

JURIJ KOLENC, D.Sc.
Fakulteta za pomorstvo in promet
Portorož, Pot pomorščakov 4

Science in Traffic
Review
U.D.C. 656:001.891
Accepted: Apr. 4, 1998
Approved: Jul. 14, 1998

DEVELOPMENT AND ROLE OF TRAFFIC SCIENCE

SUMMARY

In the past, traffic science did not always have the role and task in accordance with its needs and abilities.

The analyses reveal that scientific research in the field of traffic has not always been in accordance with its characteristics and did not apply an adequate methodology which often brought to suboptimum solutions.

Accordingly, traffic science is treated as an independent scientific field called "traffic" within technical sciences. Thus, having a definite object of research it would best fulfill its role and accomplish its task.

1. INTRODUCTION

At the present stage of development we cannot imagine further progress nor even existence without the efficient functioning of the traffic system. In the hierarchy of system this is not the most important one but it is imbued by vital functions of all the other systems.

Traffic system encourages activation of all human and material needs, and, as a basic integrating factor, directly influences all other systems, as well as countries as a whole.

Knowing the characteristics and essence of the problems of the traffic system and its subsystems, interrelation and attitudes, as well as the influence of complex factor on environment, is a prerequisite so as to be able to find scientifically based solutions through definite scientific methodology.

The problems of traffic science and the methodology of the scientific research adopted directly depend on the stage of scientific progress. Due to the specific character of the scientific methods of different scientific areas and disciplines, which are also the results of the so called dual interdisciplinary character of traffic science, special problems of approach towards this research emerge.

Traffic science and the traffic profession have so far not found their roles and places everywhere.

This attitude to traffic science, particularly unisystemic approach to research and the favouring of indi-

vidual fields resulted in suboptimal or even wrong solutions. The following are the consequences:

- high accident hazard rate, particularly in road traffic;
- unreasonably exploited transport in general;
- incompatible development of individual traffic branches;
- typical lagging behind in technical and technological development, particularly in the traffic infrastructure of all traffic branches;
- low organisational and economic level of traffic services, particularly in the field of combined and unitized transport;
- insufficient consideration of scientific and professional achievements in the field of transportation logistics;
- inadequate capacities and alternative solutions in the field of public municipal, intercity and international transportation;
- intractable parking problems in cities and problems of general traffic organisation, particularly in big cities;
- problems of speed, punctuality, safety, reliability, convenience, elasticity, cost-effectiveness and overall effectiveness of functioning of the traffic system, and its subsystems in individual traffic branches;
- problems of disharmony between the needs and abilities of transportation capacity in individual traffic branches;
- ecological problems in traffic, etc.

Therefore, a need for serious consideration of all specified problems is recommended so that traffic science can assume its right role and undertake its task in accordance with the current stage of development.

2. THE OBJECT OF RESEARCH OF TRAFFIC SCIENCE

Traffic science is a systematised and grounded amount of knowledge of objective reality gained in a definite period of time by conscious application of ob-

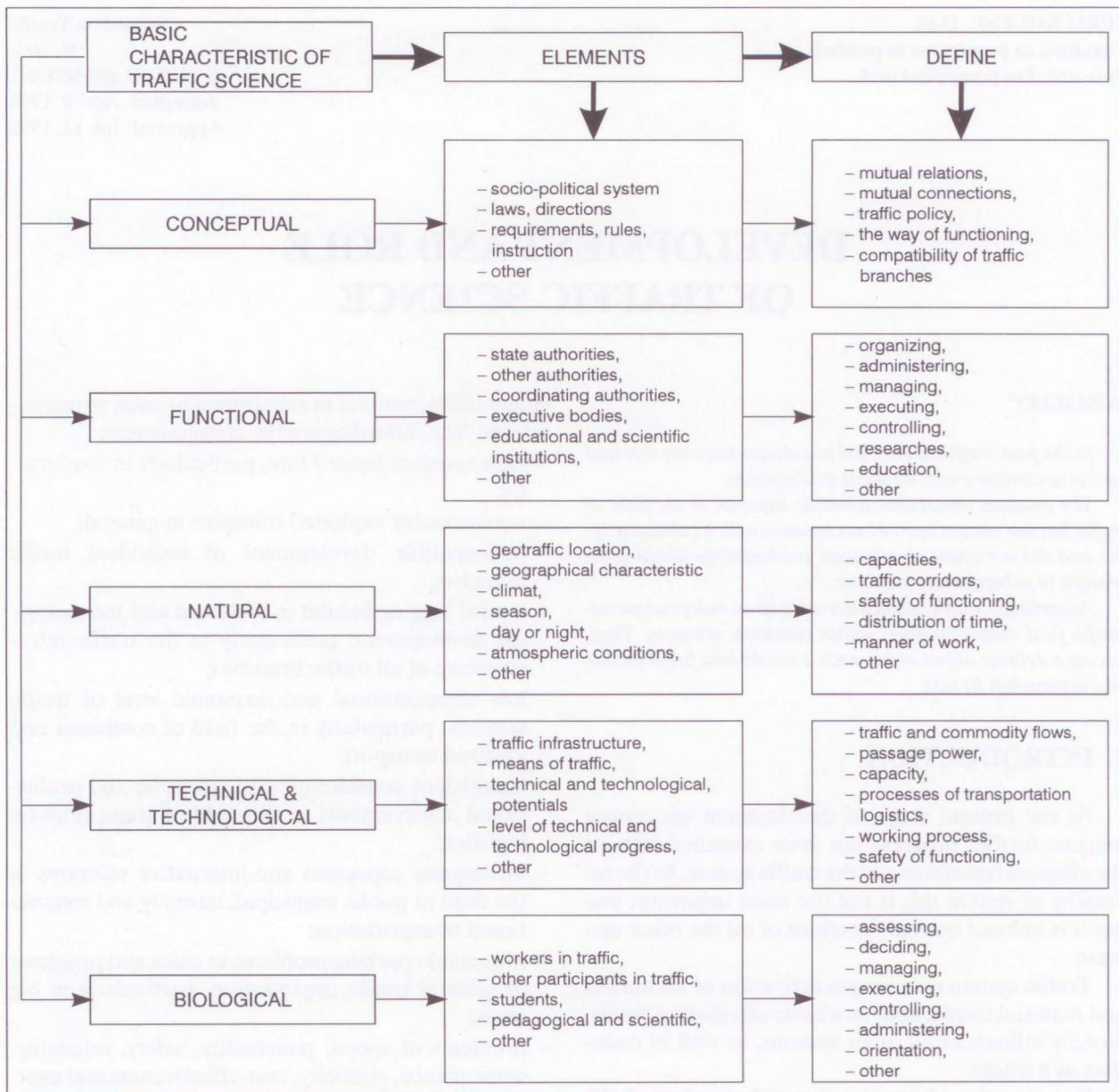


Figure 1 - Characteristic of the object of research of traffic science

jectives and adequate methods of research. It has its object of research, methodology, terminology and personnel support.

The basic role and task of traffic science is to serve the interests and development of society and it is orientated to fulfilling its needs, and at the same time the needs of development of the whole world.

Due to its vast dimensions and complicated functioning, a relatively large number of aspects and randomness as well as the interdisciplinary characteristic of traffic science (Fig. 1), it is faced with typical methodological, organisational and other problems.

Given the characteristics of traffic science, a systemic approach is recommended towards traffic science

seeking optimum solutions and gaining new knowledge on the basis of present and past experience.

For the individual disciplines of traffic science special approaches may also be applied enabling individual problems to be researched in their complexity, e.g. economic criteria. However, it should be kept in mind that from the viewpoint of traffic system such research is not complex. And from the scientific viewpoint research is not recommended in traffic science because it renders suboptimum solutions. Nevertheless, it should be admitted that it is often used in science practice.

Figure 2 presents a possible systemic approach to traffic science at the highest hierarchical level with the complex influence of environment. This approach

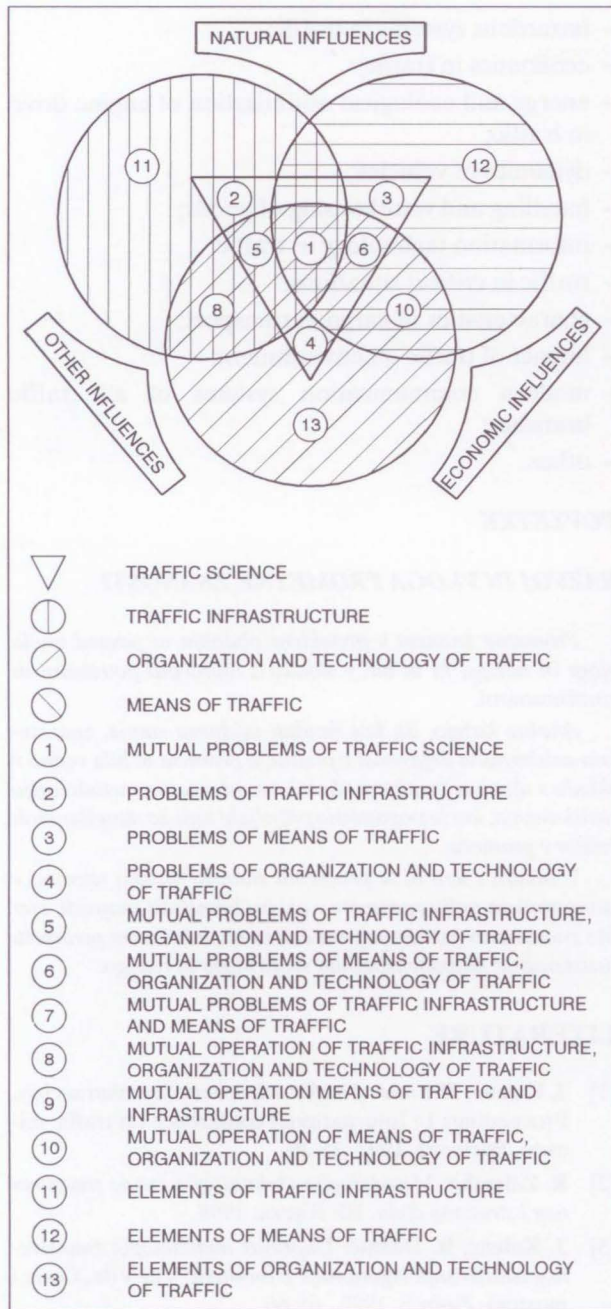


Figure 2 - Schematic presentation of a systemic approach to traffic science

represents affirmation of the role and task of traffic science in the whole world.

3. CHARACTERISTICS OF TRAFFIC SCIENCE

The characteristics of the economic development of new transportation technologies of the building up of the main infrastructure facilities of all traffic branches, the global geotrafic flow of commodities, relatively high level of motorization, the pollution of

environment and more rigorous requirements for faster, safer, more reliable, effective, more economical and all in all more efficient traffic require optimum and effective solutions from traffic science.

As a special requirement there is a need for scientific research into the efficiency of functioning of a uniform state traffic system as a subsystem of the global traffic system, above all regarding the characteristics of individual traffic branches, their compatibility, relations and connections.

Such research is as a rule very complex and there is a prevailing opinion that scientific methodology and scientific practice are fairly underdeveloped and suffer definite subjective and objective weaknesses, particularly regarding the methodological approach to this problem.

Optimising solutions for the effective functioning of the traffic system, its subsystem and individual elements with their interdisciplinary characteristics has high variability. Therefore, a question often arises whether, with an inevitable reduction, a research phenomenon will be partly or even completely wrongly identified.

This often leads the research to generalise numerous variations or to conduct research only into concrete phenomena, which however, cannot produce the required results.

Stochastics phenomena in traffic often require research with the help of simulation models, the results of which depend a great deal on the quality of the model and its faithfulness to the "original".

Given researches with numerous assumptions of conditions and their characteristics, which are not exact facts, the results are also more or less hypothetical.

Since the traffic system as a whole, its subsystem and individual elements are exposed to constant changes and adaptations to the requirements of the environment, its complete operating control and control of possible deviations is aggravated or even prevented so that entropy constantly rises and challenges its instability. The latter requires higher formalisation, which challenges non-elasticity with regard to changes of environment.

Although numerous researches were carried out on complex and individual subsystems and elements, we still cannot speak about a systemic and correct approach to these researches, particularly because our development of traffic science was not in line with everyone's needs and abilities.

Such an approach resulted in insufficiently examined solutions under the influence of "generally known" suboptimum or even wrong solutions, which are fortunately ascribed to other scientific fields.

With a systemic approach to traffic science in accordance with its characteristics, the object of re-

search and its development has marked also its further role.

It will depend on goals by traffic science whether every economy, country or society as a whole will provide a minimum existence, an easier existence or universal progress.

4. CONCLUSION

The analyses of the scientific research show that in the field of traffic science a systemic approach to research is necessary, otherwise the outcome will be suboptimum.

In accordance with the characteristics of scientific research in the field of traffic science as a typical interdisciplinary field and apart from characteristic objects of research, which derive from characteristics of individual traffic branches, it is necessary to consider optimisation of the processes and methods of the whole traffic system, its subsystem as independent systems as well as individual elements. For such scientific research the most appropriate would be a systemic approach.

Traffic science can fulfill its role and task with scientific research work within technical disciplines. To fulfill its mission in the future on the basis of an analysis made of needs and abilities, narrower fields of traffic science are proposed as individual objects of scientific research:

- optimisation of a uniform traffic system and its subsystems;
- optimisation of transportation systems;
- transportation logistics;
- management of traffic systems;
- theory of traffic flow;
- unitised and multimodal transport;
- technical exploitation of the traffic infrastructure of all traffic branches;
- technical exploitation, up-to-date diagnostics and maintenance of the means of traffic of all traffic branches;
- technique and safety in traffic of all traffic branches;

- hazardous systems in traffic;
- economics in traffic;
- energy and ecological optimisation of engine drive in traffic;
- dynamics of vehicles;
- handling and warehousing of goods;
- information technology in traffic;
- traffic in critical situations;
- characteristics of cargo in transport;
- impact of traffic on environment;
- modern communication systems of all traffic branches;
- other.

POVZETEK

RAZVOJ IN VLOGA PROMETNE ZNANOSTI

Prometna znanost v preteklem obdobju ni povsod imela vloge in naloge, ki bi bili v skladu z njihovimi potrebami in zmožnostmi.

Analize kažejo, da kot rezultat takšnega stanja, znanstveno-raziskovalna dejavnost v področju prometa ni bila vedno v skladu s njenimi karakteristikami, ter adekvatno metodologijo raziskovanja, kar je pogostoma pripeljalo tudi do neoptimalnih rešitev v prometu.

V skladu s tem bi se prometna znanost morala razvijati v samostojnem polju »promet« v okviru tehničnih znanosti, kjer bi z znanstveno-raziskovalnem delom na določenem predmetu raziskovanja najbolje izpolnila svojo vlogo in nalogo.

LITERATURE

- [1] **J. Kolenc:** *The role of traffic science in Slovenian society.* Proceedings 1st International conference on traffic science, Portorož, 1997, 25-29.
- [2] **R. Zelenika:** *Metodologija i tehnologija izrade znanstvenog i stručnog djela.* EF Rijeka, 1998.
- [3] **J. Kolenc, R. Džanić:** *Doprinos metodologiji znanstvenog istraživanja ergonomije u prometu.* Via-Vita, Ceste i mostovi, Zagreb, 1992., 65-68.
- [4] **D. Radošević:** *Teorija sistema i teorija informacija. Fakultet organizacije i informatike.* Varaždin, 1978.