while in 30% the guiltless vehicle's passenger of a pedestrian and a cyclist get slightly injured.

$$y_{KS}^{szgk} = (x_{KS}^{szgk} * 0{,}7 + x_{kS}^{kp} * 0{,}15 + x_{kS}^{gyalogos} * 0{,}15) = (2 * 0{,}7 + 8 * 0{,}15 + 2{,}4 * 0{,}15) = 3$$

For other categories the method used for passenger cars was used; these values can be found in the following table:

Table 29: Distribution of accidents by road users involved

Division by causers (y)	***Severity of injury***	***Accident participants (%)*****	***multiplier***

		p.car	*mc*	*bc*	*ped*	
passenger car (p.car)	fatal victim					1,02
	seriously injured	30	-	35	35	1,85
	slightly injured	70	-	15	15	3
motorcycle (mc)	fatal victim					1,02
	seriously injured	5	70	12,5	12,5	1,67
	slightly injured	-	85	5	10	3,36
truck*	fatal victim					1,02
	seriously injured	30	-	35	35	1,85
	slightly injured	70	-	15	15	3
bicycle (bc)	fatal victim					1,02
	seriously injured	5	-	10	85	2,54
	slightly injured	-	-	60	40	5,75
moped	fatal victim					1,02
	seriously injured					1,67
	slightly injured					3,36
bus*	fatal victim					1,02
	seriously injured					1,42
	slightly injured					2
tramway*	fatal victim					1,02
	seriously injured					1,35
	slightly injured					1,8
trolley bus*	fatal victim					1,02
	seriously injured					1,42
	slightly injured					2
animal-drawn vehicles*	fatal victim					1,02
	seriously injured					1,42
	slightly injured					2,7
Pedestrian (ped)	fatal victim					1,02
	seriously injured	5		5	90	1,35
	slightly injured	5	5	5	85	2,4
passenger*	fatal victim					1,02
	seriously injured					1,85
	slightly injured					3
animal*	fatal victim					1,02
	seriously injured					1,42
	slightly injured					2
other*	fatal victim					1,02
	seriously injured					1,85
	slightly injured					3
railway	fatal victim					1,02
	seriously injured					1,25
	slightly injured					1,6

***** *the method of calculation used in the previous table was the basis for the determination of the values of different categories*

*** *percentages of the effectively calculated categories are indicated*

5.6.5.3. Basic values of accident loss calculation

Loss values used in this wok are calculated as shown below:

For reported accidents:

a. Damage-only accidents ($BV_{AK}^{reported}$)

These shouldn't be reckoned with, inasmuch as with appropriate approximation full scope repayment exists, partly due to insurances and partly through the causer. The damages of the causer shall not be taken into consideration either.

b. Accidents with slight injuries ($BV_{KS}^{reported}$)

Presumably, in such an accident the average material loss exceeds the average damage value of the damage-only accidents. Thus, the value of reduced, external damage (in 2006) was:

$$BV_{KS}^{'} = BV_{KS}^{reported} - 1{,}2BV_{AK}^{reported} = 1{,}3 - 1{,}2 \cdot 0{,}6 = 0{,}58 mFt / case$$

c. Severe personal injury accidents ($BV_{SS}^{reported}$)

In this case severity is even of higher degree. We can rely on estimations only, supposing that the value estimated does not exceed 40% of the base value, it does exceed the value of the slighter case. Thus the estimated external loss (in 2006) was:

$$BV_{SS}^{'} = BV_{SS}^{reported} - 3{,}5 = 18{,}12 - 3{,}5 \cong 14{,}6 mFt / case$$

Here, we presumed that the average value of the damage can approximate 4 mHUF, the price of a small-mid category motor vehicle. Given the terms of today's technology, often the accident victims of a car with total damage are inflicted with minimal injuries, while in cases where no safety belts were used, even in case of minimal damage serious personal injuries could occur.

d. Fatal accidents ($BV_{HS}^{reported}$)

The material damage caused by fatal accidents shows significant variance. For the running over pedestrian accidents the material damage is not significant in contrast to multi-vehicle collisions where in the worst case the vehicles cannot be repaired anymore. The average loss is significantly higher than the average of serious injury accidents, but it is below the average value of two average passenger cars' average value. Thus, the estimated external loss (2006 values) is:

$$BV_{HS}^{'} = BV_{HS}^{reported} - 7{,}5 = 261{,}12 - 7{,}5 \cong 253{,}6 mFt / case$$

In order to establish the external costs on the basis of the underreported data, other multiplying values should be determined. These are divided in compliance with the ratios produced by previous calculations, this way resulting the following loss values:

e. Damage-only accidents ($BV_{AK}^{underreported}$)

These shall not be counted with here either.

f. Sight personal injury accidents ($BV_{KS}^{underreported}$)

$$BV_{KS}^{"} = BV_{KS}^{underrepoted} - 0{,}4 = 0{,}85 - 0{,}4 = 0{,}45 mFt / case$$

g. Serious personal injury accidents ($BV_{SS}^{underreported}$)

$$BV_{SS}^{"} = BV_{SS}^{underrepoted} - 0{,}5 = 2{,}65 - 0{,}5 \cong 2{,}15 mFt / case$$

h. Accidents with fatality ($BV_{HS}^{underreported}$)

$$BV_{HS}^{"} = BV_{HS}^{aluljelentett} - 7{,}5 = 261{,}12 - 7{,}5 \cong 253{,}6 mFt / eset$$

Consequently, the external loss values of accidents shall be taken into consideration with the versions of these values recalculated to the given year.

5.6.6. Course of calculation of the accident costs:

Calculation of costs was divided into 2 parts. Strictly supported by statistical KSH data, in the first case assisted by various methodologies the value of internal and external costs was determined. In the other case, only on the basis of statistics, we calculated with those data which were omitted because of underreporting, and internal and external cost values were also obtained according to methodologies. The final value of accident losses – in a breakdown for both causers and accident consequences, as well as for external and internal costs – results from combining the two methods of calculation.

In 2006 the number of personal injury road accidents was almost 21,000, out of which about 6 % ended with fatalities.

There were 29,280 victims of the accidents, out of them 1303 were killed, 8431 severely and 19546 more slightly injured.

If all these incidences are categorized by the person of the causers, then in 63% car-drivers, in 9% truck-drivers, in 8% cyclists and in 7% pedestrians could be held liable for different accidents.

From data supplied by the table concerning the number of accident causers and consequences, with the help of the methodology described the breakdown by vehicle categories and causer has been estimated.

Table 30: The number of injured in road accidents as per causers

Causer of injury	***Number of fatal victims***	***Number of seriously injured***	***Number of slightly injured***	***Number of damage-only incidents***
passenger car	790	4 962	12 796	80 190
motorcycle	68	543	659	5 250
truck	157	781	1 842	11 922
bicycle	91	795	1 523	10 272
moped	38	434	797	5 406
bus	14	79	191	1 224
tramway	0	5	7	48
trolley bus	0	2	11	60
animal-drawn	4	30	60	402
pedestrian	124	690	1 421	9 522
passenger	0	6	26	144
animal	1	42	109	666
other	15	60	103	738
railway	1	1	1	18
total	**1 303**	**8 431**	**19 546**	**125 862**

Within personal injury road accidents one by each from fatal, serious or slight injuries identified under other categories is charged with the railway as causer. Proportionally, cases from the incidents with material damage are also charged with the railway.

In order to determine the number of accidents with material damage we counted with the six fold number of the personal injury accidents which were proportionally distributed in each category.

Before starting the final calculation of the cost values, in the table below the number of injured in purely railway accidents should be presented, separated also by causers.

The costs of the cases reported are the following:

Table 31: accident costs in case of reported accidents in breakdown by causers (mHUF)

Causer of injury	*Cost of fatal victims*	*Cost of seriously injured*	*Cost of slightly injured*	*Cost of material damages*	*Total cost*
passenger car	206 232	89 905	16 635	48 114	360 886
motorcycle+moped	27 556	17 703	1 892	6 394	53 544
truck	40 898	14 161	2 395	7 153	64 607
bicycle	23 785	14 407	1 980	6 163	46 335
bus	3 771	1 437	248	734	6 190
tramway	0	83	9	29	120
trolley bus	0	41	14	36	92
pedestrian+animal-drawn veh.	42 525	13 448	2 038	5 954	63 965
other+passenger+animal-drawn	4 207	1 960	310	929	7 406
railway	2 350	960	140	11	3 462
railway (material damage)				3 000	3 000
total	**351 323**	**154 104**	**25 662**	**78 517**	**609 607**

Table 32: external costs in case of reported accidents in breakdown by causers (mHUF)

Causer of injury	*Cost of fatal victims*	*Cost of seriously injured*	*Cost of slightly injured*	*Cost of material damages*	*Total cost*
passenger car	200 293	72 440	7 422	0	280 155
motorcycle+moped	26 762	14 264	844	0	41 870
truck	39 721	11 410	1 068	0	52 199
bicycle	23 100	11 608	883	0	35 591
bus	3 662	1 158	111	0	4 931
tramway	0	67	4	0	70
trolley bus	0	33	6	0	40
pedestrian+animal-drawn	41 300	10 835	909	0	53 045
other+passenger+animal-drawn	4 086	1 580	138	0	5 804
railway	2 282	774	63	0	3 199
railway (material damage)				0	0
total	**341 206**	**124 168**	**11 449**	**0**	**476 823**

Table 33: material costs in case of reported accidents in breakdown by causers (mHUF)

Causer of injury	*Cost of fatal victims*	*Cost of seriously injured*	*Cost of slightly injured*	*Cost of material damages*	*Total cost*
passenger car	5 939	17 465	9 213	48 114	80 732
motorcycle+moped	794	3 439	1 048	6 394	11 674
truck	1 178	2 751	1 326	7 153	12 408
bicycle	685	2 799	1 097	6 163	10 744
bus	109	279	137	734	1 260
tramway	0	16	5	29	50
trolley bus	0	8	8	36	52
pedestrian+animal-drawn	1 225	2 612	1 129	5 954	10 920
other+passenger+animal-drawn	121	381	172	929	1 602
railway	68	187	78	11	343
railway (material damage)				3 000	3 000
total	**10 118**	**29 936**	**14 213**	**78 517**	**132 784**

Calculated values taking into account the underreporting: If values are calculated on purely railway and road infrastructure and afterwards multiplied by the underreported values and subtracted from the reported ones, the following data are obtained:

Table 34: Number of persons injured in railway accidents as per the number of causers

Causer of injury	*Number of fatal victims*	*Number of seriously injured*	*Number of slightly injured*
passenger car	16	4 217	25 593
Motorcycle	1	364	1 554
Truck	3	664	3 684
Bicycle	2	1 224	7 235
Moped	1	290	1 881
Bus	0	33	191
tramway	0	2	5
trolley bus	0	1	11
Animal-drawn	0	12	102
pedestrian	2	242	1 989
passenger	0	5	53
Animal	0	18	109
Other	0	51	206
Railway	0	0	0
total	**26**	**7 124**	**42 613**

If these figures are multiplied, the cost values are obtained:

Table 35: Cost of railway accidents in case of not reported accidents in breakdown by causers (mHUF)

Causer of injury	*Cost of fatal victims*	*Cost of seriously injured*	*Cost of slightly injured*	*Total cost*
passenger car	4 125	11 176	21 754	37 055
motorcycle+moped	551	1 735	2 920	5 205
Truck	818	1 760	3 132	5 710
Bicycle	476	3 245	6 150	9 870
Bus	75	88	162	326
Tramway	0	4	5	9
trolley bus	0	3	9	12
pedestrian+animal-drawn	850	694	1 881	3 426
other+passenger+animal	84	195	313	592
Railway	0	34	54	89
total	**6 979**	**18 934**	**36 379**	**62 293**

Table 36: External costs generated by railway accidents in case of not reported incidents in a breakdown by causers (mHUF)

Causer of injury	*Cost of fatal victims*	*Cost of seriously injured*	*Cost of slightly injured*	*Total cost*
passenger car	4 006	9 067	11 517	24 590
motorcycle+moped	535	1 407	1 546	3 488
Truck	794	1 428	1 658	3 880
Bicycle	462	2 632	3 256	6 350
Bus	73	72	86	231
Tramway	0	3	2	6
trolley bus	0	2	5	7
pedestrian+animal-drawn	826	563	996	2 385
other+passenger+animal	82	158	166	406
Railway	0	28	29	57
total	**6 778**	**15 362**	**19 260**	**41 400**

Table 37: Material costs generated by railway accidents in case of not reported incidents in a breakdown by causers (mHUF)

Causer of injury	***Cost of fatal victims***	***Cost of seriously injured***	***Cost of slightly injured***	***Total cost***
passenger car	119	2 109	10 237	12 465
motorcycle+moped	16	327	1 374	1 717
Truck	24	332	1 474	1 829
Bicycle	14	612	2 894	3 520
Bus	2	17	76	95
Tramway	0	1	2	3
trolley bus	0	0	4	5
pedestrian+animal-drawn	24	131	885	1 041
other+passenger+animal	2	37	147	186
Railway	0	7	26	32
total	**201**	**3 573**	**17 120**	**20 893**

In costing procedures statistics data for motorcycle and moped-motorcycle categories are combined, in the table the distribution among the truck categories is made on the basis of thousand vehicle-kilometres. Values of the bus category are divided on the basis of vehicle-kilometres into local and inter-locality parts, while the data relating to pedestrians and to animal-drawn vehicles are combined. Other causers are combined with the values on passengers and animals.

5.6.7. Summarization of accident costs:

The total accident cost values incurred from the previous two versions combined with those related to railway accident damages will be the following in a breakdown by causer and accident categories:

Table 38: accident costs in breakdown by cost inflictors (mHUF)

Causer of injury	*Cost of fatal victims*	*Cost of seriously injured*	*Cost of slightly injured*	*Cost of material damages*	*Total cost*
passenger car	210 357	101 081	38 389	48 114	397 941
motorcycle+moped	28 107	19 437	4 812	6 394	58 749
Truck	41 716	15 921	5 526	7 153	70 317
Bicycle	24 261	17 651	8 130	6 163	56 205
Bus	3 846	1 525	411	734	6 516
Tramway	0	87	13	29	129
trolley bus	0	44	24	36	104
pedestrian+animal-drawn	43 375	14 141	3 919	5 954	67 391
other+passenger+animal	4 291	2 156	623	929	7 998
Railway	2 350	995	195	11	3 550
railway (from cases of damage)				3 000	3 000
total	**358 303**	**173 004**	**62 042**	**78 517**	**671 900**

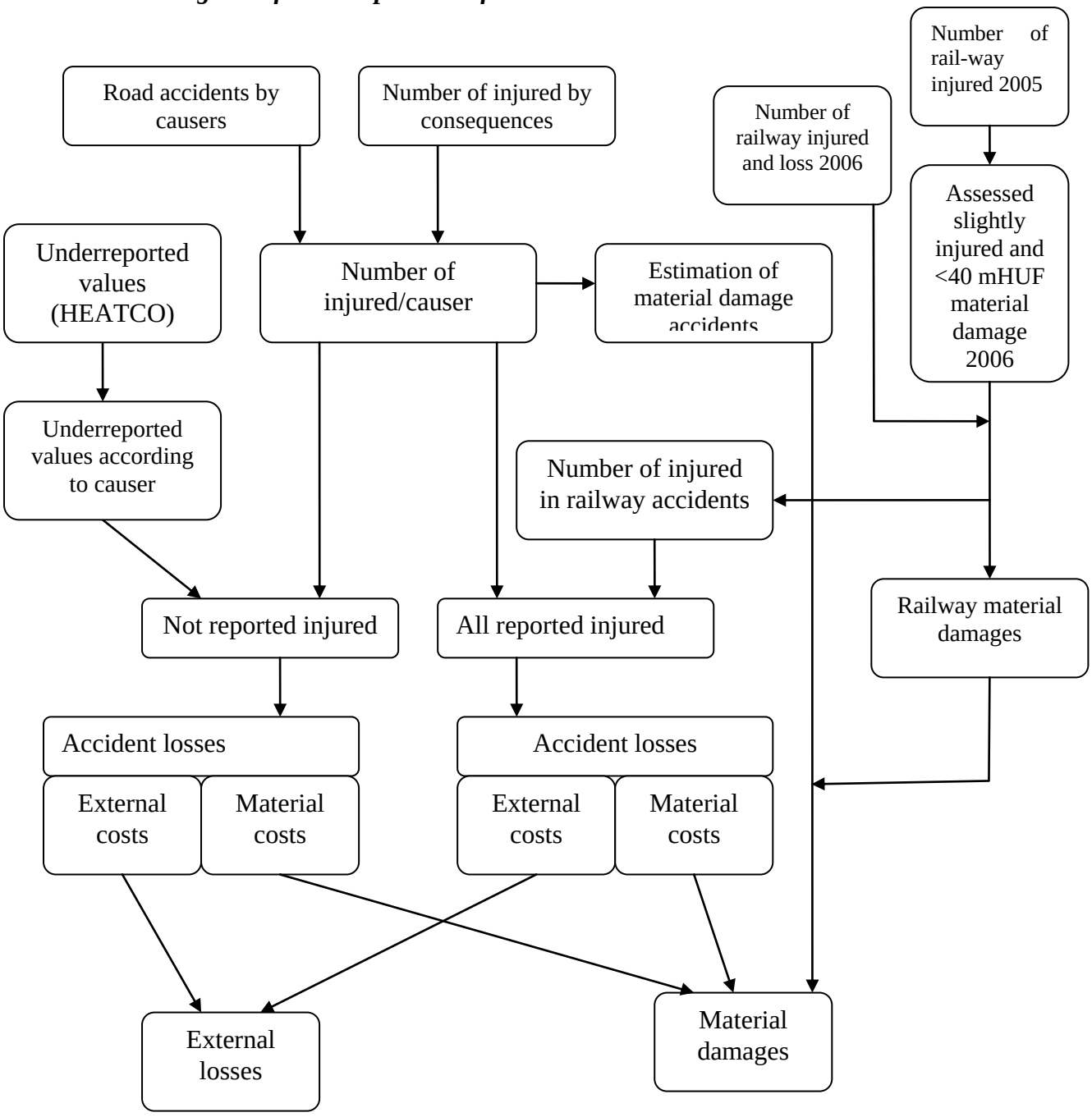
Table 39: external costs in breakdown by cost inflictors (mHUF)

Causer of injury	*Cost of fatal victims*	*Cost of seriously injured*	*Cost of slightly injured*	*Cost of material damages*	*Total cost*
passenger car	204 299	81 508	18 939	0	304 745
motorcycle+moped	27 297	15 671	2 390	0	45 358
Truck	40 515	12 838	2 726	0	56 079
Bicycle	23 562	14 240	4 139	0	41 942
Bus	3 735	1 229	197	0	5 161
Tramway	0	70	6	0	76
trolley bus	0	35	11	0	47
pedestrian+animal-drawn	42 126	11 398	1 905	0	55 430
other+passenger+animal	4 167	1 738	304	0	6 209
Railway	2 282	802	91	0	3 176
railway (from damage cases)				0	0
total	**347 984**	**139 530**	**30 709**	**0**	**518 223**

Table 40: material costs in breakdown by causers (mHUF)

Causer of injury	***Cost of fatal victims***	***Cost of seriously injured***	***Cost of slightly injured***	***Cost of material damages***	***Total cost***
passenger car	6 058	19 574	19 450	48 114	93 196
motorcycle+moped	809	3 766	2 422	6 394	13 391
Truck	1 201	3 083	2 800	7 153	14 238
bicycle	699	3 411	3 991	6 163	14 263
Bus	111	296	214	734	1 355
tramway	0	17	7	29	53
trolley bus	0	9	12	36	57
pedestrian+animal-drawn	1 249	2 743	2 014	5 954	11 961
Other+passenger+animal	124	418	319	929	1 789
railway	68	193	103	11	294
railway (from cases of damage)				3 000	3 000
total	**10 319**	**33 509**	**31 333**	**78 517**	**153 677**

5.6.8. The block diagram of the composition of the accident losses:



5.7. Congestions

Usually the everyday life of people living and travelling in large cities and in their agglomeration is made difficult by congestions.

In Budapest, around 1,000 km is the length of the road network being under the capital's management. Smooth, unimpeded movement for the traffic flows in the morning and afternoon peak hours, in the vast majority of cases, on the about 150 km section of this road net-

work is not assured. Resulting from these effects on the road sections annexed on further 25 km length the signs of congestion can be felt still.

If the bottlenecks are considered from traffic engineering aspects, it can be noticed that the average speed of through traffic is less than 10 km/h and the average vehicle delay approximates to 15 minutes/work days.

According to the data provided by traffic counts the number of the hours of congestion in the capital is close to 4. From vehicles participating in traffic nearly 320,000 are directly involved daily by the effects of these impacts.

Distribution of costs is based on the fleet of vehicles. In the traffic flows passenger cars are present in 75% (240,000), light duty trucks in 16%, heavy duty trucks in 6% and buses in 3%. In order to calculate the costs chargeable to different fleets, the hourly pay relevant to one vehicle has also to be taken into account. These values are different for each vehicle category (passenger car: 2588 HUF, light truck: 2954 HUF, heavy truck: 10919 HUF). The per capita cost value calculated for bus travellers equals to 1361 HUF. (COWI guide, HUF/vehicle-hours)

For the category of buses the HUF/vehicle-hour initial cost value is different from that one specified in the guide-book, because in the congestion period the bus occupancy rate is higher than during non-peak hours (on average 60 persons/bus).

The existing data multiplied into each other give the annual costs for congestion periods per categories, which are summarized in the following table.

Table 41: Congestion time cost in Budapest in 2006 (billion HUF)*

vehicle categories	***number of congested vehicles (thousand vehs/workday)***	***time cost (thousand huf/hour)***	***congestion time cost/year in Budapest (billion huf)***
passenger car	240,0	2,588	38,82
light duty truck	51,2	2,954	9,453
heavy duty truck	19,2	10,919	13,1
bus**	9,6	81,66	49,0
total	**320,0**		**110,372**

* 15 minutes delay counted per vehicles and workdays; 250 workdays/year
** on average 60 persons/bus

The surplus consumption related operation costs calculated on fuel-consumption norms were also determined in vehicle categories breakdown.

Table 42: Congestion generated fuel cost in Budapest in 2006 (billion HUF)*

vehicle categories	***number of congesting vehicles (thousand vehs/workday)***	***surplus fuel consumption (l/workday)***	***surplus fuel consumption ** (HUF/workday)***	***Yearly congestion fuel cost in Budapest (billion HUF)***
passenger car**	240,0	0,8	200	12,0
light duty truck	51,2	1,5	375	4,8
heavy duty truck	19,2	1,5	375	1,8
bus**	9,6	1,5	375	0,9
total	**320,0**			**19,5**

* 250 workday/year,. ** 250 HUF/litre

During congestions the harmful emission limits other than those produced under normal operational conditions shall also be reckoned with.

The average speed of the urban traffic flow is set to 40 km/h, whereas in the time of congestions it is estimated below 5 km/h.

The average cost values given for passenger cars' harmful emissions with toxic or climatic impacts amount to 12 and 7.4 HUF/km, while the same values equal to 89 and 27 HUF/km[26] for heavy duty trucks. These values agree here, since the heavy duty trucks and buses represent almost the same category.

In case of light duty trucks the corrected values have been used already, therefore the following cost values were developed 1:2.5 ratio: the toxic value 35.6 HUF/km, the climatic value 10.8 HUF/km.

Table 43: Surplus air pollution and CO_2 emission related cost caused by congestion in Budapest in 2006 (billion HUF)*

vehicle categories	***number of congesting vehicles (thousand vehs/workday)***	***surplus cost of air pollution (HUF/veh.-km)***	***surplus cost of CO_2-emissions (HUF/veh.-km)***	***Yearly congestion surplus air pollution and CO_2-costs in Budapest (billion HUF)***
passenger car**	240,0	12,0	7,4	1,5
light duty truck	51,2	35,6	10,8	0,7
heavy duty truck	19,2	89,0	27,0	0,7
bus**	9,6	89,0	27,0	0,3
total	**320,0**			**3,2**

***** *calculated with 15 minutes delay by vehicles and workdays, under the terms of 5 km/h speed; 250 workday/year*

[26] Methodological guide provided for cost-benefit analysis of road projects, COWI Hungary, Prepared for the National Development Agency (NFÜ), Budapest, March, 2007.

The excess noise costs developed because of congestions were not taken into account, because the noise effects compared to the average traffic flow in congestion periods are of a lower value on the network and its immediate surroundings.

Taking into account all three factors of costs, for Budapest the amount reaches 133.113 billion HUF/year.

Table 44: Total congestion costs in Budapest in 2006 (billion HUF)*

vehicle categories	***yearly congestion delay cost (billion HUF)***	***yearly congestion fuel cost (billion HUF)***	***yearly congestion surplus air pollution and co2-cost (billion HUF)***	***yearly congestion cost in Budapest total (billion HUF)***
passenger car	38,82	12,0	1,5	52,3
light duty truck	9,453	4,8	0,7	15,0
heavy duty truck	13,1	1,8	0,7	15,6
bus	49,0	0,9	0,3	50,2
total	**110,4**	**19,5**	**3,2**	**133,1**

The problem of congestion is proportional to the squared change of the population, therefore, in Hungary given 4 larger cities (with approx. 200 thousand population), counting with a 0.01 factor a cost amounting to 5.325 billion HUF incurs, and in case of 5 cities (population approx. 100,000) using a factor of 0.0025 the cost equals to 1.664 billion; for municipalities of smaller size this total expenditure amounts to 1 billion HUF. For road sections outside built-up areas this cost is almost 2 billion HUF.

Direct costs resulting from congestions, that is, the operation and time related costs of vehicles reached **143.101 billion HUF** in 2006.

The difference between total overall transport costs valid for smooth and congested traffic conditions is the additional congestion cost.

The White Paper (2001) pointed out that only the external cost of congestions would be equal to 0.5% of the union GDP, while the total congestion cost was estimated to be 1% by 2010 if no effective measures would be taken; practically, the problem of suburban congestions were not mentioned at all.

While in Hungary the volume of the congestion developed in the traffic of Budapest equals to that of the union, the level of congestion on national road network amounts to the union's (former member states, EU15) fraction.
The calculated result by its order of magnitude equals to the estimation based on the 1% GDP proportional congestion cost.

From the values calculated total environmental costs, as well as additional delay and fuel costs of buses and trucks are external costs. In case of the latter it is assumed that otherwise they could not reach their imperative targets, i.e. congestion is mainly caused by passenger cars. The internal costs comprise the passenger cars' time and fuel costs.

5.8. Special urban effects

In some respects the operation of local society is limited by motor vehicle traffic in urban and rural areas, similar to the damages caused to the nature. Because of land use and the separating effect of busy routes the motor vehicle traffic is detrimental for non-motorized forms of transport. From the harmful effects the CE Delft (2008) study quantified the restriction of pedestrian traffic, including the delays for pedestrians, as well as the infrastructure of cycling unsolved due to broad roads. The study indicates that the present quantification of other adverse effects (such as the visual "destruction" of the view of the town) is unresolved.

Experts' consultations concluded that it wouldn't be appropriate to charge the other actors of urban road traffic with the costs generated due to the lack of cycling infrastructure, i.e. the INFRAS/IWW overall specific values applied by the CE Delft (2008) were reduced by 25 percent, a reduced loss which according to our estimates covers pedestrians' damages.

In the calculations the traffic of the main roads of large cities, such as Budapest and medium-sized towns were reckoned with. In the case of railway transport in the absence of more precise data, 5 percent of the national traffic was taken into account.

On the basis of the specific values and the traffic data, the external social loss calculated for passenger cars, trucks and buses can be 3.9, 1.9, and 0.1 billion HUF, respectively. The harmful urban effects of the railway traffic can be estimated to 0.3 billion HUF.

5.9. Cost of energy-dependency

Because of the unequal occurrence of the oil reserves the users depend heavily on countries involved in oil production. Several studies have assessed already the economic costs of oil dependence, but most of these did not deal with issues related to transport. Property reordering resulting from the market dominance of producers, GDP loss caused by tight supplies, a loss caused by the unpredictability of oil prices (sudden and significant change), and moreover military expenditures needed to ensure oil supplies may emerge in the external costs.

Majority of the studies prepared deals with the exposure of the USA. In some studies there were different oil-dependency costs calculated due to evaluation uncertainties. For mineral oil the researches estimated this value between 0.2 and 10.6 € ct / l (CE Delft, 2008).

This cost for the total 5.1 billion litres domestic fuel use of the road sector calculated on 264 HUF/€ exchange rate equals to 1.7 – 91.2 billion HUF. Since also according to the government's energy policy our country's energy dependence shall be reduced, the role players of the economy have to be warned appropriately. Therefore, the use of the maximum value is recommended. Considering their fuel consumption, the share out of this amount for passenger cars, trucks and buses is 50.5, 36.6 and 2.6 billion HUF, respectively.

On the basis of the estimated amount of the diesel fuel consumption of the railway passenger transport sector the relevant energy dependency level is 2.0 billion HUF, the corresponding value in goods transport is not significant. External effects related to the energy dependence of electric traction with 87 % performance could not be estimated.

5.10. Transport-related indirect external effects

For quantification of gross emission of the whole aggregate of vertically related units the environmental effects of closely related activities (e.g. fuel production and processing, vehicle industry, disposal of motor vehicles and road construction and maintenance) should also be taken into consideration. During the quantification of indirect effects estimated traffic data were used as basis for the calculation of the air pollution effects.

On the basis of CE Delft (2008), the external social loss calculated for passenger cars, trucks and buses equals to 43.6, 27.8 and 2.0 billion HUF, respectively. The indirect harmful effects

of the railway passenger and goods transport may be estimated to 0.7 and 0.5 billion HUF, respectively.

5.11. Summary

On the basis of the summarization of the above items, in all, domestic road transport (the accident losses not counted with) causes 489 billion HUF external social damage per year, out of which in the case of 47 percent (229 billion HUF) the passenger cars are responsible.

According to calculations, the road goods transport charges the society in all by 241 billion HUF/year; this being 49 % of the road transport expenses. We calculated that the greatest impact (98.9 billion HUF) is affected by the smallest size, less than 3.5 tons trucks, while the categories of 3.5 to 7.5 tons and of 7.5 to 12 tons inflict 12.5 and 34.2 billion HUF cost, respectively, whereas the damage caused by the heaviest vehicles (with a mass above 12 tons) amounts to 95.7 billion HUF.

The operation of buses incurs 19.0 billion HUF/year external costs.

The railway passenger transport and the railway freight transport cause 17.1 and 3.7 billion HUF external cost annually.

6. Positive external effects in road transport

It is characteristic for the transport sector that usually the external effects are referred to as negatives and they are only dealt with as such in efficiency tests as well. Possible transport-related positive external effects are for example the „plane spotting", social trips, emergency attendance, national security, and the beauties of the infrastructure. According to VERHOEF et al. (2001) – in the terms of the present definition – these positive effects cannot be considered unanimously as positive external effects, they do not require state intervention, and are of minor significance. But the role of negative external effects is ever increasing in the society's value judgement; therefore, they should be taken into consideration and reckoned with in a more emphasised way, if possible. That is why the assessment prepared this way is called "social", as not only the emerging values of the market and those mediated directly by it have been taken into consideration, but also the effects appearing outside the market which we quantified where it was possible.

There is no doubt that society would be unsustainable without traffic, as it is an essential part of our lives. It is impossible and impractical to summarize in a more comprehensive way, in their full social influence the related far-reaching benefits on the basis of available international experience, studies and methods of calculation. If we did, it should be noted also the

possible payback results of the same expenditures in other areas (loss of profit, *opportunity cost).* A research with such profundity would go beyond the framework of the present study.

7. SUMMARY

When the work has begun the complexity of the duty was clear for us. The topic itself is ramifying, ranging from technical information through problems of economics to environmental and sociological questions, and many times those participating in the work were on different opinions. In most cases the difficulties arose from these problems and the clarification of the matters of principles in several times required a very long time, because the participants – their attention aimed at the goals set – were governed by the intent to become to consensus in as many problems as possible. In the majority of cases they were successful. The items with consensus formed the basis for the results included and summarized in this document.

7.1. Results in principles

Results were produced on several levels. In itself it was important to become acquainted with the views of each other, to clarify the differences. In many cases we arrived to consensus, the mode and the algorithm of taking into account of a given component were laid down. These were documented in details, in order to avoid the difficulties of later actualization.

Results of calculations were indicated in table form. All the elements are comprised which have been studied during our work. Having set the objective to collate the different sub sectors, all data were presented in a breakdown by sub sectors (road, railway), and within it by transport categories (passenger transport, goods transport), as well as by vehicle categories (passenger cars, trucks, and all the mass categories within it). The possibility of also presenting all over the results other than the mean value has been provided for, either because the partners could not arrive to consensus, or because the values also recognized in the literature comprise a wide spectrum. The complete table – because of its size – is not published in printed form, but it will be attached to the electronic version of the research report.

7.2. Results and conclusions in figures

Values derived from basic data and the conclusions drawn that of provide the other level of the results. As indicated previously, many such questions have also been dealt with, which – although having significant effects – can not be reckoned with in the balance.

7.2.1. Central budgetary balance of transport

As shown in tables 17 and 18 of section 2.5, the budgetary balance of transport can be determined equally with and without privatization revenues. Either of them taken as a basis, the following can be declared:

- The state budgetary balance of transport is characteristically negative, i.e. more is spent from the budget to the sector than the revenues deriving that of.
- On the average of the five years studied the road sub sector – the privatization revenues not reckoned with – shows a relative equilibrium, whereas the railway charges the state budget, significantly by 100 billion HUF/year.
- Transport by waterway and air show also a negative balance.

To sum it up, it can be declared that the negative state budget balance in transport is mainly caused by railway transport. Besides, attention has to be drawn to the fact that this in itself does not rate the railway transport. Partly, there may such accepted strategy exist, which by the continuous improvement of the service level counts for years with the support of the railway in order to make it competitive with road transport. On the other hand, some advantages of the rail-borne transport emerge in the field of the external effects, i.e. combined with these effects, a more plastic picture can be obtained on the railway situation later. For all that, given the knowledge of the level and the trend of the national railway services, it can be declared that the negative balance is not the result of the subsidies aimed at level improvement.

7.2.2. Expanded state budgetary balance of transport

Expanded state budgetary balance – as detailed previously – in addition to the above comprises also the external effects. In making the relevant calculations we were supported by the data of 2006. The value differentiated by vehicle categories and transport modes is more interesting than the combined estimates, for the very reason because a later strategy can be based just on these differences. Those specific values are considered the most significant ones, which show the specific state budgetary balance of transport, i.e. how much is the budget to pay for the transportation of 1 ton goods or 1 passenger (goods-ton kilometres, vehicle-kilometres). Necessary transport performances were derived partly from KSH data (passenger transport, railway goods transport), and they were partly estimated by using the domestic cargo weight values of the KSH and the traffic counts data of Hungarian Road Administration (road haulage). Results are presented in Table 45.

Table 45: Differentiated values of the expanded central budgetary balance in 2006 (KTI views)

	Road				Railway		
	Total	**Passenger cars**	**Trucks**	**Inter-locality bus**	**Total**	**Passenger transport**	**Goods transport**
Budget revenues (billion HUF)	**887,6**	**603,6**	**246,3**	**24**	**19,9**	**12,1**	**7,8**
Budget expenses (billion HUF)	**1034,9**	**547,9**	**358,5**	**92,5**	**183,9**	**142**	**41,9**
Budget balance (billion HUF)	**-147,3**	**55,7**	**-112,2**	**-68,5**	**-164**	**-129,9**	**-34,1**
Transport performance (million goods ton-kms, veh. kms)		**39290**	**36887**	**11784**		**9584**	**10167**
Specific budget balance (HUF/goods ton-kms, HUF/veh.kms)		**1,4**	**-3,0**	**-5,8**		**-13,6**	**-3,4**
External effects (billion HUF)	**-1307,8**	**-737,1**	**-364,3**	**-14,4**	**-26,8**	**-21,6**	**-5,1**
Expanded balance (billion HUF)	**-1455,1**	**-681,4**	**-476,5**	**-82,9**	**-190,8**	**-151,5**	**-39,2**
Expanded specific budget balance (HUF/goods ton-kms, HUF/veh.kms)		**-17,3**	**-12,9**	**-7,0**		**-15,8**	**-3,9**

The table overviewed, the following remarks can be made in relation to the situation in 2006:

- The balance of the state budget is positive only for passenger car traffic, while it is negative for all other transport modes.
- The expanded balance is already negative all over.
- Trucks are responsible for the negative state budget balance of the road sub sector. If data on details are studied, it may be seen that its reason derives from immense road damaging effect related to high axle load.
- Also as concerns the external damages, the increased impact caused by trucks is clear.
- At the first moment, the high specific budgetary balance of interurban buses is surprising; however it is evident that this results from revenues of the very low tariffs.
- On the level of the budgetary balance the balance of passenger cars is positive, even if in a low extent.

- Outstanding attention deserves the fact that the expanded specific budgetary balance including the external effects also, in the case of buses compared with the passenger cars is more favourable already. Essentially lower environmental load caused by public transport manifests here.
- Within the railway sub sector more significant budgetary subsidy is provided to passenger transport, however the balance of freight transport is also negative.
- In 2006 as against road, the railway passenger transport specifically caused 2,3 times higher expenses for the budget.
- Practically, specific budgetary expenses for the railway and road goods transport were the same.
- In public passenger transport, considering the specific values of the budgetary balance expanded by external effects, bus is cheaper by almost 35 percent than the railway.
- In goods transport the specific values of the railway mode show a three-fold greater advantage if compared with the road sector's.

On some items the viewpoints of the experts of the Clean Air Action Group were in contrary to KTI's opinion, and the expanded balance (Table 46) was somewhat amended accordingly. The explanation for these differences is the fact, that due to the reasons explained in detail previously, the Clean Air Action Group does not take into consideration the value added tax imposed on the special transport taxes (fuel tax, registration tax, other special taxes), as well as the union subsidies among the budgetary payments of the transport sector.

Differences in the first line of Tables 45 and 46 („Budget revenues") can be explained with different interpretation of union subsidies spent on transport; KTI is on the opinion that this item for passenger cars is 16.7, for trucks 16.2, for local bus transport 1.7 billion HUF, while for railway passenger and goods transport it is 5.8 and 7.4 billion HUF, respectively. The Clean Air Action Group holds that this item is not part of the revenues in this table.

The different way of taking into account the VAT imposed on special taxes increases the differences, which in KTI's interpretation is specific, and therefore, it should be taken as transport-related tax, with a value of 46.4 billion HUF in case of passenger cars. The Clean Air Action Group is on the opinion that VAT revenues fall into the category of general value added tax incomes; therefore they do not form part of the revenues in the table.

Given the case of passenger transport, the two parties' positions are different whether the VAT revenue due after consumer price supplement is to be taken as revenue. The Clean Air Action Group considers it also as a general tax revenue, and thus not part of the reve-

nues in the table. Consequently, in case of inter-locality buses this amounts to 9.7 billion, while for railway passenger transport it is an amount less by 5.7 billion HUF compared to KTI's calculation.

Table 46: Differentiated values of the expanded central budgetary balance in 2006 (views of the Clean air Action Group)

	Road				Railway		
	Total	**Passenger cars**	**Trucks**	**Inter-locality bus**	**Total**	**Passenger transport**	**Goods transport**
Budget revenues (billion HUF)	**790,8**	**540,6**	**230,1**	**12,6**	**1,0**	**0,6**	**0,4**
Budget expenses (billion HUF)	**1034,9**	**547,9**	**358,5**	**92,5**	**183,9**	**142**	**41,9**
Budget balance (billion HUF)	**-244,1**	**-7,3**	**-128,4**	**-79,9**	**-182,9**	**-141,4**	**-41,5**
Transport performance (million goods ton-kms, veh. kms)		**39290**	**36887**	**11784**		**9584**	**10167**
Specific budget balance (HUF/goods ton-kms, HUF/veh.kms)		**-0,2**	**-3,5**	**-6,8**		**-14,8**	**-4,1**
External effects (billion HUF)	**-1307,8**	**-737,1**	**-364,3**	**-14,4**	**-26,8**	**-21,6**	**-5,1**
Expanded balance (billion HUF)	**-1551,9**	**-744,4**	**-492,7**	**-94,3**	**-209,7**	**-163**	**-46,6**
Expanded specific budget balance (HUF/goods ton-kms, HUF/veh.kms)		**-18,9**	**-13,4**	**-8,0**		**-17,0**	**-4,6**

It is clear that there is no significant difference between the viewpoints of the KTI and the Clean Air Action Group: with reference to Tables 45 and 46 for all the items is evident that the difference does not alter the overall picture, the proportions are similar between the various transport sub-sectors. For example, the passenger-car transport has taken the best place in Table 46, too, not affecting negatively the state budgetary government balance

7.3. The way of taking into account other economic effects

Tables 47 and 48 contain data expanded by further social impacts: here are listed the tax system anomalies, tax evasion, as well as besides the transport-related effects of black economy also the effects of the restricted weekend traffic of trucks. For these items the difference between the results calculated by the two parties derives from the different methods of calculating the costs accounted for the private use of passenger business cars. Consequently, there is

no difference in principle, but the technique of calculation is different. In the context of this research it was not possible to reveal the reason for why is there a significant difference between the results of the two methods.

A standpoint that considers the items mentioned in the above part of the expanded budgetary balance is not accepted methodologically by KTI but it may be questioned according to the Clean Air Action Group, too, since here such manifestations were also mostly reckoned with (tax fraud, etc.), which are present in other sectors of the economy as well (although not in the same extent). Nevertheless the Clean Air Action Group sustains that such a balance is indispensable for the objective comparison of goods transport by road and railway. The remaining difference between the relevant views of the two parties and related quantified results are presented below.

7.3.1. The standpoint of the Clean Air Action Group

According to the standpoint of the Group both tax fraud and tax evasion are described as state supports. (Tax fraud means illegal actions to be punished according to the Criminal Code. By tax evasion such probability of tax reduction is meant, which although legal, distorts the market, by preferring certain activities to other ones which compete with each other in the market. The possibility of tax-free settlement of „fuel savings" in wages in road haulage is an example for the latter.) These legal and illegal „tax exemptions" are called tax subsidies in the literature. Pursuant to several studies prepared by OECD or the European Commission this item should be taken into consideration in the compilation of expanded state budgetary balances.[27]

In compliance with these principles the Clean Air Action Group supplemented the expanded state budgetary balance with the items mentioned. This balance was prepared in two versions. The first version (Table 47), which was considered as a lower estimate, presents the quantified values accepted by the KTI otherwise (at the same time acknowledging that the KTI does not agree with the inclusion of the item „Other competition distorting factors" in the balance.). In the other version those amounts are indicated which are the numerical ones according to the Groups's standpoint.

[27] The relevant OECD study was referred to in footnote 5. Two examples for studies prepared on behalf of, and accepted by the European Commission: (1) Environmentally-Harmful Subsidies – Identification and Assessment, 2009, http://ec.europa.eu/environment/enveco/taxation/pdf/Harmful%20Subsidies%20Report.pdf; (2) Company car taxation, 2010, http://ec.europa.eu/taxation_customs/resources/documents/taxation/gen_info/economic_analysis/tax_papers/taxation_paper_22_en.pdf

Table 47: Differentiated values of the expanded central budgetary balance in 2006 as amended by further social impacts (taxation, trucks stop) (lower estimate)

	Road				Railway		
	Total	**Passenger cars**	**Trucks**	**Inter-locality bus**	**Total**	**Passenger transport**	**Goods transport**
Budget revenues (billion HUF)	**887,6**	**603,6**	**246,3**	**24**	**19,9**	**12,1**	**7,8**
Budget expenses (billion HUF)	**1034,9**	**547,9**	**358,5**	**92,5**	**183,9**	**142**	**41,9**
Budget balance (billion HUF)	**-147,3**	**55,7**	**-112,2**	**-68,5**	**-164**	**-129,9**	**-34,1**
Transport performance (million goods ton-kms, veh. kms)		**39290**	**36887**	**11784**		**9584**	**10167**
Specific budget balance (HUF/goods ton-kms, HUF/veh.kms)		**1,4**	**-3,0**	**-5,8**		**-13,6**	**-3,4**
External effects (billion HUF)	**-1307,8**	**-737,1**	**-364,3**	**-14,4**	**-26,8**	**-21,6**	**-5,1**
Expanded balance (billion HUF)	**-1455,1**	**-681,4**	**-476,5**	**-82,9**	**-190,8**	**-151,5**	**-39,2**
Expanded specific budget balance (HUF/goods ton-kms, HUF/veh.kms)		**-17,3**	**-12,9**	**-7,0**		**-15,8**	**-3,9**
Other factors of competition distortion (tax fraud, tax evasion, truck stop)	**-830,1**	**-554**	**-276,1**	**0**	**0**	**0**	**0**
Total balance (budget+ externality+other)	**-2285,2**	**-1235,4**	**-752,6**	**-82,9**	**-190,8**	**-151,5**	**-39,2**
Total specific budget balance (HUF/goods ton-kms, HUF/road-kilometres)		**-31,4**	**-20,4**	**-7,0**		**-15,8**	**-3,9**

Table 48: Differentiated values of the expanded central budgetary balance in 2006 as amended by further social impacts (taxation, trucks stop) (higher estimate)

	Road				Railway		
	Total	Passenger cars	Trucks	Inter-locality bus	Total	Passenger transport	Goods transport
Budget revenues (billion HUF)	790,8	540,6	230,1	12,6	1,0	0,6	0,4
Budget expenses (billion HUF)	1034,9	547,9	358,5	92,5	183,9	142	41,9
Budget balance (billion HUF)	-244,1	-7,3	-128,4	-79,9	-182,9	-141,4	-41,5
Transport performance (million goods ton-kms, veh. kms)		39290	36887	11784		9584	10167
Specific budget balance (HUF/goods ton-kms, HUF/veh.kms)		-0,2	-3,5	-6,8		-14,8	-4,1
External effects (billion HUF)	-1307,8	-737,1	-364,3	-14,4	-26,8	-21,6	-5,1
Expanded balance (billion HUF)	-1551,9	-744,4	-492,7	-94,3	-209,7	-163	-46,6
Expanded specific budget balance (HUF/goods ton-kms, HUF/veh.kms)		-18,9	-13,4	-8,0		-17,0	-4,6
Other factors of competition distortion (tax fraud, tax evasion, truck stop)	-1513,1	-1237	-276,1	0	0	0	0
Total balance (budget+ externality+other)	-3065,0	-1981,4	-768,8	-94,3	-209,7	-163,0	-46,6
Total specific budget balance (HUF/goods ton-kms, HUF/road-kilometres)		-50,4	-20,8	-8,0		-17,0	-4,6

In line 9, Tables 47 and 48 („Effect of other factors of competition distortion") pursuant to KTI's method, due to missing tax revenues relating to the private use of passenger cars the amount of tax evasion was 554 billion HUF, while according to the method of the Clean Air Action Group on the basis of the difference between Hungary's National Accounts and the budgetary statistical data the amount of tax evasion equalled to 1237 billion HUF.

For goods carriage at wage accounting and in case of improbable personal incomes the experienced tax fraud was estimated to 165 billion HUF; because of other relevance of black economy the „social" inputs grew by additional 160 billion HUF. The grand total has been reduced by 48.9 billion HUF because of the disadvantage caused to carriers due to the week-end restriction of the truck-traffic (truck-stop).

From the results of the balance presented in Tables 47 and 48 the following conclusions can be drawn for the year 2006 (values calculated according to the standpoint and method of the Clean Air Action Group):

- The balance is negative all over.
- The balance of the passenger car transport amounts to -1200 billion HUF (-2200 billion HUF), which is 15 times (28 times) higher than that of the interurban bus transport, and 8 times (14 times) higher as compared to railway passenger transport.
- Considering the specific state budgetary balance, the passenger car transport has 4.4 times (7 times) higher values than the interurban bus transport and 2 times (3,3 times) that of the railway passenger transport.
- The specific state budgetary balance of interurban bus transport is about the half of the railway passenger transport.
- As regards goods carriage, it can be concluded that the balance of road carriage is
- -753 billion HUF (769 billion HUF), this being 19.2 times (16.5 times) higher than the railway's.
- The specific balance of road carriage is by 5.2 times (4.5 times) higher than the railway's.

Again attention must be called to the fact that only data on the balance calculated in relation to the state budget and to per-unit cost budgetary balances are presented in the table. The total cost (or per-unit ones) also includes expenditures, the definition of which is not part of the subject of this study. However, if the latter are examined, the data obtained are also interesting. In 2008, on the average the operation of a passenger car equalled to 46.5 HUF/passenger-kilometres, at MÁV-START and at Volán to 27 HUF,[28] at BKV to 23 HUF.[29] These figures show that if made proportionate with the same performance the use of the passenger car – only the internal costs considered – costs by 70-100 % more than public transport. Since the citizens pay for everything, it is not essential from this point of view whether transport is directly financed by us or through the mediation of the state. But the government will have to decide on the basis of how the given activity can be implemented if the aspects of environmental protection and equal opportunity are also taken into account.

[28] In 2008 the expenses of MÁV-START Zrt. equalled to 225 billion HUF, the passenger-kilometers run were 8.3 billion, the VOLÁN companies' expenditures amounted to 235 billion HUF, and their performance run was 8.5 billion passenger-kilometers.
[29] In 2008 at the BKV Zrt. the performed 5.1 billion passenger-kilometers costed 119 billion HUF.

7.3.2. The standpoint of the KTI

In KTI's point of view to include tax frauds in the balance is a methodological mistake.

The principle of the *status quo,* as one of the bases for the studies, was laid down at the beginning. Described ways and volumes of tax frauds are integral parts of the operation of the economy, it is not possible to separate them. However, if we do, the functioning equilibrium of the economy turns and the study provides distorted results and erroneous conclusions.

When the state's balance sheet is analysed, the inputs and outputs are grouped along the same terms, so under the conditions detailed in the given chapter this is methodologically sound.

Also the derivation of the expanded state budgetary balance is pursuant to the above principles, and to the requirement regularly voiced by the Clean Air Action Group that externalities can be set against externalities, while other internalities against the internalised effects. Because, here the value of the external effects is added to the values of the state budgetary balance, with negative externalities on the output side, and with the positive ones on the input side.

Undisputable, effects taken into account in the category of "tax-frauds", are an integral part of the economy, the formation of market prices, i.e. they are internalized values. Their involvement in the balance would only be possible if their resulting outputs - also internalized – were also involved. However, this could not be done otherwise than through the investigation of the transport effects of the entire national economy, which – as referred to in chapter 2 – could not be undertaken in the context of this work. However, if expenses and returns cannot be presented according to same principles, then they, or one of their selected components, cannot be reckoned with in either sides of the balance, as the above requirement adopted by the Group dictates it.

Therefore, insertion of the tax-frauds in the balance is incorrect, no conclusions can be drawn from the results obtained, i.e. the lower three lines in tables 47 and 48 cannot be interpreted.

7.4. Conclusions

In order to draw the correct conclusions, the circumstance – explained in detail in the introduction – that the balance is not complete should not be forgotten. As a result, the findings below are relative, the results can be interpreted only in relation to each other, and no absolute value judgment can be developed on their grounds.

It is well indicated by the balance data of the state budget that for the relative balance of the state budget there are substantial charges imposed on passenger car operators. (In the views of the Clean Air Action Group, however, the payments of the passenger car operators and the budget expenditures are in practice of the same scale, that is, the formers do not contribute to the improvement of the state budgetary balance.) Nevertheless, it is clear that the external effects also taken into account, all modes of transport have a negative balance and the most significant change can be experienced in the per-unit cost budgetary balances of passenger cars and trucks. It is thus concluded that considering the factors taken into account, from the different passenger transport modes it is the passenger car transport, whereas in freight transport the road goods transport that are the most expensive ones.

Many areas of the economy are appropriate for tax fraud or to obtain additional revenues. Inter alia trade, service industry and transport can be mentioned here. Under the present circumstances of taxation within the area of transport mainly the road transport is the field where availability of higher additional revenues is possible for larger masses. This arises both from the mass and individual features of it. The community and railway transport – inasmuch as they are operating in typically strict hierarchical, almost "paramilitary" system – the possibilities for obtaining massive incomes are less available. In order to explore all the effects exerted on the economy, the competitiveness of the sub sectors and the modal split could require very complex investigations.

The results are also drawing the attention to several distinguishing features. Out of them one of the most important is that against the result to be expected and the public opinion the community railway transport seems to be more expensive than the road. This is clearly due to the

fact that the performance of the former is lower (i.e. fewer people and fewer goods are transported by that mode).
Although this work is not supposed to provide solutions, some circumstances should be highlighted.

The difference is large enough for not to blame only the low traffic on side railway lines for the relevant transportation results of the railway and the bus transport. In practice apart from commuters' traffic in the agglomeration the oversupply of community transport is everywhere significant. The actually higher tariff reduces the attractive force (competitiveness) of the railway passenger transport (IC surcharge, IP charge – in many relations there are no services without surcharge and of acceptable level). It should also be taken into account, that improvement of the level of services are going to imply considerable investments, which means that for many years, it is expected that railway costs will exceed those of road passenger transport. This strategy is acceptable if it results in really more competitive and successful service.

As previously indicated, when making decisions concerning the selection of the transport modes, the travellers and suppliers are counting with the external effects only in a limited extent. So long as cost circumstances do not change, more dynamic improvement of road sub sector – e.g. in goods transport – is clear. This can be influenced to a certain extent, for example by supporting the RoLa systems.

7.5. Trends of progress

Overall, it can be stated that it is absolutely necessary to raise the level of awareness concerning the external effects in order to realize the socially more rational modal split. In order to determine the optimum in the modal split, however, on the one side the systematic updating of the calculations implemented within the framework of the actual work, and on the other side the determination of the full range of benefits and expenditures is required.

As highlighted several times before, tax frauds and tax evasions became integral parts of the economy, which distort the market position of some participants. Traffic is no exception either. In the transport sector, the present work, even if not fully, but it tried to explore the nature and the extent those of. It was not in our power – nor was it our task – at the same time to examine in detail their economic impact and correlations. It would be very important to clarify their roles in order to avoid turning into the opposite direction of an intended possible in-

tervention. Social justice, achievement of neutrality in competitions, the steps made should not result in the impossibility of the sector's performance and in delivering the market at foreign participants' mercy. Consequently, it is of major importance to carry out research work in this field in the next years.

The question also arises, to what extent the results of current research influence projects assessment and traffic modelling procedures. Because in many cases numerical values were derived from these procedures, the current research could not give the answer. In some cases, however, interaction is clear; investigation should be continued, and by using the results, the procedures should also be updated.

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