SELECTION OF MISSION ORIENTED TECHNICAL PROGRAMMES*

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There are several more or less exact method known from international special literature as well as from practical experience for defining necessary measures needed for achieving the strategical aims of society. According to our present knowledge, out of these the PATTERN and the CPE methods have been adopted most efficiently.

These methods based on the decision theory, set out from the assumption that "to know what" had to precede "to know how". As a matter of fact, for choosing the most promising possible technological solutions of all the solutions at our disposal it should be known what the society, economy and each of its branches endeavour to achieve. From the first primitive methods for choosing the tasks of research and programming them like drawing up linear evaluating matrixes or preparing tests, there were developed the methods of significance or decision trees which, though adopting different techniques, have a common aim: to join the long-range targets with activities to be begun with immediately.

The so called PATTERN system had been applied extensively first in American military and space research. According to the basic principles of this system (see in detail in Erich Jantsch: Technological Forecasting in Perspective, OECD, Paris, 1967) medium and long-range decisions on development are made in such a way, that activities necessary for achieving any set target are listed within a hierarchical relevance system similar to a product tree. A scenario serves as the foundation of this system containing all aims and targets for the next decades as well as expert opinions on what kind of problems are to be faced, which solutions are recommended in the course of this development, taking also into account possible scientific and technological changes. The relevance tree is completed on the basis of the scenario drawn up by the experts considering also possible trends of development. i.e. political and economic conditions. Setting out from strategical targets, all activities

are decided upon, followed by a definition of the conditions, means (based on a systems-oriented view) needed for the realization of these targets right down to the problems where we are lacking scientific-technological knowledge necessary for the solution and where therefore a research task should be set.

The relevance tree achieved in this fashion shows but the logical order of problems, however, without any evaluation whatsoever. The following step is the evaluation of different activities, problems, tasks and means etc. listed at each of the levels, and this evaluation is made from the viewpoint of levels positioned directly above them. Thus, activities having to be displayed for achieving the strategical target are to be evaluated from the point of view of the strategical target, while problems to be solved for displaying such activities are evaluated from the point of view of these very activities etc. Evaluation is made according to different criteria as well as the different weights of the criteria. Criteria are changing at each level: e.g. at higher levels criteria of importance are applied, while at the level of means and subordinated subsystems criteria of economic character are coming to the fore. For instance, are the necessary means available or not, and/or what time is needed for the securing of these? Finally, a third kind of evaluation is also made aiming at throwing light on the mutual utility of individual elements, examing thus the following problem: from the viewpoint of the realization of how many of the elements positioned above them are the individual elements at different levels necessary?

The CPE method, a further developed variant of this decision pattern has been elaborated by a planning group of the French Ministry of Defence.

The exploitation of the possibilities inherent in the methods mentioned basically depends on the fact, how many informations are available and what were their degree of reliability.

The adaptation of these decision relevance trees gains special actuality when drawing up a national scientific research plan. A temporary target-catalogue could be elaborated enabling the start of practical work. This catalogue would contain the following target-groups:

1. Increasing the consumption fund and changing its structure

    a) Change in the structure of food consumption.

    b) Increasing the supply in durable consumers' goods.

    c) Improving the quality of wearing apparel.

2. Development of the infra-structure

    a) Improving on the structures of passenger transport and transport of goods and increasing their capacity and the level of these services.

    b) Choosing an up-to-date structure of energy supply and improving the power supply.

    c) Development of the service and repair workshop network.

    d) Country and town planning.

    e) Housing projects and building of social and cultural establishments.

    f) Development of public utilities.

    g) Mass communication, telecommunication etc.

3. Increasing the technical level of material production.

    a) Decreasing the consumption of materials and specific energy.

    b) Development of techniques of conversion of materials.

    c) Development of standardization, typifying, prefabrication, structural elements.

    d) Micro-miniaturization, micro-electronics.

    e) Chemical and biochemical conversions.

    f) Increasing the specific output of crop land.

    g) Increasing the output per product unit.

    h) Automation and control of production.

    i) Mechanization and automation of material transport.

    k) Development of national information systems etc.

4. Increasing the technical and the general level of culture.

    a) Procurement of new achievements in sciences.

    b) Increasing the efficiency of vocational training and extension courses.

    c) Popularization of general education etc.

Similarly, target-catalogues for natural and social scientific researches could be compiled. The above enumerated socio-economic targets could be used for the derivation of scientific and technological knowledge, for gaining a clear concept of activities needed for their realization and for the solution of problems having arisen in the course of realization and during producing means for solving technical and social problems (Relevance tree).

After having classified the problems according to target-groups, the next step could be the evaluation of concepts and research to be done in order to fulfil these aims: the evaluation should be effected in compliance with the importance for the target set and the effect on the national economy (primary criteria). The evaluation on the basis of these two criteria could be effected with different technics. Let us see for instance a punch-card system which can be applied to data processing, too. With this system the appraisal is resulting in certain points which are summed up, and subsequently all variants to be taken into account are listed according to the amount of their points.

For reckoning or estimating the economic effect there are several methods at our disposal. The common feature of all of them is the fact that the time requirements and risks of technical feasability is taken into account by discounting the total expected result and expenditure to the time of the decision.

Discounting the result reckoned with the probability of success and expenditures to 0 time (net value) renders it possible to list the research alterna-

Importance / Economic effect	Weight	Absolutely necessary	Necessary	Desirable	Un-necessary
		3	2	1	0
Above the average	3	6	5	4	3
Average	2	5	4	3	2
Below the average	1	4	3	2	1
None	0	3	2	1	0

tives on a priority basis according to an estimated, real and/or planned specific yield. Although the inherent uncertainty of the individual factors can be reduced by applying the calculus of probability, because of numerous unmeasurable parameters, a final order of priorities can be established only by the estimate of experts. However, through this method we might gain a possibility for evaluating the alternatives according to their deviation from the average.

If the social, economic aims of the target-catalogue are evaluated by the government in a different way, the number of points of the individual concepts should be increased by the preferential target value, thus resulting in a pre-ordered list of target-programmes.

As the concentration of considerable material and intellectual resources is demanded for the realization of possible research programmes and these are available only to a limited degree, it is to be considered which programmes should enjoy priority. Consideration should be also given to the convertibility, and expandability of the researchers' potential as well as their time requirements.

Summarizing the programme the following can be stated:

The development of a national long-range scientific research plan can be effected through the following steps:

1. Compiling a catalogue of socio-economic aims.

2. Assorting research alternatives necessary for the realization of these aims and targets according to targetgroups.

3. Judgement of the suggested research projects on the basis of formal criteria.

4. Evaluation of the proposals satisfying formal criteria according to their importance and effect on national economy.

5. A final categorizing of the target-programmes on the basis of the limiting conditions.

Naturally, all this postulates the detailed elaboration of technical-economic plan studies necessary for the realization of the social and economic aims, in order to gain all information needed for decisions. It is absolutely futile to ensure the conditions of research work if nothing is done for rendering possible the realization of research achievements for the development of technology and national economy.

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