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AN EVALUATION OF THE ROAD TRAFFIC SAFETY IN ROMANIA

ATTILA GÖNCZI
University "Polytechnica" of Timişoara
Department of Mechanization and Transportation Engineering
Remus 14, 1900 TIMIŞOARA, ROMANIA

DUMITRU IANCULUI
University "Polytechnica" of Timişoara
Department of Mechanization and Transportation Engineering
Remus 14, 1900 TIMIŞOARA, ROMANIA

REMUS URSULESCU
University "Polytechnica" of Timişoara
Department of Mechanization and Transportation Engineering
Remus 14, 1900 TIMIŞOARA, ROMANIA

Abstract

The paper is an attempt to discover some specific aspects that characterise road safety in Romania, in order to identify the most feasible and effective actions towards safety improvement. From this point of view, measures must be taken first of all in built-up areas, where the large majority of the accidents with personal injury (about 93%) and of the fatalities (about 87%) occur. Another objective is the reduction of the accident severity, which is one of the biggest in Europe. The paper presents some proposals in order to improve traffic safety.

THE MAIN CHARACTERISTICS OF THE ROAD TRANSPORTATION SYSTEM

The quantitative changes, the spatial distribution and the standard of living of the population of a country are factors which determine the demand for transportation, for the modes and the facilities which are provided to fulfil the demand; these factors influence the level of road safety too.

Population

During the period before 1990 - the beginning year of the post-communist era -, the population was characterised by two important processes: (1) a continual increase of the population with 14.6% in the period between 1969 and 1989 and (2) a massive mutation in the relative proportion of the population in the rural and urban areas (see Figure 1).

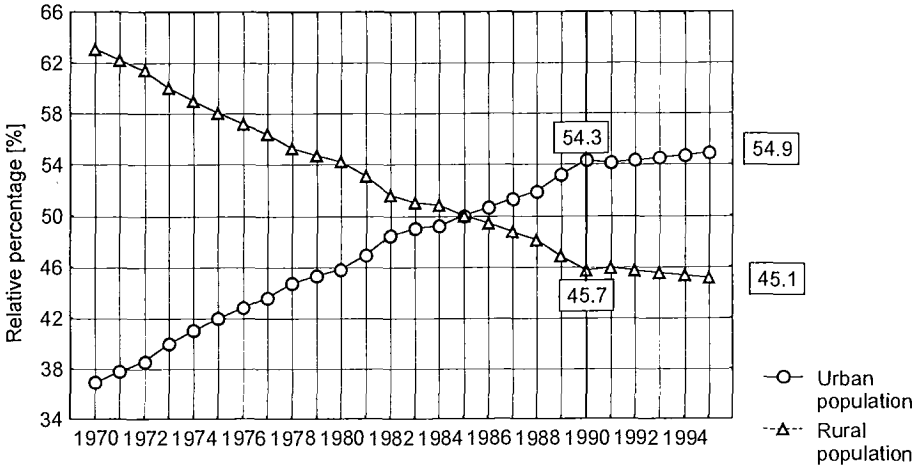

Figure 1 - Relative proportion of the urban and rural population in Romania between 1970 and 1995 (Source: National Commission for Statistics, 1996)

After 1989, a new trend has appeared in the population variation, characterised by a decreasing, until 1994 due to emigration, and after 1994 due to natural negative increase too. During this period, the rate of the urbanisation decreased dramatically from 0.92% per year - average value for the 1970 to 1990 period - to 0.16% per year between 1990 to 1995. In spite of a high rate of the structural reorganisation, the level of urbanisation is still under the level of Western and Central European countries. The structure of the population of the urban areas is presented in Table 1.

Table 1 - The structure of the urban areas of Romania

Groups of towns and cities, by number of inhabitants	Number of towns and cities in the group	Population, as % of total urban [%]
Total	262	100.00
Under 50,000	215	29.1
50,000-99,999	22	13.5
100,000-199,999	13	14.9
200,000-399,999	11	26.0
Over 2,000,000	1	16.5

Source: National Commission for Statistics(1996)

As one can see, the majority of the urban population (57.4%) live in cities with more than 100,000 inhabitants. This fact is very important from the point of view of road safety.

Motor vehicle statistics

The period before 1990 was characterised by a very low motor vehicle ownership and a very poor level of motorisation. In 1989 there were about 1,776 thousands motor vehicles and the level of motorisation was 76.73 motor vehicles per 1,000 inhabitants. In the 8th decade, the increase was of 47.5% in the number of vehicles and of 41.5% in the level of motorisation. From 1990, the rate of the increase is higher. Until 1996 the augmentation is about 66% in the case of motor vehicles, and even bigger for the passenger cars, of about 85%. This important increase took place during a period when the general economic situation was constantly bad. In Figure 2 the relative variation of some characteristic parameters (motor vehicle and car ownership, level of motorisation and the gross domestic product, GDP) is presented.

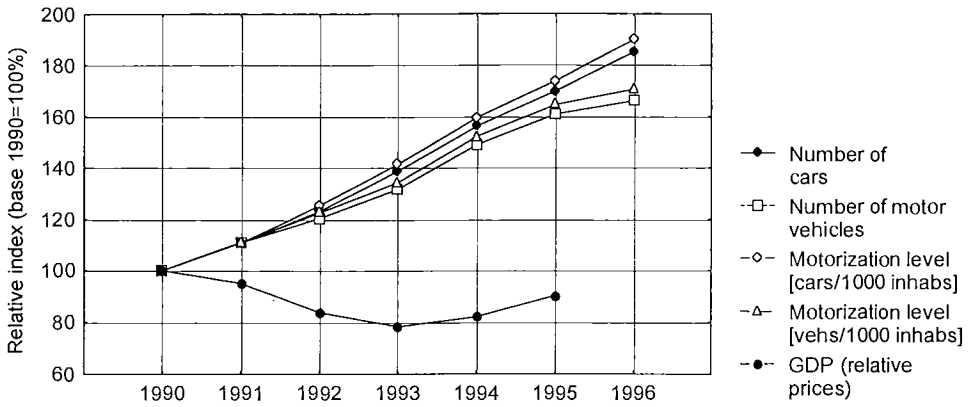

Figure 2 - Indices of motor vehicles and passenger cars ownership and of the level of motorisation and gross domestic product in Romania (1990-1996) (Source: National Commission for Statistics, 1996)

Even after this period, characterised by a high rate of growth, the level of motorisation is very poor, even if compared to the development level of Romania. In order to demonstrate this supposition, in Figure 3 a correlation is presented between the gross national product per capita (GNP per capita) and the car ownership ratio (persons per passenger car) for a number of European countries. The correlation is built-up analogous to the Smeed model (Smeed, 1949), as a non-linear estimation between the variables.

As one can see, the correlation is acceptable (R^2=0.676). The main conclusion which can be drawn is the existence of three different groups of countries:

- countries for which the observed value of car ownership ratio is bigger than the one predicted by the estimation model (above the 95% confidence upper bound) in the case of Denmark, Ireland, Greece and Romania;
- countries for which the difference between the observed values and the predicted ones are statistically not significant (between the upper and the lower bound for 95% confidence) in the case of Belgium, Germany, France, Luxembourg, United Kingdom, Austria, Finland, Sweden, Spain, Portugal;
- countries for which the observed values of car ownership ratio is smaller than the predicted values (under the 95% confidence lower bound) for Bulgaria, the Czech Republic, Poland and Hungary (in the case of the last two countries the corresponding points are on the lower bound for the 95% confidence).

In the case of Romania one could conclude that the car ownership ratio is bigger (the level of motorisation is lower) than it might be considered as normal for the level of the economic

development of the country. From this point of view, the underdevelopment is obvious. The level of the underdevelopment could be exaggerated because of a possible overestimation of the GNP, due to the existence of some efforts to evaluate and to take into account the so-called "black" and "grey" economy even in the official statistics.

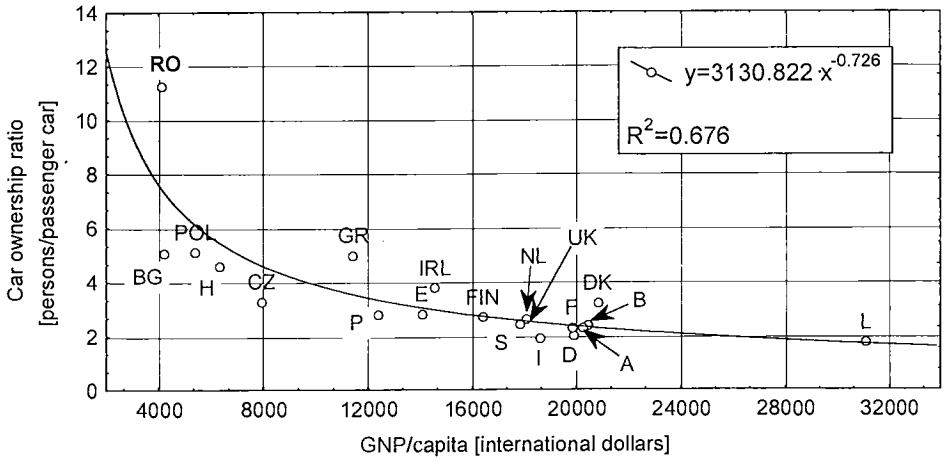

Figure 3 - Correlation between the gross national product per capita (GNP/capita in international dollars[1]) and the car ownership ratio (persons/passenger car) for a number of European countries. (Sources: National Commission for Statistics, 1996; Eurostat, 1996)

Another characteristic of the Romanian vehicle ownership is the relatively reduced percentage of the passenger cars having reference to the total number of motor vehicles. Even if the trend after 1990 was a continuous increase of this ratio, in 1996 the cars were only 68.93% of the motor vehicles. The average value for the same ratio in the EU countries in 1994 was 83.47%. The value is very similar in the case of the so-called "Visegrád-countries" (*i.e.* Poland, the Czech Republic and Hungary), the average percentage being 81.35%. In the same time, in Romania, in about 80% of the road accidents the implied vehicles were passenger cars (79.83% in 1995 and 80.74% in 1996).

It is important to notice the highly unequal territorial distribution of the level of motorisation. Among the 40 counties of Romania and the capital, Bucharest, there are four in which the index of motorisation is under 100 motor vehicles per 1,000 inhabitants (the minimum value is 67.8 motor vehicles per 1,000 inhabitants). In the same time there are four other counties plus Bucharest[2], which have more than 200 vehicles per 1,000 inhabitants. In one of the South-Western counties of Romania[3] the value of the motorisation index is 277.9 (at the end of 1996), which is higher than the average value in Hungary or Poland (Holló, 1996).

Making the Kolmogorov-Smirnov normality test, the result is that we could accept the *H0* hypothesis, *i.e.* the distribution of the level of motorisation is normal at 95% significance. Although, we have to notice that it is a very "flat" normal distribution (the kurtosis is 1.52), which is right skewed (the skewness is 0.77). A distribution with such a big variance could be a major obstacle of road security improvement, due to the heterogeneity of the drivers from the point of view of the driving skills in heavy traffic and the capacity of managing crisis situations in traffic.

From the perspective of the age of the motor vehicles, the situation could be characterised by a continuous and massive ageing, due to the reduced capacity of buying new vehicles in Romania, although the country has its own automotive industry, and the prices of the passenger cars made in Romania are relatively low. After a period of about four years, when a large amount of very old motor vehicles, imported from abroad were registered in Romania, some measures were taken in

order to stop this dangerous process: the registration of the motor vehicles older than six years is prohibited and the percentage of the price paid as customs duty is increasing with the age of the car.

Use of motor vehicles

Due to the lack of a comprehensive system of data acquisition, the estimations of the motor vehicle and passenger travel in Romania are not very reliable and, in some cases, are controversial. In the Romanian Statistical Yearbook (National Commission for Statistics, 1996), there are not any data pertaining to vehicle travel, but there are data on passenger and road freight travel.

In a report of the National Highway Administration (1994), the motor vehicles travel for 1990 is estimated to 7,303 millions veh×km. In the same report, the international transit traffic on the "E" highways was estimated as being 4.1 times bigger in 1992 and 8 times bigger in 1993 than in 1989.

In the same report of the National Highway Administration, it is stated that in the period between 1990 and 1994, the traffic on the national highways increased by 30%. Out of this information, one could estimate that in 1994, the motor vehicle travel was about 9,500 million veh×km. On the other hand, in a statistics on road accidents of the United Nations Organisation (1997), the estimation for 1994 is 30,035 million veh×km, which is 3.16 times bigger than the other estimation. Due to this significant difference between the diverse estimations, the values of the motor vehicle travel are not used in this analysis.

In Figure 4, the indices of passenger and road freight travel and the relative variation of gross domestic product (GDP) are presented.

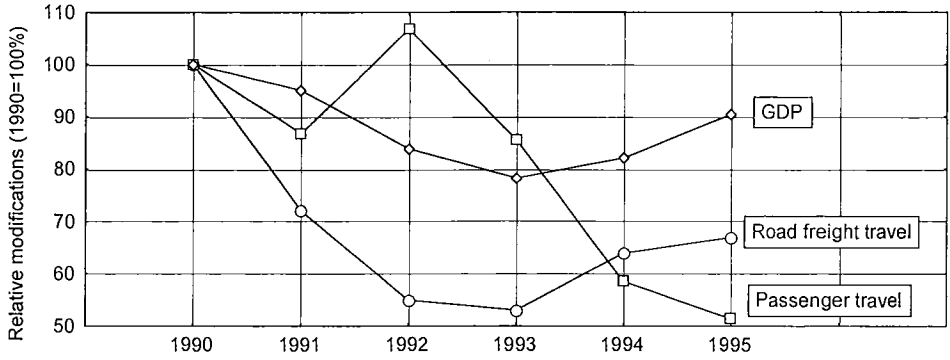

Figure 4 - Variation of the indices of passenger travel, road freight travel and of the gross domestic product in Romania (1990-1995). (Source: National Commission for Statistics, 1996)

The analogy between the trend in freight travel and the evolution of the GDP is obvious. On the other hand, it seems to be no close relationship between the economic situation and the volume of the passenger travel.

Road network length and structure

Romania's road network is basically composed of 153,014 km of public roads, of which 51% have bituminous and Portland cement concrete surface. This length corresponds to 0.64 km/km^2 and to 6.57 km/1,000 inhabitants. These values show that the level of the development of Romania's road network is well under the European average. The structure of the road network is presented in Table 2. Although the length of the national highways represents only 20% of the public rural (*i.e.* out of built-up areas) roads, they establish the major network and about 65% of non-urban traffic is supported by them.

Table 2 - The structure of the road network of Romania

Type of the road	Length [km]	Proportion [%]
National highways, of which:	14,570	100.00
motorways	113	0.78
with hard surfaces	12,676	87.00
with light bituminous surfaces	1,603	11.00
"E" highways (for international transit traffic)	4,508	30.94
County and township roads	58,133	
Urban roads (considered legally in built-up area)	80,198	

Source: National Highway Administration (1994)

In 1994 about 5,000 km of this major network were in bad shape. Until the end of 1997 about 1,000 km of national highways (especially "E" international highways) were rehabilitated. But even now there are many places without markings and there are no major improvements in the geometric design, first of all in the case of the intersections at grade, such as separate parallel turning lanes or channelisation.

The length of county and township roads is 58,133 km which represent 80% of the rural roads in Romania, but they have to support only about 35% of the non-urban road traffic. The quality of these roads is very heterogeneous, about 40% having bituminous or cement concrete surface, 45% stone surface, the rest being soil-surfaced.

In Romania, in 1994 there were 80,198 km of urban roads in built-up areas, out of which 21,841 km are strictly in urban areas (in towns and cities), but only about 12,650 km are hard-surfaced (National Commission for Statistics, 1996).

TRAFFIC SAFETY IN ROMANIA - TRENDS AND MAIN CHARACTERISTICS

The importance of mortality due to road traffic accidents

The mortality in Romania is one of the highest in Europe. Among the European countries only Belarus, Bulgaria, Hungary, the Russian Federation and Ukraine have a higher mortality rate. This situation and the very low motorisation level cause the importance of the mortality due to the road traffic accidents to be lower than in many developed countries. For the countries of the European Union, the average fatality index is 1.35 fatalities/10,000 inhabitants, which means that 13.5% of the mortality is due to road traffic accidents. The same values for Romania are: 1.26 fatalities/10,000 inhabitants which corresponds to 10.8% of the total mortality.

If we analyse the situation of the mortality for different age groups, the differences become more obvious. In Figure 5 the standard death rate (SDR) and the relative weight of mortality due to road traffic accidents (RWM) is presented for different age groups. The curve of the SDR has the classical "J"-shape. The RWM reaches the maximum value of 12.2% for the age group of over 20, below 25 (20-24), but this group have a relative low SDR of 0.94 deaths per 1,000 members of the group. In France, for instance, in 1984, the RMW for the age groups 15 to 19 and 20 to 24 was 43% [9], which means that almost half of the fatalities in these age groups were caused by road accidents. This very high percent is an important warning for the society.

In Romania the highest absolute number of fatalities corresponds to the 40 to 45 years age group, namely 282, but, because of their very high SDR, the RWM for this age group is "only" 3.44%. This could be one of the main explanations of the general lack of interest in Romania for the road traffic safety.

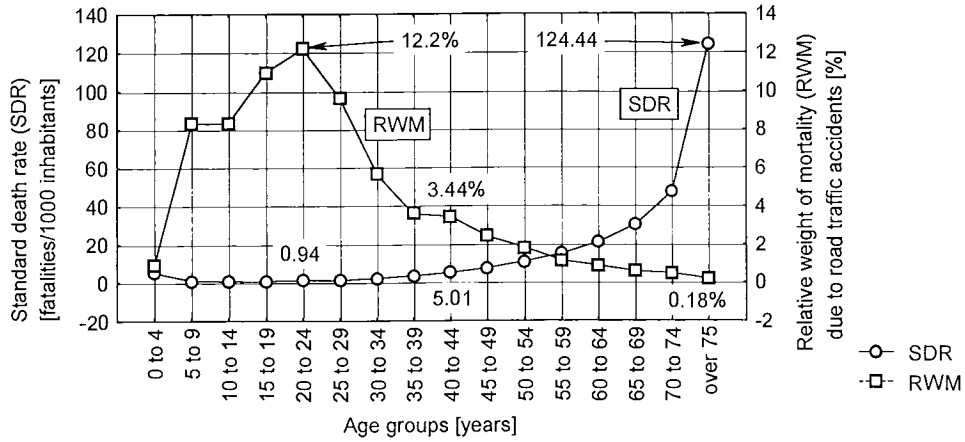

Figure 5. Standard death rate (SDR) and relative importance of mortality due to road traffic accidents (RWM) in Romania (1995) (Sources: National Commission for Statistics, 1996 and Ministry of Health, 1996)

Main trends in road traffic safety 1970-1995

In order to evaluate in a scientifically exact manner the trends in road traffic safety, we have to make some very important general observations. In Romania, before 1990, one of the mottoes of the regime was: "no bad news". Thus, sometimes, the statistics were consciously altered, distorted. Another important issue is that sometimes the statistical system simply did not work properly: some data were forgotten, others were acquired in a wrong way and some of them are simply not available because they were not acquired. For example, there is no information about the number of the accidents with personal injury, because if the victims do not need treatment in a hospital, they do not appear in the statistics. Another example is the lack of an exact definition of the notion "killed in a road accident". Based on our investigations, the definition used by the practitioners describes a victim as killed in a road accident if it is obvious that the cause of the death is the accident. Thus, probably the number of fatalities due to road accidents is slightly underestimated, compared to the standard definition ("who was killed outright or who died within 30 days as a result of the accident").

In Figure 6 the indices of the number of severe road accidents, seriously injured persons and killed persons is presented (base value 1970=100%).

By analysing the graph in Figure 6, it is obvious that from the point of view of the road safety there are two main periods: until and after 1989. The first period was characterised by:

1. a very low motorisation level: the importation of passenger cars was strictly limited and the capacity of the Romanian automotive industry was far of being sufficient;
2. a very strict control of the fuel consumption (in the 9th decade there was a period in which for every passenger car the owner had the right to buy a quantity of no more than 15 litres of fuel per month);
3. a very repressive and by far too powerful police which had the opportunity to enforce a distortable legislation.

The result was a relative stability of the traffic safety. The important diminution of the fatalities after 1980 is due to the massive decrease of motor vehicle travel and partially "obtained" only in the statistics. After 1989, most of the above mentioned limitations disappeared.

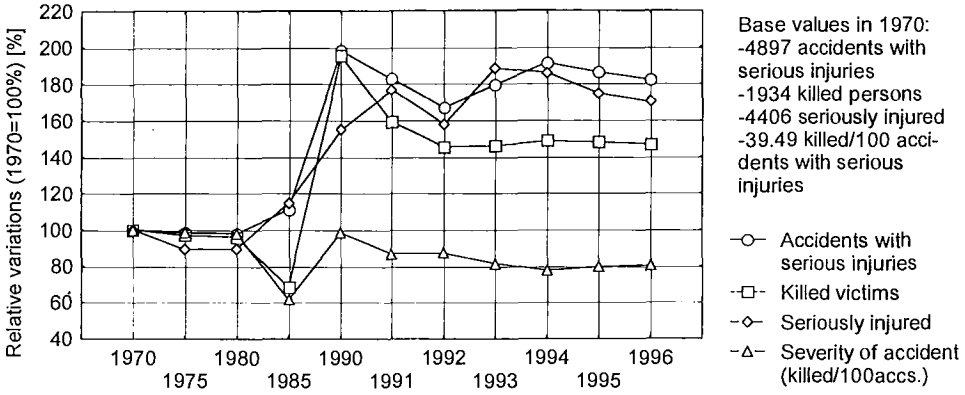

Figure 6. The indices of the number of severe road accidents, seriously injured and killed victims (base values in 1970, considered 100%) (Source: United Nations Organisation, 1997)

The year 1990, which was the first year of the post-dictatorial era, brought a dramatic deterioration of the road traffic safety. The index of the number of severe accidents and of the number of fatalities at the end of 1990 was at 198% and 195.6% respectively. The increase of the number of seriously injured victims was not so massive because the severity of the accidents increased to a very high level (38.96 killed in 100 severe accidents).

In 1990 there were 9,708 severe accidents, 6,823 seriously injured and 3,782 killed persons. Thus, the index of mortality was 1.63 deaths/10,000 inhabitants, the index of fatalities was 18.12 deaths/10,000 motor vehicles (or 29.27 deaths/10,000 passenger cars) and there were 51.79 deaths/100 million veh×km. Each of these indices had huge values. The increase took place mainly due to the massive changes in the structure and the functioning of the Romanian society. Qualitatively, the same phenomena were described by Holló (1996) in other former socialist countries (*e.g.* Poland, the Czech Republic and Hungary), having essentially the same effects. After the political upheaval, most of the above mentioned restrictions were abolished or suspended, even some of those which are necessary for the well and safe functioning of the road traffic system. Furthermore the special situation of the police in Romania, which under the socialist regime was an institution of repression too, is, or it was a hindrance in performing their function of control and enforcement in the traffic system.

As it can be seen in Figure 6, one has to analyse separately the trends before and after 1989 due to the discontinuities in the trend functions of different parameters.

Evaluation of trends in traffic safety after 1989

In order to identify some of the main measures to be taken for the improvement of traffic safety we analysed the variation of the main parameters describing the traffic safety.

In Figure 7 the indices of the above mentioned parameters and of the motorisation level (motor vehicles per 1,000 inhabitants and passenger cars per 1,000 inhabitants) are presented. As one can see in the graph, after 1990 - which is the year of a negative national record -, in 1991 and 1992 there appear an important decrease for every safety descriptor. This is a positive process. Nevertheless, after 1992, this trend changes. We have to notice a slightly increase in the number of fatalities, even if this is statistically not significant. In the case of the three other parameters, in Figure 7, the trend is characterised by significant increase followed by a slight decrease. Especially in the case of the total number of victims, the trend seems to be a relative stabilisation around the

number of 10,500 (97.59%). Under these circumstances, the decreasing number of fatalities could be explained by the improvement of the effectiveness of the rescue teams and of the medical emergency system and not by an alleviation of the road safety. A greater number of the victims of the road accidents are saved by the rescue and medical emergency teams.

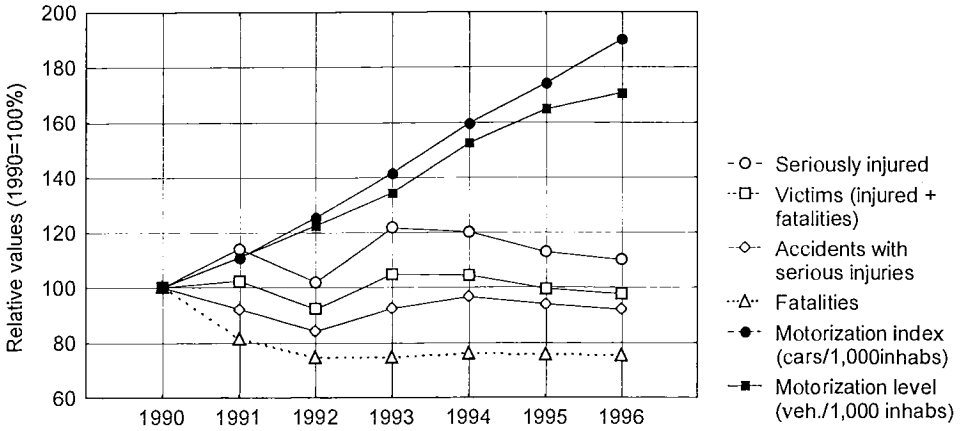

Figure 7 - Indices of the number of severe accidents, number of seriously injured, number of fatalities, total number of severely injured and killed victims and rate of the index of motorisation (motor vehicles and passenger cars per 1,000 inhabitants) for Romania (1990-1996) (Source: Road Traffic Police Department, 1996 and 1997)

Evolution of fatality index

In Figure 7 one can see that, in the case of the fatalities, a tendency of decrease appears, but an asymptotic variation could be previewed. As the index of motorisation presented a significant increase in the same period, we studied the evolution of the fatality index (number of fatalities per 10,000 passenger cars).

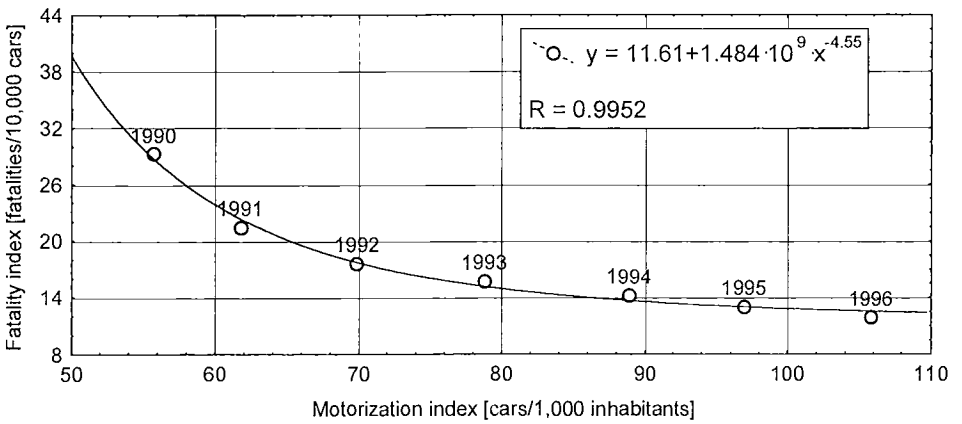

Figure 8. Correlation between the fatality index and the index of motorisation for Romania between 1990 and 1996.

We performed a non-linear estimation over the observed values in order to discover a possible correlation between the fatality index and the motorisation index for different pairs of values at different moments for Romania. In principle, we thought that this could be analogous to the well-

known Smeed formula (Smeed, 1949) with the difference that, we studied different values of a single country, distributed in time. First, we conducted the estimation by using the Smeed model. The resulted correlation is very good (R^2=0.935), but the model underestimates the fatality index in 1990 and in 1994 to 1996. Then, we made a new estimation by using a function having a horizontal asymptote. First, we tried a model of $y = a + b\, e^{-cx}$ form. The resulting correlation was better than in the previous case (R^2=0.987). In another attempt, we tried a version analogous to the Smeed model. As we can see, the goodness of the fit is the best in this case, the coefficient of the correlation having a very high value (R^2=0.9904). The results are presented in Figure 8.

If these assumptions describe a possible future evolution, in some years the number of fatalities will begin to increase. We can assume that important deteriorations in the economic situation are improbable. Thus, the trend in the increase of the motorisation index is sustainable in short term. If the trend in the case of the mortality index continues, *i.e.* no major safety improving measures implemented in the near future, from 1997 to 2000, the number of fatalities due to the road accidents could increase above 3,000 per year.

TRAFFIC SAFETY IN ROMANIA COMPARED TO OTHER COUNTRIES

In order to build up a comprehensive program to improve traffic safety, it is necessary to evaluate the actual situation and to predict possible future trends in traffic safety. These goals are easier to reach by studying the traffic safety in an international context.

Trends in the quantitative evolution of traffic safety

By studying the trends in the evolution of fatalities, which is probably the most important descriptor of road safety from the point of view of public awareness, one can conclude that there are important differences between the European countries from this point of view. In order to find out some possible models to study, it could be efficient to look for countries which present an evolution and conditions analogous to the trends and system characteristics specific to Romania. In Figure 9 the indices of variation of the number of fatalities for selected European countries are presented, taking as base the value corresponding to 1970.

We consider Romania to be part of a group together with Greece, Portugal and Spain. The main characteristic of these countries is the existence of an intensive increasing period, followed by a stabilisation (in the case of Greece and Romania) or a slight decrease (for Spain and Portugal) but at relatively high indices (at around 130% for Spain and Portugal, at 148% for Romania and around 195% for Greece). These four countries have in common the existence of a period of "hard" dictatorial regimes in their recent history. The transition from the dictatorship to the democracy seems to be marked by the massive worsening of the road safety, having a dramatic increase of the level of motorisation as a background. As a report of The World Bank (1996) suggests, the rapid growth of motorisation in some countries means that road-users, both drivers and pedestrians, lack experience in safe traffic behaviour. Another important remark to be made is the fact that in these countries the definition of the victim killed in a road accident is different from the standard one. In all the cases, the departure from the standard definition has the effect of under-registration of the fatalities and over-registration of the seriously injured victims. Thus, the differences between these countries and any other EU (except for Austria in the period between 1966 and 1991) are bigger in the case of fatalities and, probably, smaller in the case of the number of injured than in the statistics. In a report made by EUROSTAT (1996) the under-registration is evaluated to be 15% for Greece and 30% for Portugal and Spain. We have no estimations in the case of Romania.

It is important to emphasise that, for example in Hungary, Spain or Portugal a trend of decrease appeared after 1991-1992, due to the measures implemented in order to ameliorate the situation of the road safety. These measures could be very instructive in order to improve traffic safety in

Romania on medium and long term. An other important issue could be the effect of the appearance of the first generations of traffic engineers graduated in Romania at the University "Polytechnica" of Timisoara.

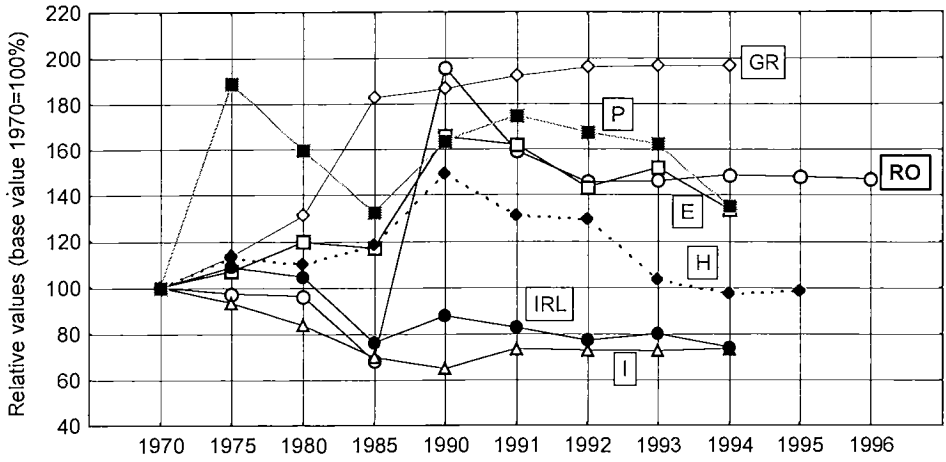

Figure 9. Evolution of the indices of fatalities due to road accidents in selected European countries (Source: EUROSTAT, 1997)

Road safety in Romania - an international comparison

In order to have the possibility to compare the level of the road safety between countries, there are some indicators which are frequently used.

First among these is the mortality index or rate, which is the number of killed persons per 10,000 inhabitants (or sometimes per 1,000 inhabitants - which is analogous to the standard death rate -, or per 1 million inhabitants). The main advantage of this parameter is that both the numerator and the denominator are usually well and exactly determined, *i.e.* the mortality rate is a reliable factor. As Holló (1996) stated, the problem is that the value of the mortality index is not correlated with either the level of the traffic safety, or the level of road endangering. The same opinion is sustained in the report of The World Bank (1996), namely that the mortality index has low values not only in the countries where the level of road safety is high, but also in the countries with low motorisation level and/or low density of population. From this point of view, the situation in Romania seems to be acceptable: in 1994 the value was 1.27, which is greater than in Finland, Sweden, Netherlands or the United Kingdom, but is smaller than in Portugal, Spain, Greece or the Central European countries.

Another frequently used factor is the fatality index, which is the number of fatalities per 10,000 motor vehicles. Sometimes, the inverse ratio is used, which could be considered as an index of road security. From this point of view, the situation in Romania is the worst in the group of the studied European countries (the 15 members of the EU, Bulgaria, the Czech Republic, Hungary and Poland). In order to make a quantitative comparison we made a non linear estimation using a model based on the Smeed formula. The results are presented in Figure 10.

As one can see, the correlation is good (R^2=0.779), and the observed value for Romania is in the 95% confidence bound of the model, i.e., even if the observed value is big, 14.24 killed per 10,000 cars, it corresponds to the level of motorisation of the country.

An important estimator of the road safety is the severity index, which is the number of killed persons in 100 accidents with personal injury. In the case of Romania, the problem is the lack of reliable information on the number of the accidents with personal injuries. In these circumstances, we made an estimation based on the number of slightly and seriously injured victims, using the average number of injured per accident. In this case, the number of accidents with personal injury is estimated to be about 18,086 in 1995. Thus, the severity index is 15.91 fatalities per 100 accidents. Using a model analogous to the Smeed formula, we made a non linear estimation for the values of the severity index *vs.* the motorisation index. The results are presented in Figure 11.

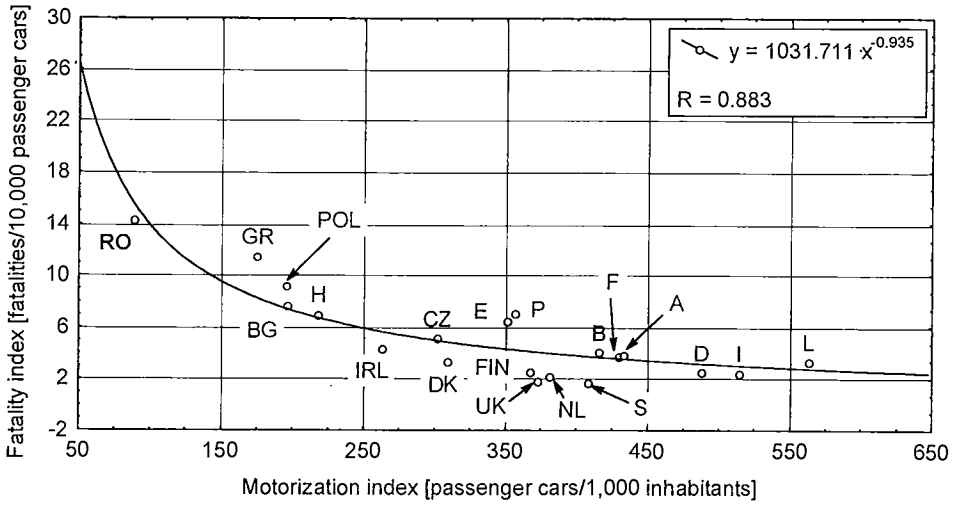

Figure 10 - Correlation between the fatality index and the motorisation index for selected European countries for 1994 (Source: EUROSTAT, 1996 and United Nations Organisation, 1997)

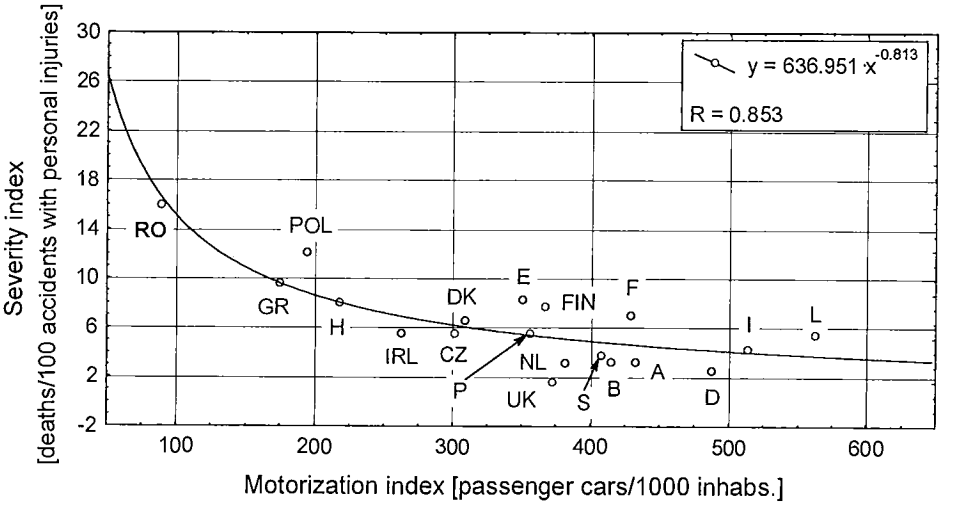

Figure 11. Correlation between the severity index and the motorisation index for selected European countries for 1994. (Sources: EUROSTAT, 1996 and United Nations Organisation, 1997)

It can be stated that the correlation is good (R^2=0.728) and Romania is in the 95% confidence bounds, together with Greece, Hungary, Denmark, the Czech Republic, Poland, Italy and Sweden.

CONCLUSIONS AND PROPOSALS

Grosso modo, the situation of the road traffic safety in Romania is unfavourable. Only the mortality index has a relatively low value (1.26 fatalities per 10,000 inhabitants). On the contrary, fatality and severity indices are among the biggest in Europe (14.49 fatalities per 10,000 passenger cars and 15.91 fatalities per 100 personal injury accidents), and the natural process of their decrease with the increasing level of motorisation seem to have an asymptotic character. If our assumptions prove to be correct and this tendency persists, this could produce in the near future an augmentation of the number of road deaths in Romania. Even from another point of view there are signs which confirm a tendency of worsening. The total number of road accidents in 1996 was bigger than in 1995 with 32.3%.

In order to improve safety or, at least, to prevent its possible worsening, it is necessary to amplify research activity and, based on the results of the investigations, besides using foreign experience and results, to elaborate a series of co-ordinated interventions and to implement feasible measures. The newly established Inter-Ministerial Council of Road Safety has to develop a comprehensive policy in order to alleviate road traffic safety.

In our opinion, some of the areas in which the most effective measures could be implemented are:

1. Improvement of the legislation[4], first of all by:
    - Reduction of speed limits to 50 km/h in built-up areas.
    - Extension of the compulsory seat belt usage to all public roads, in order to reduce accident severity, first of all in built-up areas, with special attention for the non-urban built-up areas.
    - Intensification of the control and enforcement activity of the traffic police, with special attention to speed limits, priority rules, alcohol, drugs, seat belt usage, non-motorised traffic activity (pedestrian, cycling and other) and stationary traffic.
    - Improvement in training of both drivers and instructors and raising of the examination standards.
    - Introduction of a temporary driving license for the first one or two years.
    - Introduction of penalty points besides imposing a fine for especially dangerous infringement of the Highway Code.
2. Modifications in the legislation of the insurance, in order to interest the Insurance Companies in road safety research and improvements, moreover, to encourage them to use their possibilities to influence individual drivers attitudes and behaviours directly by the focus of their marketing.
3. Creating local awareness of the problem by collecting data on road accidents, building interagency consultation on safety issues and priorities, disseminating information in mass-media and undertaking safety audits of all road project designs, including rehabilitations (In Romania the last is very important, because rehabilitated roads often retain existing poor horizontal and vertical alignment, while new surfaces, wider seals and straighter alignments can encourage higher speed and increase accidents if not matched by appropriate use of signs, design of intersections and provision for the large number of vulnerable road users; see The World Bank, 1996).
4. Improvement of the statistical system (based on subsidiarity), in order to facilitate identification of the most effective and feasible targets and measures, not only at national, but also at local level. Harmonisation within the national statistical system (Police, hospital and insurance records) and with international standards, through membership in databases like IRTAD and CARE, for instance.
5. Development of the Road Traffic Police from the technical and professional standpoint, with a view to implement special enforcement programs based on timeliness of different targets and on local conditions (similar to Selective Traffic Enforcement Programs, STEPs in Canada, see Page, 1992).

Last but not least, it is very important to clarify the problem of the resource availability and to establish a grant mechanism in order to sustain specific research activities.

ENDNOTES

[1] Currency resulted by computation from the Gross National Product International Comparison Program, representing the values in USD affected by the average international prices of participant countries.
[2] From the point of view of the number of the inhabitants, Bucharest is equivalent to three or four medium size Romanian counties, and has more inhabitants than the most populated county.
[3] Timiş county, having the administrative capital in Timişoara.
[4] Some of these proposals are introduced in the Highway Code, but these were a result of a governmental decision, not voted by the Parliament

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