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RESEARCH ADMINISTRATION: THE ART OF KEEPING THE BALANCE BETWEEN GOAL FULFILMENT AND CREATIVITY

by

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1 The Problem 1)

Public and private funds for research and development have been rising rapidly throughout the world during the last 20 years. Behind this development stands the insight that rapid technological change has created economic growth and wellbeing in industrialized countries. Experience from latter years has shown that the research-produced technicological change also creates disturbances, in both the physical and the social environment where man lives. These two tendencies: Growth of the research sector and the combined desirable and undesirable effects of technological change have constrained many countries to form public bodies aimed at influencing the growing research and development activities (The Brooks Report, 1).

Many of these countries also experience a change in the social objectives. The orientation towards favouring economic growth now tends to be combined with goals related to needs for greater equalities between groups of people and regions of the country, greater stress on a socially and environmentally acceptable development. This development includes a more complicated balancing of various objectives against one another than before. Politicians and administrators now need for their decisions not only efficient measures to achieve their objectives but also means to improve goal formulations and methods to balance these goals against one another.

1) The basis for this problem specification are OECD material on research policy. Most important are the so-called Brooks Report (1) and the summary report of and papers delivered to an OECD conference on Agricultural research in November 1972 (2, 3, 4, 5, 6, 7).

At the same time it is obvious that research is not neutral in relation to structural change. Thus, for example, agricultural research has on the one hand created many possibilities to produce food cheaper. On the other hand it has given rise to overproduction problems, income problems for small farmers and regional imbalances. With this in mind, changing public goals might well introduce new demands on the research sector and a redivision of funds between research areas.

New overall goals in society and a multidimensional structure of these goals also introduce more complicated research problems. When the GNP-oriented goal is replaced by QOL (quality of life) objectives then many of our research projects are turning multidisciplinary. It is no longer enough to deal with the balance between biology and economics. Now come a host of dimensions perhaps best summarizable in a word like "ecology". In research organization this means that the individual researcher is (to take an extreme solution) replaced by the team of researchers from different fields, working together in multi-discipline projects coordinated via a systems analytical research plan.

These can be a set of arguments for the necessity to formulate goals for research and to do this in accord with society's needs. A number of problems are associated with this goal formulation procedure. Let us examine some of them.

Any society consists of a number of different interest groups. Conflicts can arise for example between consumers and farmers, as to the weighting of various objectives. The same might be true for the inhabitants of rural and urban areas, for farmers on small and big farms, etc. The need for research within a sector is seen with different eyes by these various groups. Also, differences might exist in the way problems and urgent needs are perceived by farmers, administrators and scientists. This may be the result of inadequate contacts between the groups, of differences in value, of different viewpoints on what the relevant ends and means in agricultural policy are, or of mere differences in language and ways of expression. These differences in goals (real or imagined) and in perceptions of goals, create difficult problems in goal or priority formulations for research (5).

A specific problem is that sector-tied research institutes, public or private, and institutes with only sector-schooled researchers or scientists from only one discipline might well have too uniform goal perceptions to constitute really creative research environments. The research organization needs to counteract tendencies of this type. They might otherwise result in the creation of selfcontained and stagnant research "ghettos".

Let me quote a writer in the new journal "Research Policy" on the problem of differences in goals of the scientist and his research organization. BLUME (8) says:

"There remains a further difficulty, and one not unique to the complex organizations which I have been discussing. The formal objective(s) of an organization are rarely identical with the objectives of the individuals making up the organization. The individual players in a football team may be as concerned to display their own talents to the full (in the hope of transfer, or of being selected for their national team) as to ensure the succes of the team. Professionals in organizations typically vary in their commitment to the organization, and sociologists have distinguished a theoretical category of those whose principal loyalty is to a conception of success which may take them easily from one organization to another. In general we may say that individuals make their careers in organizations to the extent that their current employers provide them with the rewards and satisfactions which they seek from their work, whilst bearing in mind opportunities available elsewhere together with the social costs of transfer. A problem for management is then the provision of appropriate rewards".

2 Towards a Balance between Goal Fulfilment and Creativity

It is obvious to the author of this paper that clearer ideas are needed as to how our society develops, how man wants it to develop and what acceptable overall goals in this siccessively

more complicated world of ours should look like. It is also equally obvious that society can require scientific research not only to produce new knowledge but to produce knowledge relevant to the needs of society in this development. An orientation of research towards the problems relevant in society's development is necessary. An awareness has also to exist that problems are so complex that multi-disciplinary approaches are often necessary to solve them.

At the same time research cannot afford to lose its content of creativity, of spontaneous search by curious minds, of constructive joy and of independence.

This, then, is the problem: How can we create a research sector oriented towards the goals of society and at the same time possible to work in for creative scientists?

There are many possible answers to this question.The obvious Scilla and Charybdis of this sailing-trip are: Research steered by top administrators distributing funds according to politically determined goals; and imaginative scientists aimlessly seeking new knowledge. Far from proposing the answer to the question I will devote the rest of this paper to indicating elements which might be parts of a workable solution. The attached list of literature gives some of the sources used.

2.1 Identification of problem areas

That the increased complexity of our world requires more effort for the identification and formulation of research problems is expressed by the Brooks Report (1):

"The systematic identification and formulation of new problems are the more necessary because the distinguishing characteristic of many of the present social demands is that they are defined more by the dissatisfactions they engender than by a precise formulation of the satisfactions looked for: existence of dissatisfaction, in other words, does not automatically imply a recognition of preferable alternatives. The complexity of society and the limitations of knowledge make it difficult or impossible to envisage realistic alternatives. This is one of the frustrations of modern society: today's "hungers" are not easily defined. Thus, environmental pollution, the chaos of city life, and the inadequacies of the universities arouse discontent that is not expressed in precise alternative concepts of the types of environment, city, or university desired".

....

"Thus it is very important to use knowledge to define an expanded range of alternative opportunities and make them as specific as possible. The search for objectives implies a new approach that would systematically attempt to relate problems emerging from new social demands to actual and predictable techno-economic possibilities".

The identification of problems can take the form of specific research projects, or of study findings made by public committees or other official bodies, by foundations, pressure groups, and so on. Problem identification can emerge as the result of discussions where scientists, administrators and consumers of research results cooperate.

2.2 Formulation of goals

We have seen in the problems analysis of this paper that barriers often exist between scientists, politicians, administrators and representatives of the agricultural industry. Language problems, differences in values and problem perceptions, geographical obstacles etc. can be the causes. The necessitates that any goal formulation procedure must include interactions between these groups to become successful. "...there must be a dialogue in which scientists join with representatives of Government and of the agricultural industry" as WANSINK and ULBRICHT (7) say. Swedish experiences (9) indicate that this dialogue consists of many rounds. It is not a one time event but a process over time, and which tends to be continuous. We are here close to the so-called "Management by Objectives" (MbO) procedure wellknown from Management Science.

GILCHRIST (6) reports that this procedure has been used to administrate agricultural research in Canada since 1969. As it is applied there, it contains a goal specification element and yearly program reviews with revision of goals and research activities. The goal specification procedure is reported to contain the dialogue element ("mutual involvement") mentioned earlier.

2.3 Flexibility of the research organization

The stressing of research management by formulating and enforcing goals can be developed too far by planning enthusiasts. It might introduce long range fixation of ressources and thus lead to inflexibilities. Any planning system has to give freedom for plurality in research (10). This can be achieved by opening up several research financing agencies with completely separate and independent staffs. With only one source of funds or when the same persons sit on many financing boards, individual scientists can suffer heavily. Plurality in values, problem perceptions and research methods and important to guarantee a good flexibility. Furthermore, in many cases it might be more efficient to consult and coordinate between projects than to plan joint projects.

Inflexibilities are often built into the structure of the research organization. Good examples (from, 7) are the grouping of scientists in rigid departments according to discipline, rather than multi-discipline groups, the separation of research from development and advisory service, the lack of goal specification activities in the organization, the scientists motivations as built up from recognition by their peers rather than from fulfilment of the goals of the organization, lack of career recognition for work in interdiscipline teams.

There are a number of possibilities to loosen these rigidities. One is for the research organization to engage in long range planning activities directed towards goal formulation as mentioned earlier. Another is to introduce what has (in 6 and 7) been called a matrix organization. Existing departments according to discipline constitute the formal organization. Multidiscipline planning committees and project groups constitute the organization for carrying through those studies, far not all, that can most profitably be solved via the team approach. Here I should like to quote WANSINK and ULBRICHT (7), who emphasize that these multi-discipline groups should be temporary:

"Perhaps BENNIS 1) was right when he wrote:

The social structure in organizations of the future will have some unique characteristics. The key word will be "temporary"; There will be adaptive, rapidly changing temporary systems. These will be organized around problems to-be-solved. The problems will be solved by groups of relative strangers who represent a set of diverse professional skills. The groups will be conducted on organic rather than mechanical models; they will evolve in response to the problem, rather than programmed role expectations. The function of the "executive" thus becomes coordinator, or "linking pin" between various project groups. He must be a man who can speak the diverse languages of research and who can relay information and mediate among the groups. People will be differentiated not vertically according to rank and role but flexibly according to skill and professional training".

Flexibilities also can be introduced on the individual level. It is necessary to reward scientists for teamwork. WANSINK and ULBRICHT (7) ask if research workers and research leaders are trained to accept change. Flexibility means that the scientists has to be willing to change research fields, that the research leader is willing to change his style of management, all for the good of better goal fulfilment.

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1) BENNIS, W.G., 1966: Changing Organizations. New York. McGraw-Hill.

Flexibility of minds might also be promoted through travelling in order to gain experience of new research environments and by the invitation of guest scientists to the home department.

2.4 Motivation of creative persons

The most valuable resource in research as well as elsewhere is not funds and laboratories but people, above all creative persons. Efficient research requires that the motivation of these persons is understood and due consideration taken to it in the organization. WANSINK and ULBRICHT (7) point to the psychology literature and mention that motivating factors for creative people are "self-actualization", i.e. the fulfilment of an individual's potential, and "job content (interest and pride in the work), freedom to initiate (responsibility), opportunities to grow, and demanding tasks" (7, p. 6);BLUME (8) in his review article (well worth reading) goes through studies on motivations of scientists. From this it can be seen that at least two lines of thought exist. One of them is stressing that "the professional esteem is the only reward which the scientific community can offer its members" (8, p. 46). If this is so, these authors argue, a number of conflicts appear when the scientist works in an organization with goals other than these professional ones. Examples are conflicts over goals, over control of job efficiency, over incentives and over the influence which scientists have in the organization. The solutions of these conflicts require accomodation, t.e. modifications of the demands made upon the organization by the scientists, or vice versa, or a mutual compromise (8, p. 49).

According to another line of thought identity of values is not to be found among scientists. Some of them are committed to the norms and values of pure science. Others are anxious to devote themselves to research, but are less concerned with making a reputation outside the organization they belong to on the basis of published work. Others, finally, lack the commitment to science and are anxious above all to make an adequate living and are likely to be involved in research only in so far as it fits in with this personal goal (8, pp. 52 - 53). In his review BLUME (8, p. 53) finds the latter line of thought particularly useful as a model for explaining many of the attitudes of scientists working in "Large R & D organizations".

All this will be sufficient to indicate that the motivation of the scientist has many dimensions which very well might have individual overtones. Successful accommodations of research organizations to the motivations of those scientists they want to keep is not only an important feature of research administration but also requires adjustments of various types to different persons.

2.5 Organization of the research environment

Much of what has been said earlier under the heading "flexibility ..." is relevant here too, and will not be repeated. I will instead give a cursory account of what BLUME (8) says under the subtitle "The productivity of Scientists". He himself summarizes his review under this section in the following way:

"A few general prescriptions for effective research performance seem to follow from this work.

1. Organizations should stimulate the commitment to science of their personnel by demonstrating their appreciation of scientifically valuable research. Scientists should be encouraged to draw up plans of work, write papers, present their findings to staff colloquia. Considerations of purely scientific quality should clearly count, together with supervisor evaluations, in decisions on promotion.

2. A participative style of management, in which research objectives are determined by supervisors and scientists in concert is best of all. Though many scientists may claim to want to be 'left alone' they actually profit substantially from the knowledge that others are aware of, and interested in, their work- and, indeed, from a certain pressure.

3. Communication is very important to a research organization, and both the flow of information from outside as well as its internal diffusion, should be facilitated. There is some evidence that relevant scientific and technical information tends very largely to enter an organization via a relatively small number of crucial individuals, whose outside contacts, and use of the scientific literature, are much more extensive than average. These individuals serve as prime sources of information for their organizational colleagues. If the 'gatekeepers' can be identified, and their role supported by the organization (for example by encouraging their attendance at conferences), this may yield vaulable dividends. Internal communications should also be encouraged between scientists. Their interaction can be promoted at a technical level (e.g. by providing facilities for the general use of many scientists), or even at a social level: people are more inclined to consult those whom they know. Transfer of individuals between groups can be a useful aid to intergroup communication. Finally, physical planning is important, and since communication seems to be facilitated by geographic proximity groups which must be in contact should be located nerby.

4. Individuals should be encouraged to diversify, both in terms of the areas of their disciplinary expertise, and in terms of the functions which they perform. Full-time and permanent occupation on any one type of R & D function (basic research, applied research, product improvement etc.) is to be avoided.

5. Although no clear answer to the question of wether specialist ('functional') or project group organization is to be preferred may be given, some dissimilarity in the make-up of groups is advantageous. For example, groups can usefully be made up of people differing their career orientations (whether to science' or to the organization), general modes of approach to problems, and so on. Nevertheless a certain amount of 'emotional' support seems to be necessary even for the most creative scientists. Some research administrators feel, probably correctly, that specialist (disciplinary) organization offers such support. (For this, among other reasons, a 'matric' system is frequently to be preferred, in which discipline heads are responsible for specialities, project heads for projects, contracts etc.). The balance between similarity and dissimilarity within a research group as the group ages - and corrective measures may be necessary. However neither the nature of the aging process nor its effect upon performance are as yet clear" (8, pp. 66-67).

2.6 Selection and training of Research Directors and Project Leaders

It is I think of interest to note under this heading what WANSINK and ULBRICHT (7) said on leaderships. They question whether the traditional leader "a strong man, a scientist with authority and will-power" is the right person to lead a research organization when changing research priorities requires narrowing of his own field of action, integration of his institute with others where he will bot be the (only) top man, and coordination of projects in inter-institute projects. WANSINK and ULBRICHT's choice is of a person which "has to have enough scientific experience to know not only what it is the scientists are doing, but what motivates them; the ability to communicate to them what the goals are; to have a real interest in people, in trying to stimulate them to grow within the framework of the organization; and to be able to be flexible he must have enough knowledge of modern management and its techniques" (7, pp. 8 - 9) to make his subordinates feel that they are working in a creative and stimulating environment.

Finally: We are urgently needing an adequate training program for project leaders, the leaders of the multi-discipline teams which have to cross the old frontiers of institutional disciplines. Such a program might include systems analysis, problem formulation training, evaluation procedures to successively sift research alternatives in intermediate criteria of probable success, network techniques for time planning, and psychology to handle scientists of various personality characteristics.

3 Conclusions

The volume of research as well as its importance is increasing in modern society. Many-dimensional QOL-goals are in this society replacing more one-sided GNP-objectives. The growing research sector is not unaffected by structural change. Different groups in society (farmers, consumers, politicians, administrators, scientists) experience and perceive technological change in different ways.

All these are strong arguments for the necessity of clearer formulations of goals and priorities in scientific research. These formulations have to be influenced by the needs of society and its various constituent groupings as these needs are expressed in goals and changes in them over time.

In my opinion, it is possible to create a research sector which will take into account both the objectives of society collectively, and also the working environment of individual creative scientists, in the following way:

We need to set aside part of our research funds for systematic identification of new problem areas stemming from ongoing changes in goals and technology. These identifications are in principle multi-disciplinary and multi-interest-group tasks (2.1).

We need a procedure (or procedures) for formulation of goals for research which includes a dialogue between scientists, politicians and administrators. This process of mutual influencing is one of great delicacy. Fulfilment of society's goals is one pole in these discussions. Stimulating research environments for creative and independent scientists is another (2.2).

It is of the utmost importance that the setting of research priorities and allocation of research funds is carried through in an environment characterized by plurality. One strong omniscient big brother sitting on all the funds has no place in this procedure (2.1, 2.2 and 2.3).

We need to increase in interdiscipline research groups. This can be accomplished by using a "matrix" organization of research. The existing disciplinary departments serve as formal basic organizations. Part of the research funds are directed towards temporary project groups for the solving of specific research problems (2.3).

As a consequence of and a prerequisite for this organization we need to reward scientists for team work. We also need to train them for working in teams (2.3).

Society's changing goals and problems require flexibility in departmental research programmes and adjustments in the individual scientist's research fields (2.3).

We need to match the list of important research projects against the motivations of scientists available. "The right man for the right job" also has a motivational aspect (2.4).

Close attention needs to be paid to the establishment of a creative research environment in our institutes. Features of this are: Participative style of management; Stimulation of an extensive flow of information both from outside and internally; Travels; Change of research areas for individual scientists; Variation of responsibilities, teaching and advisory work; Stimulation of both individual and group research in both intre- and interdiscipline terms (2.5).

We need research directors who are stimulators and coordinators (2.6).

We need more training for leaders of (coordinators in) multi-discipline research teams (2.6).

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