

Aspects of governmental research and development funding programmes for ground transportation systems

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MOTIVATION AND OBJECTIVES OF GOVERNMENT PROMOTION

Transport and traffic services are essential components of the infrastructure in every country; of an infrastructure guaranteeing that the social and economic demands made on both the mobility of the population and on the exchange of goods and commodities are being met. The efficiency of this infrastructure is a yardstick for the individual's quality of life as well as for positive overall national accounts.

Transport and traffic systems in advanced industrialized countries are characterized by a high degree of mechanization and by complex organizational structures. In most cases, the interlacement of the different sub-systems to become an integrated or combined transport and traffic system optimized throughout is, however, poor and insufficient. The difficulties with which we are already confronted today and which we must expect to increase in future, have been caused by the concentration of the population in conurbations, by an increase in the production of goods as well as in the transportation of goods and services at European and international level, and by an increase in transport and traffic due to leisuretime activities. At the same time, the demands made on the quality of available services have increased, above all with a view to safety, profitability, energy utilization, environmental protection, speed and comfort.

The rapid increase in traffic during the past, as well as the high share of private vehicles in the traffic system, and increasing deficits in nearly all sectors of public transport, are particular problems we have to solve.

If we want to avoid a critical intensification and accumulation of problems already existing within the field of transport and traffic, we must – apart from improving investments and organisation – try to develop and implement technical improvements and establish better links between the different sub-systems.

Structural planning and regional development, road planning and road building, provision of traffic and transport services, as well as the organization of the overall transport system, have always been tasks which must undoubtedly be fulfilled by the government. Thus it goes without saying that the government has an increased obligation to open up and implement new technical possibilities for fulfilling the above tasks. It is to be feared that – without direct government measures to promote technological developments in the transport field – those technical innovations which are either required or, at least, desirable during the next few decades will either not be available at all or not in due time, and that they will not be available to a sufficient extent.

Furthermore, we would not be able to take sufficient account of the fact that means of transportation should be accident-proof and reliable in operation, and that they should take account of environmental protection. We could further not expect a long-term improvement in the cost structure of public transport companies; and we will not be able to exhaust the possibilities for achieving economical energy and other resources utilization for the overall system quickly enough.

The following are the main objectives of government measures to support research and development in the field of transport developments (Fig. 1):

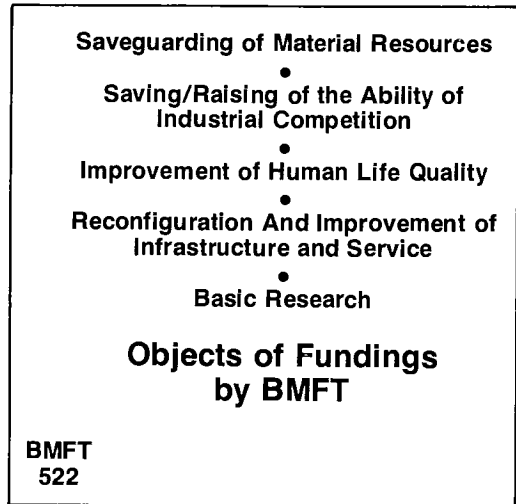


Figure 1

– Provision and maintenance of efficient transport and traffic services, as well as of infrastructures in the transport sector, above all within and between the individual conurbations;

– reduction of the total costs for means of transportation and, at the same time, improvement of the economic situation of the transport companies;

– increase in the reliability, safety, rational energy utilization and low pollution of all technical systems and their components;

– guarantee of the long-term competitiveness of the transport companies and the export industry at international level.

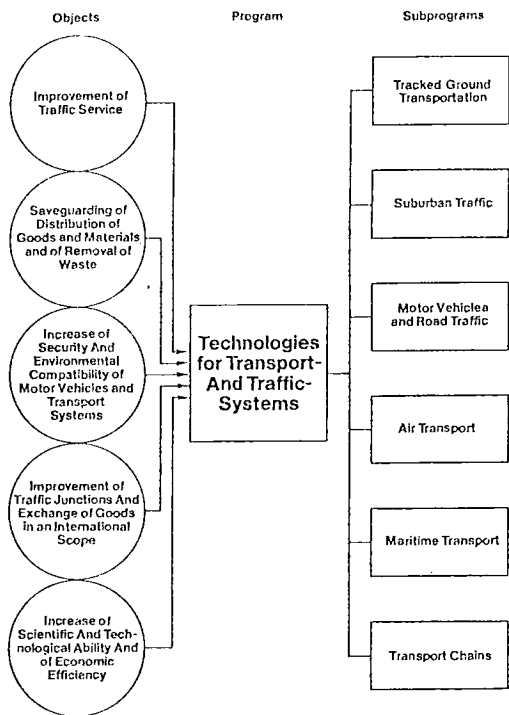


Figure 2

BMFT-Program Technologies for Transport- and Traffic-Systems

TASKS TO BE FULFILLED (Fig. 2)

The following are the main tasks to be fulfilled with a view to the above objectives – limited to the field of surface transport and traffic:

- the technical and organisational improvement of conventional, as well as the development of new, means of urban mass transportation until they are ready for commercial use;
- the development of conventional railway techniques or of new contact-free vehicles as an integral part of a future European transport network;
- the improvement of traffic safety, of energy utilization and reduction of environmental pollution by all means of transportation, in particular, however, of motor vehicles, by developing and introducing appropriate technical auxiliary means; and
- the examination and, possibly, development of new technical transport systems for raw materials, goods and wastes, taking into account the criteria of economy, safety and environmental protection.

E.g. more than 10 percent of annual governmental budgets are spent for transportation and traffic purposes with effects strongly influencing the situation in future decades. Therefore long termed planning and far reaching technical problem solving attempts are needed.

As a result of the support given to selected projects, the responsible persons and authorities shall be given comprehensive and expert information, as well as a list of clearly-defined technical solutions, so that they will be able to select and introduce those systems best suited for future tasks in the field of transport and traffic.

PROMOTION PRIORITIES

The following sub-programmes are supported by the Federal Ministry for Research and Technology in the field of surface transport and traffic systems:

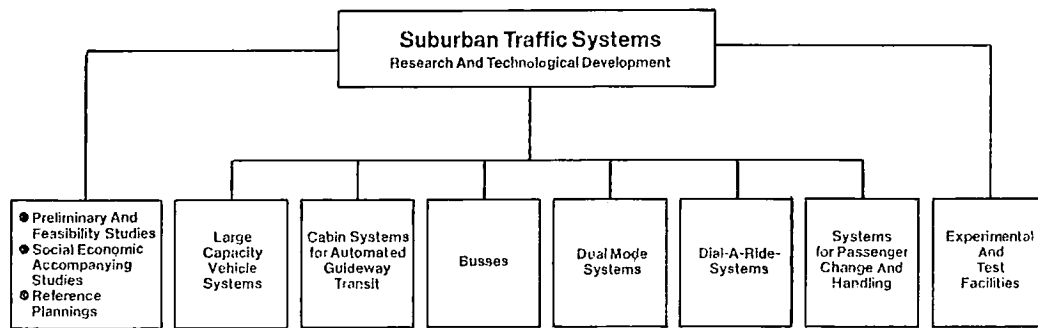


Figure 3

BMFT-Research-Program Suburban Traffic

Public systems of urban mass transportation (Fig. 3)

If we want and in the future inevitably have to improve the ratio between private and public transport and – in the long run – want to make this ratio a reasonable one, then we must – in addition to existing means of urban mass transportation which are being further improved – develop and demonstrate those technical systems and transport concepts which are better suited to meet the requirements of users, operators and the environment.

The following are the technical development lines, partly including new structural and operational concepts, which are being promoted:

- urban mass transportation systems using large-

capacity vehicles (light rail systems, underground)

- urban mass transportation systems using small and medium sized cabins,
- bus systems suited for future needs,
- systems which can be used in several modes of operation (dual mode systems),
- demand-oriented systems of urban mass transportation (demand bus, dial-a-ride), including
- new technical systems for passenger transport and the transhipment of goods and commodities, as well as
- traffic lane and station construction techniques.

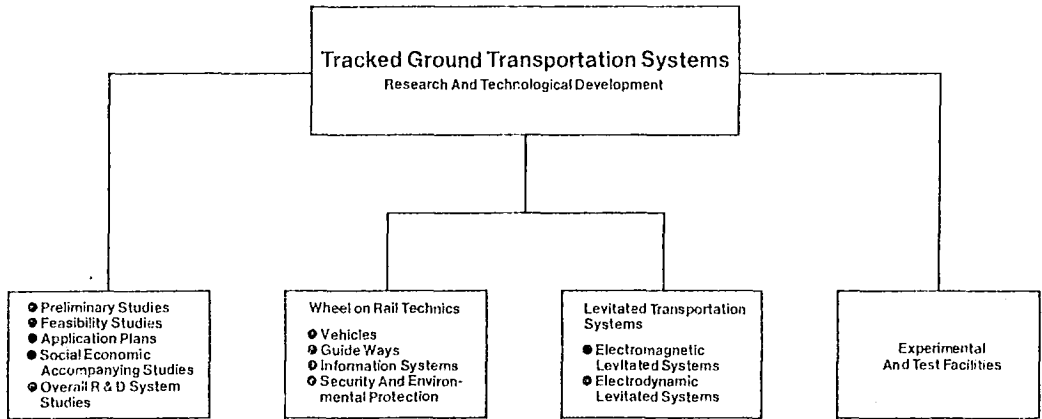


Figure 4

**BMFT-Research-Program
Tracked Ground Transportation Systems**

Tracked ground transportation systems (Fig. 4)

By a promotion programme in this field, we wanted to establish a basis for rail systems, the technical and operational design of which would be adapted to future needs. Under the sub-programme

– steelwheel-on-steelrail technologies (RS) methods for an improvement of the railroad system are being elaborated, in order to open up the reserves in technology as well as economy.

Apart from advanced wheel-on-rail concepts, – magnetic levitation techniques (MS) with linear motor propulsion system are being studied for future generations of rail systems, i.e. new high-

speed transportation network. In this field, the Federal Republic of Germany has been able to take a good position.

The following systems are still being examined in order to select the very best one:

- the system of electromagnetic levitation (by attraction) (EMS),
 - and the
 - system of electrodynamic levitation (by repulsion) (EDS),
- whereas the studies on the air cushion system have been dropped.

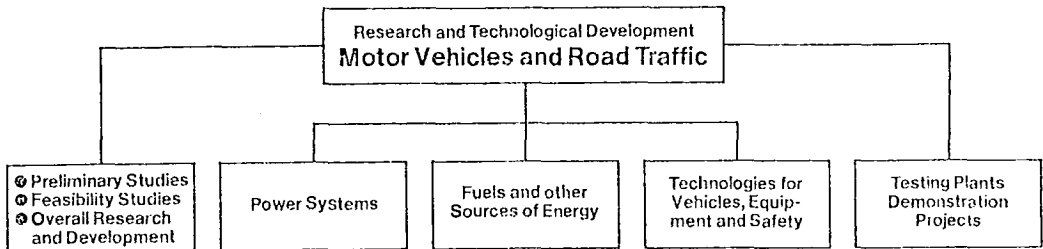


Figure 5

**BMFT-Research-Program
Motor Vehicles And Road Traffic**

Motor vehicle engineering and road traffic techniques (Fig. 5)

Today, as well as within the nearer foreseeable future, a major share of traffic and transport services will be borne by the motorcar. Technically advanced systems may contribute to a reduction of environmental pollution, safety risks, energy consumption and disturbances in the traffic flow. Therefore, support mainly concentrates on

- propulsion systems,
- unconventional fuels,
- undercarriage and body construction,
- technical auxiliary means in the field of road traffic,
- systems to control the traffic flow,
- safety technologies.

Transport chains (Fig. 6)

Individual households, local communities, as well as

industrial enterprises, are increasingly dependent on a centralized supply and exchange of raw materials and both industrial and consumer goods. A lot of technical and especially organizational problems have to be solved to guarantee the quality of life as well as a sound basis for industry.

IMPLEMENTATION OF PROMOTION MEASURES

The giving of advice, holding of objective discussions and performance of expert work for the Federal Ministry for Research and Technology in connection with the management, control and efficiency control of sub-programmes and individual projects are tasks for the following bodies in particular (Fig. 7):

- ad hoc panels of experts,
- project advisers,
- project committees,
- annual status seminars.

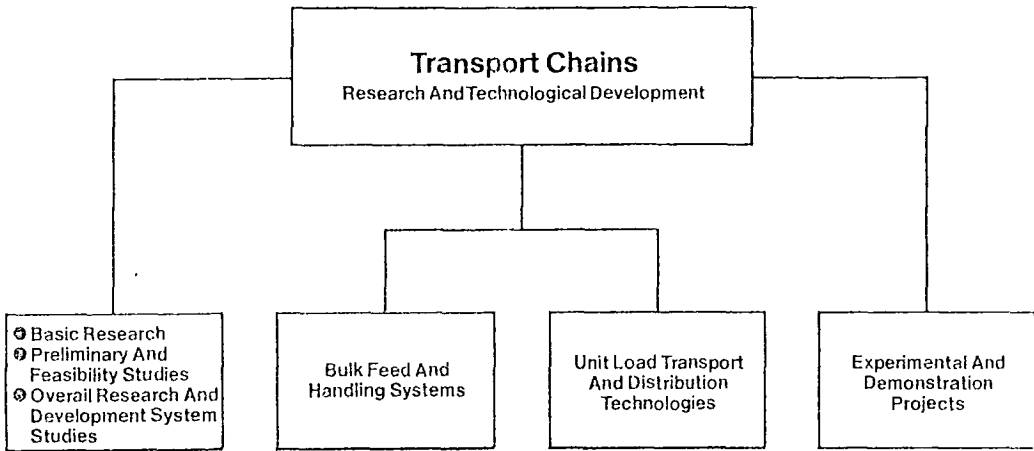
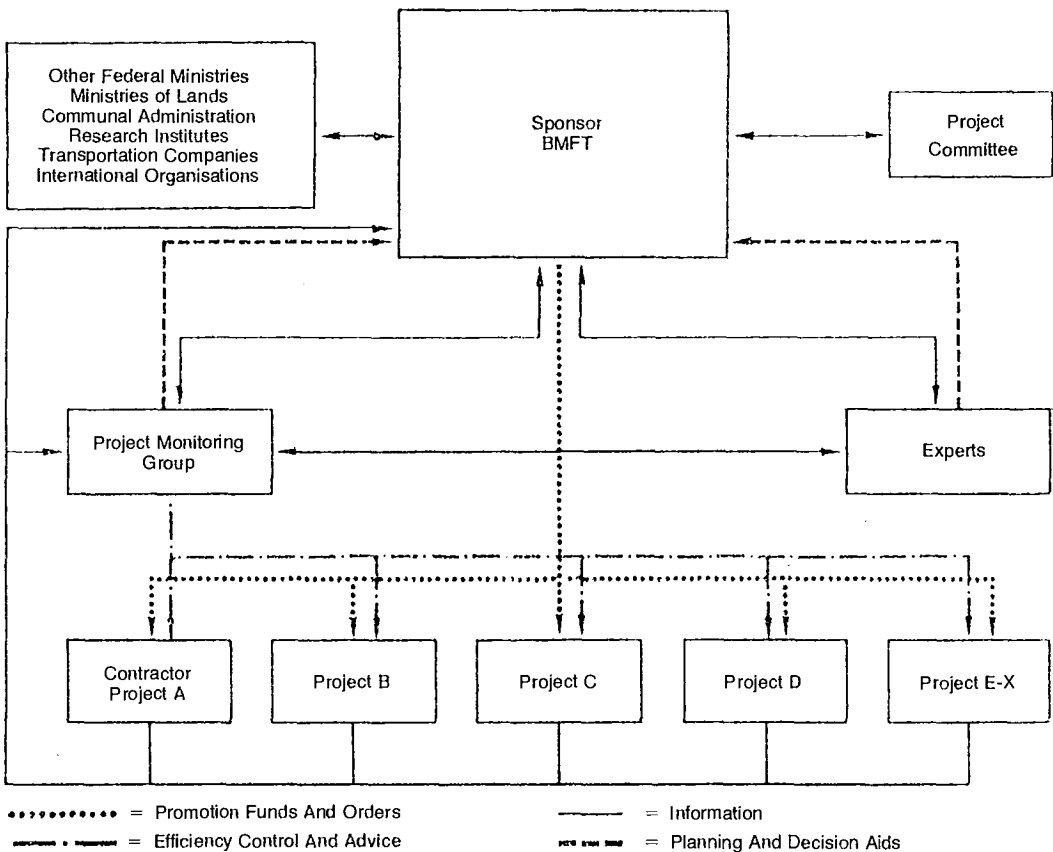


Figure 6

BMFT-Research-Program
Transport Chains



Organisation of Fundings

Figure 7

Priority promotion is given to selected projects. Promotion on a broad scale is not desired. Individual projects are promoted by way of grants amounting to between 50% and 100% of the overall costs incurred in each case. At the same time, enterprises in trade and industry are themselves required to make an appropriate contribution. Contracts may be awarded in special cases. Systems analyses, socioscientific studies and cost-benefit

analyses are carried out both in advance and also accompanying each project. As a rule, close cooperation is required between industrie, universities and government-supported research institutions.

From 1969 up to the end of 1976, the Federal Minister for Research and Technology made funds available for promotion to the amount of 485 million DM (Fig. 8).

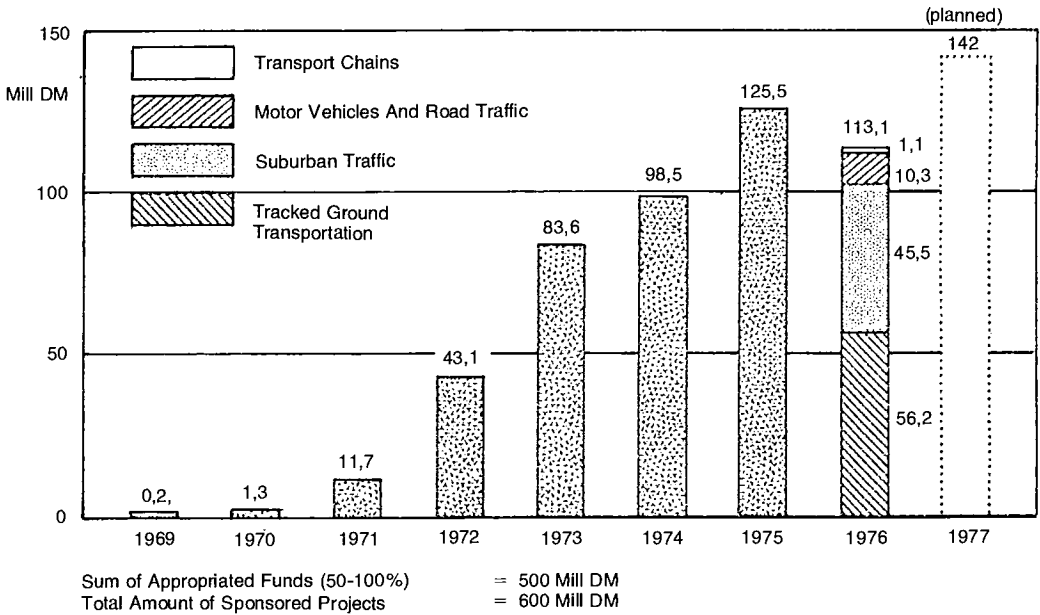


Figure 8

Fundings of BMFT for Transportation R & D

FUTURE PROSPECTS

Many countries are actively engaged in seeking solutions to the problems posed by the tasks devolving on us in the future in the sector of transport and traffic. Intensive research and development work is being carried out for the greater part with considerable by support governments. The technical development lines being pursued vary to a great extent, and the stage reached in development also varies in each case. Up to now, the course taken by studies carried out in the Federal Republic was mostly very promising, rapid and relatively inexpensive, with the result that the next development phases could be commenced. Good results, however, do not in themselves ensure the success of most projects. They merely constitute a few initial steps along a path which will be laborious, difficult and – even in the most favourable circumstances – not without setbacks. We cannot yet be certain whether our suppositions and plans are correct, whether the demand as forecast for the

coming decades will actually occur, whether it will be possible to arrive at a competitive price/product or price/service ratio and thus achieve real profitability, and – last, but not least – whether the general economic situation creates fairly favourable prerequisites. There is no patent solution to the problems raised by urban mass transportation systems and motor vehicles. Market demand will determine the choice of the systems ultimately selected. A high-speed surface rail transportation system cannot, however, be introduced on a national scale in our country. It must be considered in a greater context, e.g. a uniform system of this type should be designed for use in Europe. The advantages of such a system can only be fully appreciated if it is introduced on such a scale, ignoring the borders of countries. This specific instance – and the same holds for the other fields of development – demonstrates the necessity for international cooperation, which is possible, being of obvious use and therefore of benefit to all concerned.