

ITS –PROMISING TOOLS FOR SUPPORTING THE TRANSPORT POLICY

Dr. Ágnes Lindenbach¹

Abstract: *The application of intelligent transport systems/services on the road network is a challenge for the future, based on a well-defined ITS strategy with identified priorities. The actual deployment of ITS systems consists collective traffic control systems using VMS on the motorway network and some individual information systems giving traffic and travel information for the user via different mode of communication. The main areas of future developments is defined by the European tendencies, the European Transport policy, as well as by the Hungarian Transport Policy and the general framework of the ITS applications. The future development will be based on an open system architecture.*

Key words: ITS-strategy, transport policy, future ITS developments, interoperability

Characteristics of Road Infrastructure and Traffic

The total length of the Hungarian road network is about 160,000 km. The following table (n°1.1) shows the structure of the road network by road categories.

Road category	Length (in km)
- national road network	30,322
- main network in total:	7,009
- motorways and motor roads:	505
- main roads of I. order:	2,173
- main roads of II. order:	4,332
- secondary roads:	23,313
- local roads:	105,233
- private roads:	27,919
In total:	163,474

Table n°1.1: Structure of the road network by road categories (31st Dec 2001)

Of major importance is the 30,000 km long national road network. The length of main road network is about 7,000 km, which represents 23% of the national road network and accommodates more than 60% of the national traffic.

The Hungarian road network is described as follows in generalities:

- The road network has been extended centrally-radially, that is all motorways and the most important main roads lead into the centre of the country, into Budapest.

¹ Dr. Ágnes Lindenbach, Associate Professor, Budapest University of Technology and Economics
H-1111 Budapest, Műegyetem rkp. 3. Hungary, Phone: +36 30 9642856, Fax: +36 1 463 3054
E-mail: interut21@mail.datanet.hu

- The road network completely lacks cross-connections, except for the motorway ring-road M0 around Budapest.
- The motorways do not form a coherent network, only some subsections have been expanded.

The national motorway and motor road network is insufficient to accommodate the present traffic volume and the situation will be much worse for the expected traffic in the future.

Motor Vehicles

By the end of 2001 a motor vehicle fleet of approx. 2,94 million vehicles was determined. The degree of motorization today is 240 private cars per 1000 inhabitants. A degree of motorization of 400 private cars/1000 inhabitants is assumed to be the limit for traffic planning. According to a scenario this figures will be reached in the year 2020.

Traffic Volumes

The values of the ADT (average daily traffic) determined in 2000 amount to

- 23.278 veh/24 h (annual growth of 1,5 %) on motorways and
- 9.648 veh/24 h (annual growth of 4,5 %) on main roads.

Mileage

The total mileage on the public road network was approx. $2,87 \times 10^7$ vehicle km in 2001. About 64 % of the mileage is covered on major roads, i.e. on approx. 23 % of the total public road network.

Accidents

The continual worsening of traffic safety in the early 1990's turned into a favourable trend after 1993, even with increasing traffic volumes, was the result of an overall safety policy. The most beneficial action was the restriction of speed limit inside inhabited areas to 50 km/h (beginning 1st March 1993).

The number of accidents on national roads is displayed in the following table (n°1.2) by road categories.

Road category	Number of accidents in year 2001
motorways	284
motor roads	16
main roads of I. order	1,930
main roads of II. order	2,776
secondary roads	4,208
<i>National road network:</i>	9,214

Table n°1.2: Number of accidents on national roads in year 2000

An interesting risk indicator is the number of road fatalities related to the number of population, which is 18.5 deaths/100,000 habitants in Hungary, as compared to around 12.6 in the EU.

Transport Policy

In the coming years the growth of traffic performance is expected to continue in the member states of the European Union as well as in the Central and Eastern European region and, on the other hand, the transport policy of the future is focussed more and more on the demands and needs of road users.

The White Paper, which is entitled “European Transport Policy for 2010 - time to decide”, adopted in September 2001, spells out the EC’s strategy and guidelines of its transport policy for the next decade.

This new transport policy includes an underlying emphasis on *safety issues*, besides *environmental concerns* and initiatives for *sustainable market growth*.

Regarding the road safety the ambitious goal is to reduce the number of fatal accidents by 50% from 2000 to 2010.

Although the countries of the Central and Eastern European region are not yet members of the European Union, the following of the European trends is of special interest. Especially as “Acquis communautaire” is to be adopted as a mandatory requirement of accession, and also because some of these countries have direct motorway links to the European Union’s road network, the TERN (Trans European Road Network).

The objective of the governmental transport policy is in accordance with the economic policy of the government, the modernization program of the Hungarian economy, taking into account the principles of the EU transport policy as well. The main strategic guidelines of the Hungarian transport policy (Transport Policy of the Hungarian Republic, 1995) that was put into effect are the followings:

- promoting the integration-process to the European Union;
- improve the terms of regional relations with the neighbouring countries;
- supporting a more balanced regional development of the country;
- protecting human life and environment;
- effective, market-based transport management.

The *need for a new national transport policy* with a *new approach* emerged due to the following changes of the last years:

- new tendencies of the world economy:
 - globalisation and regionalisation,
 - new forms of ownerships, reduction of state ownership, propagation of competition in transport;
 - modified state involvement, strengthening of market-regulation role of the state;
 - increase of liberalisation processes, constitution of an integrated EU transport market;
- new priorities: transport safety, protection of human life, health and environment;
- acceleration of technological development.

In accordance with the above-mentioned factors, the main task of the elaborated new transport policy is to ensure the sustainable mobility, which means to ensure the harmonization between the demand side and the supply side. The characteristics of the transport policy ensuring sustainable mobility are its complex aspect, the longer planning horizon (to 2015) and the practice of “subsidiarity”.

The new “Development plan of the motorways and motor road network” until 2015 reflects the main goals and objectives of the new Hungarian Transport Policy (see picture n 1).



Picture n°1: The new “Development plan of the motorways and motor road network” until 2015

ITS Highlights in Hungary

Collective Traffic Control and Information Systems Using Variable Message Signs

MARABU

In the early 1990's a system study for an integrated traffic control and information system was prepared for the strategically important motorway ring road around Budapest (MARABU – Management of Road Traffic Around Budapest). The completed project comprises several subsystems as follows: data collection system, MARABU control centre, fog and black ice warning system, roadside traffic information system, parking guidance system, and section control system. The main tasks of the MARABU system are the permanent monitoring of the traffic, improved utilisation of the capacity of the M0 ring road, optimum use of the distributor function of the motorway ring road as well as the improvement of road safety.

MAESTRO

The *MAESTRO* system was implemented in 1999 on a North-East M3 motorway, it aimed first of all a higher level of quality of road operation. Further tasks are the support of a better traffic flow, the improvement of the road safety. The information provided is also related to the traffic conditions on the surrounding roads. The traffic data collection system using inductive loop detector is completed by a video camera monitoring system.

ITS Systems for a Better Road Operation

ÚTMET – Road and Weather Information System

ÚTMET is a road and weather information system, as a part of IRIS (Intelligent Road Information System), with the aim to support the winter road maintenance work, by using the most advanced technology. The system was launched in 2000, it contains about 200 meteoric data collection stations on the whole road network. Another 20 external meteoric stations are cooperating with the ÚTMET. ÚTMET includes roadside meteoric stations (with solar cell or wired power supply roadside data collection units, weather and traffic sensors), the ÚTMET

centre (collection and process of data, data store, data exchange with the meteoric centre) and terminals at the maintenance centres and, in a later phase, VMS for the road users.

ÚTFORG – Traffic Data Collection System

Also being planned is a traffic data collection system, using the very same infrastructure (power supply, data transfer) of the above-mentioned road weather information system. This system will include 50 traffic data collection stations, and it would provide traffic and speed data (by vehicle categories) from the critical sections of the national road network, 24 hours a day. It will give us an opportunity to detect congestion on the road network, and the real-time data from this system would be very useful for ÚTINFORM (traffic information-centre of the Ministry of Economy and Transport) in its everyday work.

Individual Traffic and Travel Information Systems

Regarding the individual traffic information systems, the main technical conditions for the operation of such systems already exist in Hungary and certain systems are functioning (primarily with experimental aims). However, one cannot speak about the existence of comprehensive and integrated systems.

GPS is available and functioning in several systems. GSM provides a data transferring possibility, and the number of mobile phones is rapidly increasing, with a steadily expanding sphere of connected services. Other systems in operation include GPS-based fleet management, mobile-phone related information systems, and GPS-based navigation systems (in experimental phase).

The road users can obtain “pre-trip information” in Budapest at the so-called “Info-touch” terminals. For example, one could access through the terminals information regarding public transport possibilities and recommended driving routes on the basis of static traffic data.

Role/importance of ITS deployments

In accordance with the recommendations of the TEN-T Expert Group on ITS for Road Traffic Management the network shall include infrastructure for traffic management and information services, based on active co-operation between traffic management system at European, national and regional levels.

The infrastructure shall include Intelligent Transport Services as follows:

- Traffic Management and Control
- Traveller Information Services
- Freight and Fleet Management
- Incident and Emergency Handling
- Electronic Fee Collection
- Monitoring Infrastructure
- Traffic Centres

So for our region the definition of the above mentioned infrastructure elements make possible the use of future EU funding (regional funds, cohesion funds) for the development establishing of ITS infrastructure on the future elements of the TERN.

Main Areas of Possible ITS Developments in Accordance with the Transport Policy

In accordance with the European tendencies, the content of the White Paper as well as with the Transport Policy of Hungary, and the general strategy for ITS application the main areas of ITS developments are as follows:

Elimination of Bottlenecks on the Road Network

The elimination of bottlenecks of the road infrastructure is of crucial importance in the future. First applications would concentrate on the border-crossing sections of main roads and motorways, including those on, and connected with, the Danube-crossing bridges.

Traffic Control and Information Systems on the Motorway Network

The most important impacts of these systems are favourable effects to the traffic safety. In the future the traffic information and control systems using VMS should be the basis of the motorway operation. The first crucial step would be the monitoring of critical sections of the motorway network for early detection of traffic problems as well as for the needed measures of travel times.

Traffic Control Centres

Regional traffic centres could then be established for these regions, for which system integration is of high importance. That means the establishment of a common database, the harmonisation of the different measures as well as the application of integrated traffic control strategies.

Traveller Information Systems

For the operation of effective traveller information services the preconditions are the availability of a comprehensive database as well as the provision of the needed information to the users. The needed data must be equally available for the road users (through different types of media, including radio, fax, videotext, SMS by GSM, Internet telephone/mobile phone), for different road operators or other organisations (e.g., police), as well as for other external service providers.

DRRP: Distance Related Road Pricing

A distance related road pricing is considered to be a potential instrument to charge a user proportionally for his use of the road infrastructure. In the future, beside the existing toll-systems, using “vignettes” with video enforcement, EFC systems, based on the real distance run by the cars could operate on the Hungarian motorway network. For the future systems both the *technical* and *non-technical* tasks must be defined and solved.

ITS Applications for the Effective Road Operation

The requirements of road operation related to TERN will be accepted also by the Hungarian Road Administration. The further development of ITS tools supporting the road operators has high priority (road weather information and data systems, traffic monitoring, positioning systems, etc.).