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BUREAUCRATIC TRENDS IN ORGANIZATION
AND INSTITUTIONALIZATION OF SCIENTIFIC ACTIVITY

The title terms of this article are not meant to suggest the inadequacy of models of administrative organization of human work that creates organizational order. The terms are used in their descriptive, not evaluating or pejorative sense; the author only wishes to present some difficulties encountered by the modern organization of scientific activity and present his theoretical reflections concerning that issue.

The notion of bureaucracy is encumbered with associations that evoke emotional attitudes far from objective synonymy. Therefore it is difficult to speak about bureaucracy without attempting to achieve a uniform definition of the range of meanings of that word, if only for the purpose of this article. The emphasis on the importance of that issue becomes particularly useless in the face of trends towards administrative management of scientific activity.

Being aware of the emotional connotation and the tendency to a pejorative interpretation of this notion the author wishes to discuss the two aspects of its meaning:

(1) postulates or instructions in which the notion of bureaucracy is defined as a trend towards rational organization of man's collective activity based on definite principles,

(2) empirically observed deviations from the postulated bureaucratic model connected with the reality of functioning of an institution.

We shall deliberately abandon the analysis of the notion of bureaucracy as a historically formed type of organization bequeathed with the cultural legacy of administration models of ancient states (China, Egypt) as well as medieval or contemporary monarchies. We are interested primarily in the contemporary model of bureaucratic organizations connected with the functioning of institutions carrying out scientific activities. We shall restrict our interest in scientific activity to the coexisting,

though historically formed, contemporary forms of organizations with which the author became acquainted during his research.¹ The confrontation of the postulated and the real models with the organization of scientific activities is to answer the question to what extent the postulates of bureaucratic organizations can be conducive to the improvement of scientific activity.

1. THE POSTULATED MODEL OF BUREAUCRACY

The historical formation of models of social organizations has constituted the subject of sociological interests since the dawn of the epistemological isolation of this discipline. Those who like Saint Simon or Max Weber saw the science of society as a means of shaping reality were interested not only in the analysis of existing models of social organizations but also in postulating models, ideal types which could play a positive and active part in the formation of that reality. Models of organization of social life were born spontaneously. They preceded the trend of rational formation of those models. Due to that, Auguste Comte saw the basic cognitive problem in the social order formed according to "natural laws". In the existing types of social organizations he observed a variety formed under the influence of forces not fully controlled by the intellect of the organizers.

Max Weber was also aware of that phenomenon discovering the danger of dehumanization in expanding organizations based on an impersonal attitude towards targets and in the development of regulating functions which might result in destroying man's individuality; his concept of bureaucracy interpreted by other sociologists has been identified with the efficient organization of the institutionalized activity.²

Therefore, sociologists utilizing the notion of bureaucracy associate its meaning with the following problems of organization of purposeful activity:

(1) Variation and expansion of specialization is defined by means of objective criteria of individual qualifications. The prestige of the particular posts to persons of social merit. Personal values "flawed" the position. Afterwards social consciousness created the belief that it is sufficient to hold the position in order to acquire the prestige, social respect, and the sense of importance. Succession or appointment to a position became synonymous with acquisition of specialization and proper qualifications.

¹ Z. Kowalewski, *Some Problems about Functioning of Scientific-Technological Institutions* (in Polish), in: *Nowatorzy w Zakładzie Przemysłowym*, Ossolineum, Wrocław, 1968.

² R. K. Merton, *Reader in Bureaucracy*, New York, 1953.

(2) Differentiation of the range of competence and responsibility is subordinated to the hierarchic arrangement of posts: the higher the position in the internal division of labour the wider the range of responsibility; the higher the position the higher the qualifications and the range of competence.

(3) Documentation of all procedural elements is made by means of explicit and lasting symbols intelligible to the members and easily submitting to control. This leads to an excessive growth of paper work, office work, documentation work, and posts of controlling and auxiliary functions.

(4) Aims and duties of an institution formulated into statutes, regulations *etc.* define the way of acting in order to achieve the goals of that institution. Independently of those general formulations there exists the necessity for a systematic actualization of norms by issuing detailed rules and regulations to mark off the right behaviours, *i.e.* such that lead to the realization of the aims. Institutional rules and prohibitions are in their substance the subject of the activity, but they also include instructions concerning the attitude adopted towards other individuals that take part in the collective organizational enterprise.

(5) The concept of man involved in processes of organizational cooperation presupposes the emancipation of the role of an official from the other individual social roles. Interhuman relations are based on a rational link of common concern for the subject of activities (in the technological or teleological sense). Personal emotions, individual desires, inclinations, habits, *etc.* cannot influence the behaviour connected with the execution of the function of an employee, member of the organization. Material or objective links (not emotional or personal ones) constitute the characteristic feature of relations between individual members of the organizational system. They are normalized by formally recorded norms and protected with sanctions.

We realize that the postulated model of bureaucracy as recapitulated in these five points is sometimes identified with the concept of formal organizations based on "scientific principles" in contrast to informal and spontaneous organizations.

Its particular elements deal not only with the historically formed organization of the apparatus of power, security (army), or modern manufacturing industry, but also with such branches of human activity as exchange (trade), religion, education, and learning. Though the functioning of a trade organization is subject to the laws of demand and supply it demands a flexibility similar to that required of the army during hostilities, it demands "office" documentation of activities and application of stabilized norms *etc.* Though religious organizations seem officially not to adopt bureaucratic models (fraternities, orders, associations of followers) they have worked out their own bureaucratic apparatus of

very rational features. The army, administration and industry as well as education have worked out their own kinds of bureaucracy. This, however, cannot be said of the organization of scientific activities which are strongly influenced by models of the administrative-industrial bureaucracy.

2. THE FUNCTIONING OF BUREAUCRATIC ORGANIZATIONS

The problem of functioning of modern organizations constitutes the subject of isolated studies in the sociology of organizations — the theory of organization understood as a constituent part of general methodology, *i.e.* praxiology, in economics, law as well as in cybernetics and applied mathematics. The present article deals with the problem only from the sociological-utilitarian point of view.

(1) The specialization and isolation of the individual functions in the internal organization of work lead to the segmentation and quantitative expansion of participants in the activities so that the issue of co-ordination of their joint action demands a still greater isolation of the regulative functions. On the other hand, the definition of the range of qualifications and their subordination to the determined current targets makes the personnel less efficient in new situations which have not been predicted by stabilized models. Simultaneously, the range of specialization and qualifications of various organizational functions is extremely difficult to define accurately. In this case the employee very often becomes an "expert" by the fact of acquiring the post rather than by his qualifications. The different specialities frequently cannot find any "common language", *i.e.* an integrate system of values that would enable a concurrent interpretation of the aims of the institution, its basic targets. In those cases the functioning as such of the institution becomes the most important and explicitly interpreted aim; it results in definite advantages for the participants. But the identification of the institutional aims with the functioning of the institution very often leads to an "organizational mysticism" or alienation where nobody (in the personal sense of that word) realizes the aims according to the recognized systems of values, or to his own interpretations of the aims that had led to create the institution; on the other hand, nobody opposes the execution of redundant activities that are devoid of any rational sense. The real functioning of the institution is then based on an interplay of external forces supporting the institution as a functional unity. Specialistic differentiation acquires symbolic features; the highest real qualifications are connected with the ability to conform to active internal and external factors which oppose and support the functioning of the institution.

(2) The organizational hierarchy based on rational prerequisites of

the range of qualifications, competence and responsibility does not eliminate the influences of the social system of values, non-institutional factors that transfer their own criteria of hierarchy and competence to systems different from them. Thus, the highest posts in the hierarchy of trade and industrial organizations may be held by people with military, administrative and political qualifications because the range of responsibility may comprise not the fundamental but the regulative activities.

The differentiation of the range of competence connected with a great number of those participating in the collective activity leads at the same time to a narrow range of responsibility susceptible to various interpretations which practically has no legal importance. The individual participants are responsible not for the realization of the whole work (or service) but for one of its elements, which, due to "objective" reasons (such as inefficiency of co-operating parties, unpredicted events, or non-standardized features of elements involved in the activity), cannot be achieved. The execution of the target becomes connected with the violation of one's own range of competence. It may be contradictory to the existing division of work and responsibility. The making of decisions whose realization does not depend on specific persons but on the functioning of the whole organization (the autonomous system linked with the whole of the institutional system in the given society) becomes dangerous, because it cannot be linked with the sense of responsibility: the person who makes the decision is not able to secure its realization. In those cases "collective decisions", which exempt from responsibility, are taken. The lack of individual responsibility for the decision made or targets performed shatters the postulate of efficient acting. The effect constitutes a resultant of various forces, not a result of conscious and rational activity subordinated to a logical concept shaped in the mind of a thinking being.

(3) Documentation of the actions connected with an activity must employ elaborated schemes which can be justifiable for those who analyse or supervise the activity. Nevertheless, some activities require documentations which are extremely complicated or even impossible in certain circumstances (*e.g.* when they deal with the process of thinking, learning, analysing, or constructing in one's imagination, manifestation of positive attitudes towards work *etc.*). The documentation of many activities may be so tedious and laborious that it consumes more time than their execution (*e.g.* sometimes filling up bills takes longer than the act of buying, a lecture is shorter than the documentation of its contents, doctor's advice may be shorter than its documentation which comprises description of illness and performances connected with diagnosis, therapeutical prescriptions *etc.*).

Certain specialized activities are subordinated to the technique of

utilizing symbolic documentation which can be understood by a specially qualified personnel. The use of documentation standarts (reports, descriptions *etc.*) legible to laymen demands auxiliary activities that seem redundant or even untrue (unreliable) to specialists. This happens when the central supervisory institutions are unable to take into account the existence of separate techniques of acting in all domains of social life. Besides, the supervision over the adaptation of the particular documentation to schemes may have nothing in common with the study of the purposefulness and effectiveness of activities of the institution — which is the fundamental aim of supervision.

Supervision over performances becomes then an isolated and useless activity which affects both the institutions and the supervised individuals as a form thoughtless importunity and a waste of the most precious and scarce value — time. When treated as an impulse for the efficient execution of tasks, supervision often brings about deviations within the sphere of documentation which submits not to the teleological aspect of institution or to essential needs but to orders exacted by the supervisors (thus competence in documentation for the purpose of supervision and for material needs of the institution leads to what is called “double book-keeping” which in some cases refers not only to financial matters).

(4) The norms of behaviour defined in statuses, regulations, and instructions may be interpreted in many ways. Tendencies for their specification lead to such a great quantitative increase of regulations and instructions that it is practically impossible for the performers to get acquainted with them. Objective situations resulting from the functioning of the given institution in the society, the features of people and objects entangled in processes of organization of work always deviate from the models employed by the legislator in his mind. That is why law does not constitute a sufficient factor of the evaluation and interpretation of reality. Internal regulations and instructions of the institution play a similar role but it is impossible to appoint special regular officials to interpret simple and complex acts of the employees of the institution (though it often happens to be necessary, and then arbitrary and fellow-workers' juries are appointed). The interpretation is usually performed by the superior who passes the opinion on the acts of the subordinate and makes him responsible for them. At the same time subordinates pass opinions on the superior's acts and learn a lesson of an autodidactic and socio-philosophical nature.

The normalization of human behaviour by the most rational instructions formulated by the legislator constitutes a separates cognitive problem; it is a concern of psychology, sociology, philosophy, and the theory of law. Many opinions opposing the possibility of regulation of human behaviour exclusively by means of legal norms can be quoted.

The identification of postulates and aspirations of the legislator with the real motives guiding human behaviours implies a relatively primitive concept of human nature and proves deceptive in many cases.

(5) A similar issue appears while examining the assumption that participation in an organization is connected with the possibility of a full and entire identification with the role of an official; the assumption that there exists a chance to exclude oneself from other social roles which are to be performed within the institution itself as well as outside it. Sociological analyses of functioning of modern organizations show that every employee has to perform many social roles within the same institution. Therefore, in socialist enterprises, he performs not only the role of the institution's functionary but assumes the roles of an expert, a member of political and trade organizations, a colleague, and finally the role of a politically conscious citizen.

Independently of that, every employee's roles of a member of a family group (father, bread-winner) or of the cultural community are esteemed. Therefore, specialized (social, cultural, and educational) institutions within the enterprise are concerned with the satisfaction of needs that arise from those roles.

An employee of an institution does not participate in its life solely as a functionary of a system of organized activity but also as a member of various groups that have their institutional forms both within and outside the enterprise. One may say that the concept of the employees' full identification only with the role of the institution's functionary opposes the very structure of functioning organizations and expectations of those who wish to see labour institutions not only as places of work but also as places for full socio-public, ethical, and educational activities of every employee.³

Sociologists engaged in empirical studies of the functioning of bureaucratic institutions found that the role of a functionary is not interpreted identically by all employees engaged in the process of participation. As a result of his empirical analyses, Leonard Reissman has differentiated a bureaucrat, a functionalist, a martinet, and an "up to the eyes in work".⁴ The first identifies himself first of all with his professional function which is independent of his current performances executed within the institution. The second is conscious of his specialization which he identifies with the performances executed in the institution. He shows a "higher degree of identification with bureaucracy". A martinet identifies himself with the post he holds in the institution;

³ Z. Kowalewski, *Chemists in Polish People's Republic* (in Polish), Warszawa, 1962. See also S. Kowalewska, *Psycho-Social Conditions of Work in the Industrial Enterprise* (in Polish), Wrocław, 1962.

⁴ L. Reissman, "A Study of Role Perceptions in Bureaucracy", *Social Forces*, vol. 27, 1947.

the post being for him the fundamental criterion of evaluation of his hole, and very often, his value. He treats the bureaucratic system of hierarchy and norms as the basic element regulating his life and relations with other people. The martinet is similar to an "up to the eyes in work" who does not identify himself with his professional group but exclusively with the technical aspects of work executed in the institution. For him performances that are determined by the needs of the institution define his role. His aspirations are concerned with possible changes that may give him a chance of acquiring a higher position in the existing hierarchy.

Various types of identification and various types of interpretations of the employee's role and, consequently, of activities related to that, make the analysed institutions appear as organizations which are not submitted to explicit rational criteria. They create social structures which comprise spontaneous as well as rational models of behaviour.

The chances for the participation and interpretation of social roles are different; they depend on the position acquired in work. Expectations in this aspect vary in industrial, technological and design, and educational institutions.

In the analysis of functioning of an institution attention should be drawn to one more aspect, namely, the type of co-operation with which we are concerned.⁵ The postulated model of bureaucracy is practically based on the assumption that positive co-operation is characteristic of human relations. Thus, the concepts of hierarchic structure and of regulation of the employees' behaviours by means of established norms constitute a substantial expression of those optimistic assumptions. Organization theories seem to assume tacitly that we have to do primarily with positive co-operation in all concrete institutions. Dealing with disputes and conflicts constitutes only a marginal issue, it is characteristic feature of states of "abnormality" which should be liquidated.

Positive co-operation appears to be one of the basic conditions for the effective functioning of an organization. At the same time, it is impossible not to note that this postulate is realized partially. Positive co-operation dominates in most human groups within internal organizations where there exist stabilized authorities and internalized norms, whereas relations between individual human groups, various sections, and whole institutions are very often based on negative co-operation — whether it is a potential conflict or a dispute, whether a game, a competition, or a struggle. Relations between capitalist enterprises are based mainly on negative co-operation — competition, often struggle. Relations between socialist institutions assume positive co-operation as their basis but we

⁵ "The positive and negative co-operation" — terms used and explained by Tadeusz Kotarbiński in his *Traktat o dobrej robocie* (Treaty on Good Work), ch. XII–XIII, Wrocław, 1965.

have still to ascertain by empirical studies to what extent we are dealing with positive co-operation and to what extent with various forms of negative co-operation. The analysis has been hindered by the impossibility to define explicitly a "group" or institution as a whole. The cognitive problem consists in the criterion of division between individual units of organized economic activity as well as of the non-economic one. Is it the laboratory, enterprise, group, institute, or the department that constitutes the unit of organized collective activity? Objective and subjective criteria employed for the purpose of that kind of analyses bring about various results: sociological researches inform that social identifications depend on the category of employees we deal with. For the managers the whole enterprise may constitute a unit of collective activity, whereas for white- and blue-collar workers — only their section of work. Relations between individual sections of the enterprise⁵ are very often characterized by negative instead of positive co-operation.

Some types of organized human activity are based mainly on an assumed negative co-operation: those are mainly military and political organizations. Though their internal organization is based on the principle of positive co-operation the necessity to function and to become isolated points to the existence of adversaries or enemies with whom the relations are based on the principle of negative co-operation. Dissemination of models of negative co-operation which are characteristic of those organized forms of human activity is reflected in such phrases as front, vanguard, struggle, mobilization of reserves, which are frequently used or even misused.

Negative co-operation occurs mainly in situations where distinct and contradictory aims exist. Assuming that the existence of positive co-operation is connected with the acceptance of common aims, studies of the teleological structure of particular institutions, of the particular forms of organized collective activity become particularly important.⁶ What elements of that structure are recognized by all participants (employees, members) as common values, and what as distinct ones? Are the aims of a socialist enterprise and a state institution identical with those of their workers? Do particular elements of organized activity have common or distinct aims? What is the range of common and distinct interests? Empirical studies answer those questions. The results of those studies permit to state that the theory of negative co-operation constitutes a branch that has been underestimated by the science of organization. Negative co-operation seems to be more common than positive co-operation, very often it is treated as a "method" of work that leads to common positive effects.

⁶ K. E. Boulding, *Organization and Conflict*, in: *Conflict Resolution*, vol. 1, New York, 1957.

3. THE POSTULATED MODEL OF BUREAUCRACY AND SCIENTIFIC ACTIVITIES

The isolation of scientific activity from other forms of organized human activity becomes very difficult when, on the one hand, the growing social prestige of science prompts us to use that word to describe all activities leading to cognition, and on the other hand, when more and more groups interested, to a certain degree, in that activity are created. To achieve some degree of simultaneity of use of the word "science" and of those activities which could not be called "scientific", it is necessary to note the distinct features of three partly synonymous terms: knowledge, science, technology (technics). The notion of knowledge is inseparably connected with the idea of cognition (gnōsis); but not every cognition can be recognized as "scientific", not every knowledge is scientific (epistēme). Knowledge constitutes the condition for any rational activity. For *homo sapiens* it is linked with each social role performed by man. It is necessary to possess definite knowledge to perform the role of a family member, member of a society, member of an educational or research group, member of an economic group *etc.*

The processes of cognition and learning for man begin as soon as he leaves his mother's womb and end at the moment his central nervous system is injured or damaged.

Methodical observation of all phenomena, logical construction of compact systems of cognition (knowledge), application of research methods worked out as a result of historical cummulation of intellectual output, search for laws, regularities, and correlations change the acquired knowledge into science, and give rise to system of scientific statements.

The boundaries between non-scientific and scientific cognitive activities are not easy to define precisely. Therefore in practice the institutional interpretation appears most explicit.

We speak about scientific activity when dealing with isolated institutions which are recognized by the society as performing that kind of activity. Nevertheless, many simplifications occur because the criteria of selection of scientific institutions are different in various societies, similarly to the variability of criteria in the same society in different historical periods.

Knowledge that has features of a practical skill is usually called technology. Nevertheless, technology is interpreted not as a practical knowledge permitting to perform particular actions to achieve the required target, but, simultaneously, as the functioning of big mechanisms created by man to facilitate the achievement of concrete targets, and satisfaction of needs. Therefore, the notion of technology is closely connected with that of instrumentalization and that is why it has different meanings in such expressions as "technique of war", "technique of writ-

ing", "organization technique" etc., and in "modern technology results in economic development".⁷ In its first meaning the notion is synonymous with knowledge and skill which allow to achieve the given purpose. The second meaning is synonymous with instrumentalization, *i.e.* the exclusive utilization of more perfect and precise tools to facilitate the execution of particular performances or complexes of performances. We may say that the first meaning constitutes a teleological interpretation of technology (as means to achieve the target) whereas the second constitutes an instrumental interpretation (as tools or complexes of tools facilitating particular performances).

By "science and technology" we mean knowledge submitted to methodology and instrumentalization that facilitates all performances, including cognitive endeavours. Apart from the notion of technology, in its instrumental meaning there exists a notion of "technology" as a system of knowledge of production methods and methods of achieving definite targets.

When considered as a system of knowledge, no matter what knowledge, technology is submitted to its characteristic method of cognition, therefore it is very often difficult to distinguish it from system of knowledge defined by the name of discipline or scientific trend. Its methodological problems (*i.e.* cognitive endeavours) constitute the starting point for considerations (not the definition of the subject of cognition or the aim of those endeavours). There remains the controversial issue — what is science and what technology. It was traditionally assumed that scientific activity is engaged in search of the answer to "why?" — in causal explanations of phenomena and facts, whereas the teleological point of view was a feature of engineering and construction, technological endeavours, and practical aims.

If we view the notion of technology from the historical point of view, we may note that it applied to the knowledge which allowed to achieve particular production effects on a mass industrial scale. In this formulation "technological knowledge" is clearly different from scientific knowledge because the latter restricts its concern to cognition; it does not deal with mass application of the effects of cognition.

One should say that the domination of cognitive systems of values constitutes a characteristic feature of science, whereas the domination of systems of values connected mainly with the social applications of knowledge — a feature of technology. But there exists a close link between them: the first constitutes a requisite of the cognitive activity of teleological type and the teleological activity contributes to the formulation of new problems and puts forward questions of causal character.

Scientific activity is linked with technological activity which creates

⁷ M. Weber, *Wirtschaft und Gesellschaft*, Tübingen, 1922, p. 32.

new infrastructures, and consequently, new prospects, as well as with educational activity — instruction and training. Science constitutes also a system of knowledge exercised in various kinds of educational institutions including the problem of learning. In educational institutions learning is connected with the acquisition of that scope of knowledge that has already been arranged into connected with fields still unknown — it deals with understanding the unknown — in the objective or inter-subjective sense (understanding the unknown in its subjective sense constitutes a characteristic feature of every process of learning).

Since its isolation scientific activity has been connected with education because the cognitive aims result from intellectual needs of an individual, but the effects are used by the society which gives it a different, organized form.⁸ In the present social situation there are four basic organizational trends of institutionalization of scientific activity to be mentioned.

The first one is connected with understanding treated as a spontaneous need not submitted to the discipline imposed from outside. The trend resulted in many inventions and was exercised by amateurs in their spare time. Cognitive activity of this type may be submitted to some scientific method but at the same time it may constitute a configuration of various methods because the satisfaction of individual's needs, his spiritual or intellectual development constitute its main aim. That activity may be organized by various social groups thus creating the phenomenon defined in the history of science as an intellectual or cultural atmosphere of particular environments (distinguished geographically and culturologically). Popular-scientific, technical-scientific, cultural and educational associations constitute an institutionalized expression of that activity. That activity is not always *sensu stricto* identified with the scientific activity in the present organization system of social life, though neglecting its values in shaping the intellectual culture may lead to the destruction of scientific culture of a nation.

The second trend in scientific activity is connected with the didactic and educational aims of the society. It is located in institutions of advanced education (colleges, universities). This is the oldest form (institutional and organized) of scientific activity closely linked with didactic activity. Many believe that research activity divorced from didactic activity is useless — it does not contribute to the intellectual or research development. Education, not research activities, which performs auxiliary functions aiding the didactic-educational process, constitutes an institutional target of that activity. Therefore, in the 18th century the institutional forms of scientific activity were aimed mainly at the expansion of systems of knowledge proper, at carrying out research activities sub-

⁸ F. Znaniecki, *The Social Role of the Man of Knowledge*, New York, 1940.

mitted to methodological instructions, regardless of didactic targets.

The third trend assumed various institutional forms, mainly those of scientific societies and state academies. In Poland — the Warsaw Scientific Society, the Poznań Scientific Society, the Lvov Scientific Society, the Academy of Technical Sciences, the Polish Academy of Sciences, and different Research Institutes — of Social Economy, Social Affairs, Culture of the Country etc.

After 1945 the activities of scientific associations became of auxiliary character. The main trend of research activity has been organized in the institutions centralized in the Polish Academy of Sciences. The internal organization of individual research institutes of the Polish Academy of Sciences (institutes, departments, laboratories) is not based on the model though there exist the same organizational instructions. Their form is determined by structure of systems of knowledge as well as by those factors that have led to the institutional expression of cognitive needs.

The fourth trend of scientific activity is also varied but its organizational form is relatively more unified than that of the third trend. It is linked with the non-scientific activities, *i.e.* with economic activity of various types, with education, medical service, and political activity. The isolation of individual research units results from the cognitive and educational needs of institutions concerned with industrial production, tectonics, agricultural health service, and military activities. Considering the character of research activities we may distinguish technological-research institutions, *i.e.* industrial institutes and laboratories, and social-research institutions, *i.e.* institutes, laboratories, and enterprises aiming at the satisfaction of cognitive needs connected with the organization of social life (*e.g.*, Institute of Work, I.E.O.P., Research Institute of Co-operative Organizations). Their structures are based on a common model similar to the bureaucratic organizations which created them. They treat research activity mainly (if not exclusively) as a teleological-practical activity. It has been assumed that the targets of research activities are determined by the teleological structure of institutions subsidizing and controlling the research centre that is to work for them.

Speaking about scientific activity we are not concerned with one ubiquitous model but with many types of historically formed models. Irrespective of whether a scientific activity is of didactic-research or technical-research character, it is subject to a certain sequence of the cognitive process itself which has its own phases independently of the subject of research. They are connected with the isolation of cognitive problems as well with the equipment that is a requisite of solution of the problem.

Institutional organization forms are based on stabilized types of research apparatus, regardless of the problem. They posit a similarity of problems and similarity of solutions. In this case the performance of

creative research works is not always connected with the particular devices possessed by the laboratory. Only long-term works, mainly of technological type, are closely connected with that type of laboratories. Other works require the creation of an "intellectual atmosphere" or an "intellectual home" which constitute the place that concentrates the intellectual efforts of the group as well as the possibility of access to unique devices that may be utilized in the particular phases of the research work. There are justified psycho-sociological reasons that underline the special value of such a scientific workplace linked with a traditional university chair. Research work *sensu stricto* is always threatened with failure. One may spend many years solving insoluble problems; one may make errors in experimenting which may annul the chance to obtain correct results; one may obtain correct results but find too little interest in the problem to publish the results or to use them in the society. All situations of that type are unlikely to provide for any psychic or social satisfactions and may lead to discouragement or even to mental breakdowns.

Meanwhile the social status of the scientific worker is stabilized by the very fact of conveying knowledge already gained and that which is being currently achieved by himself. It increases his prestige in the subjective sense as well as his social prestige — intellectual values get objectivized in those systems where they can be manifested. The exclusively research work cannot provide for such satisfactions.⁹

To many strong individualities, this is no reason for submitting their research work to social expectations. The history of learning provides us with examples of eminent scholars who worked in solitude and who may have neither expected nor received any social forms of esteem during their life. The standardization of research laboratories and of the organization of research concerned with scientific activity can create optimum opportunities neither for the development of the scientist's personality nor for the development of knowledge and its social uses.

Therefore the question whether or not there is a chance for working out organizational models for scientific activities which would help all research workers to achieve the desired effects still remains vital. We should examine the mentioned values of the postulated bureaucratic model.

The rational organization of activity based on the postulated bureaucratic model wants to distinguish the internal division of work connected with specialized scopes of performances submitted to the teleological structure of the institution. The assumption of that organizational instruction for scientific activity requires reflexion, mainly on its teleological structure. In scientific activity (if it remains such) the

⁹ L. S. Kubie, *Some Unsolved Problems of Scientific Career*, in: *The Sociology of Science*, New York, 1962.

teleological structure is fixed, first of all, by the cognitive aims regardless of the functions assigned by its organizers (whether they stress the educational-cultural or the practical-economic, or the political-ideological functions). They may take the receptive form (*i.e.* "objective experiencing of reality") as well as the constructive form ("construction of given elements of reality"; this construction being, at the same time, an examination of the syntheses of laws achieved). The historically formed types of specialization in scientific activity are differentiated not only as regards the method applied and subject of research and the system of knowledge to which the activity is submitted, but also by the existing apparatus and the socio-cultural type of personality of the research worker interested in the research activity. Consequently, analysing the historically formed social roles of scholars Florian Znaniecki distinguished among them the following types: (a) explorers of truth, *i.e.* those who arrived at the rational evidence and conviction about facts and truths as a result of their intellectual activity, (b) taxonomists, who begin their activity by adopting certain truths and then submit facts to those truths which lead to the creation of doctrines treated as equivalents of knowledge, (c) contributors of fragmentary notes who owe their existence to the system of university degrees; their works fall into line with the paradigms represented by a given scholar or a teacher only, (d) "advocates of truth" who develop in the struggle of some scientific school against another, in the struggle for priority of some systems of knowledge, (e) eclectics and historians of knowledge who also emerge in the atmosphere of struggle between schools. Though they find truths in representatives of other schools they are not advocates but erudites, (f) propagators of knowledge. Among them Florian Znaniecki distinguishes teachers, *i.e.* educators and popularizers of knowledge.¹⁰

Independently of what scientific discipline they choose and in what institution the above types of scholars find adequate conditions for their work, they will differently interpret the teleological structures of their institutions. The definition of various types of specialists becomes particularly difficult as far as the postulates of the bureaucratic model are concerned when beside the two mentioned types of differentiation (epistemological and psycho-cultural) we consider the differentiation connected with type of research work (didactic research, technical research). The internal division of work may require an advanced division of performances. The division may be based on the sequence the research process or it may be restricted to an isolation of two fundamental functions: the managerial and the auxiliary (like in most traditionally organized types of handicraft workshops, artistic, medical and scientific work). The organization of didactic-research workplaces is, in principle, based on

¹⁰ F. Znaniecki, *op. cit.*, p. 160.

the differentiation of functions of an "independent research worker" and an "auxiliary research worker". Besides, there are still "engineering-technical" workers as well as technical and administrative workers according to the model of department institutions. In the present organization of work in Poland there are all categories of "research workers" provided for by systems of regulations. That does not mean that the names (titles) themselves correspond to the same functions in different types of institutions. The title of an "auxiliary research worker" does not correspond to its real function in many research institutions; similarly, the title of an "engineering-technical worker" does not mean that the person is not a research worker (especially in department institutions and other establishments where salaries of engineering-technical workers are higher, and their stability more secure).

Tendencies to differentiate organizational functions in scientific activities carried out in accordance with the postulates of the bureaucratic model are by no means represented by a differentiation between categories of workers.

The isolation of auxiliary functions and sets or even entire institutions concerned with scientific activities is best expressed by documentary and bibliographical specializations, by the specialization of information services, statistical techniques *etc.* Specialized functions dealing with particular sections of collective research (similarly to the organization of production) may be differentiated according to the subject of research, type of scientific discipline, or to the method employed. For instance, the modern offices for the study of public opinion and the disseminated techniques of socio-statistical research modelled after them tend to differentiate several specializations (originators, heads of research, technicians who work out of polls, technicians who elaborate the graphical form of polls, statisticians selecting community samples, poll-collectors, codifiers, designers of feature convergence tables, statisticians analysing the data *etc.*). The possibility to differentiate the particular specialized functions in scientific activity is connected with the application of a stabilized organizational-methodological standard. The existing differentiation of particular functions, the specialization, may not contribute to the success of research hindering the achievement of results if the research does not resolve itself into the verification of previously suggested hypotheses but is of an explorative character, and if the formulation and solution of the problem exceeds the previously utilized standards.

Bureaucracy in scientific activity does not consist in the differentiation of the particular auxiliary specializations directly connected with the process of research but with the differentiation of administrative functions connected with the needs of documentation of the activity —

not according to methodological instructions of individual scientific disciplines (each scientific activity is subject to a method which requires the planning and documentation of all performances of epistemological value) but in accordance with the standard of administrative or other non-scientific institutions. Thus a machinery which is not adapted to the requirements of scientific activities is created. It is adapted to the requirements of either financing or controlling institutions or to institutions imposing cognitive problems. The administrative employees engaged in scientific activity do not always represent the role of professional clerks with typical bureaucratic features (in the pejorative sense of that word). Their role in small research units is similar to the auxiliary and technical functions supporting scientific activity, whereas in central institutions where their number exceeds that of research workers (e.g. in ministries supervising universities and colleges, in big department institutions, in the Polish Academy of Sciences etc.), very often they become not the technical aid for scientific activities but a group of employees that have to treat administrative work as the basic one controlling the activity. From the point view of organization theory one may say that the process of change of regulative and auxiliary functions into basic ones and *vice versa* takes place in that situation. That phenomenon becomes obvious when the real, not the postulated, teleological structure of those institutions is analyzed. The aims of individual isolated organizational units of head offices (departments, sections, commissions) are connected with problems of financing, personnel policy, administrative planning and reporting and of the co-ordination of activities. They are run neither by their own research sections nor by professionals trained in organizing scientific activity. The predominance of regulating and auxiliary targets over the fundamental ones cannot produce the teleological structure characteristic of research, scientific, or didactic institutions, instead it produces a specific type of administrative management of science.

The range of competence and responsibility in scientific activity is marked, first of all, by specialization though different from the specialization of a functionary of an institution. Nevertheless, responsibility is not assigned and submitted to the existing system of hierarchy of institutional posts but, first of all, to intellect or to the intellectual (or intellectual and ethical) authorities representing particular scientific specializations. Those differences are firmly stressed by Stanisław Ossowski: "A research worker is a man whose disobedience in thinking constitutes his professional duty. His social service consists in refusing obedience ... to the synod, committee, to the minister, emperor, or to God, while performing his professional activity. If he obeys, and if he changes his opinions at order ... he departs from his duties, the same as an engineer

who either for the sake of peace or for profit, or because of sloth or pusillanimity substitutes reinforced concrete with air bricks or granite with wood." ¹¹

The issue of the range of methodological responsibility differs very much from the range of organizational responsibility in structures of the complex, interdisciplinary and multidirectional character of scientific institutions. The manager and director of an institution who represent, say, mechanics, may be recognized as responsible only for those sections that carry out activities concerned with the methodology known to him. It is more difficult for him to formulate problems and analyze consistently the research work of, say, the physical chemistry or biochemistry units. That is why scientific activity submitted to the system of organizational hierarchy in big institutions carrying out research in various disciplines constitutes a problem of great epistemological importance: the organization of research laboratories, of financing and administration becomes easier, but multidisciplinary institutions which are not submitted to any explicitly defined methodology very often go through crises connected with the lack of component scientific management.

The hierarchy which develops as a result of scientific activity is connected with experience based on intellectual contact — not on organizational supremacy. Very often interpreted as "scientific supremacy" it constitutes an obstacle in the organization of cognitive performances. The notion of "scientific supremacy" defined in terms of separate posts of "directors or scientific managers" may be explicitly interpreted if we relate them to qualifications comprising all aspects of epistemology, not to one-discipline specializations. Those difficulties vanish if scientific activity is carried out by small autonomous units which are called "chairs" at universities.

According to the represented school of thought, every independent scientist fixes the range of his interests and interprets the discipline of cognition isolated in the course of cumulative output of generations of scholars or various research schools. The discipline need not be identical with the interpretation of the particular scholar who represents the same discipline. Thus there is a greater variety of research initiatives in small units than in big enterprises centralized within departments of academic institutions. The relationship between the particular organizational links of no legal status (enterprises, laboratories) and the superior organ (management) differ in the various types of big scientific institutes. If an institute was created as a result of individual or collective efforts of people representing the same "school of thought", it retains its epistemological bonds in spite of its size; individual organizational links constitute a compact system. The teleological structure of such an institute

¹¹ S. Ossowski, *Marxism and Scientific Creativity in Socialist Society* (in Polish), Warszawa, 1957, pp. 92-93.

may be called monolithic. A contrary situation occurs in a scientific institution that by its legal status constitutes a merger of various groups, if it was created as a result of administrative decision or personal endeavours which aimed at creating a new post, granting the sense of dignity or a higher social status for the individual. In that situation managerial posts are created which are means to laying the bases for an administrative instead of an epistemological authority. In order to support their authority managers increase the section of administrative employees who seem not to notice the differences between formal or organizational superiority, and intellectual authority. Those employees gain higher positions in the institutional hierarchy than regular scientific workers who become their "subject". When the "red-tape" process is not controlled by scientific sections, when some scientific workers identify themselves with administration, a particular type of "scientific-administrative" institutions appears. The activities in such an organization resolve themselves, generally, into the organization of auxiliary activities (equipment, conferences, documentation *etc.*) and not of research.

Though they seem to be of monostructural character, other big scientific institutions constitute federations of autonomous establishments in spite of their independent legal status and only one managerial post (director). The role of management and administration appears similar to the organizational function performed by the departments of the Polish Academy of Sciences in relation to the scientific institutions it supervises.

The hierarchic structures of organization of scientific activity are not based on the same system of values as in the bureaucratic model or in empirically studied administrative and economic institutions. Attempts at the centralization of scientific activity create some element of hierarchic structure similar to the administrative one. Nevertheless, this situation results mainly from the fact of adopting alien models instead of the requirements of science.

Scientific documentation is effected by use of a method characteristic of that discipline. It differs according to whether we have to do with collective or individual researches; whether the research requires the subject of observation and results to remain secret for some time; whether the discipline utilizes a code or protocol system. The documentation of cognitive performances is indispensable in every domain; models concerning that issue are of a character common for all groups and disciplines. Sometimes those models constitute an individual separate form — presentation of an individual research laboratory. Independently of institutional organizations forms and technical services (laboratory, documentation, information *etc.*), every scientific activity constitutes a result of an individual emotional and intellectual effort connected with the prob-

lem (teleological aspect) as well as with the method employed to solve it.

An artist as well as a scholar employ instruments of standardized, sometimes unique, forms. Standardized forms of instruments are related to the symbolic as well as material apparatus of the discipline. Unique instruments are connected with individual workplaces that are very often more vital for the results than the standardized apparatus.

What is the individual workplace of an investigator? The method and individual features of personality — processes shaped under the influence of epistemological and social factors, constitute the basic elements. The basic elements of the investigator's workplace comprise, first of all, instruments for documentation of ideas; schemes, plans, suggestions, fragmentary results, sketches, information obtained *etc.* One could say that the individual workplace of the scientific worker resolves itself mainly into the documentation of information of various kinds. No homogenous standards have been elaborated as far as that issue is concerned, but studies of that problem will probably enable the specification of heterogenous forms of technique of work in the preparing, planning, and documentation of activities, in reporting the results *etc.* This documentation is connected with work technique which varies but, at the same time, is readable for a specialist.

Postulates concerning the documentation of activities which are included in the model of bureaucratic organization imply an effort to supervise those activities. Supervision aims at recognizing the stages of implementation of targets and aims. In the case of an economic activity where results may be defined by means of material or financial indices documentation may be helpful in explaining the causes or effects of particular results of that activity, whereas in the case of intellectual activity the documentation of distinct performances may not always play that role; it becomes useful for people engaged in those activities, but supervision, consisting in following the documentation, of results of those activities may prove deceptive. Intellectual processes can be documented only fragmentarily, even the most precise records do not reflect the whole of the process of thinking. It is not necessary to stress here that thought is often expressed differently in speech and in writing and differently in literary or protocol records, and in code.

Documentation in scientific activity comprises information which is explicit and relatively precise only when it is read by a person acquainted with the subject and method used by the scientist in his report, whereas documentation prepared for administrative purposes takes as a point of issue the existence of some indices by means of which it is possible to define explicitly the scientific activity as well as to evaluate its results. Thus, quantitative indices in planning deal with the number of elaborated subjects or the number of books and articles published,

while the total expenses indicate the success or failure to implement the "financial plan". There is no need to argue that kind of indices may sometimes not be informative because they may render erroneous information about activities. The principles concerning the cost and output of articles of standard use transferred from industrial production have been adopted. Comparison of the number of subjects and sums spent by individual institutions cannot be recognized as documentation corresponding to the postulated model of organization of work based on bureaucratic principles but as a transfer of models worked out for different purposes. The effects of scientific activities are doomed to imperfection and shallowness if the intended documentation of performances and effects of every scientific activity by means of those indices (or of their symbols) are not differentiated in accordance with the characteristic features of the particular disciplines.

The norms that regulate behaviours of members of a working group in the postulated model of bureaucratic organization are based on a system of stabilized values — a system of statements of dogmatic character. Norms regulating behaviours in research processes of scientific activities are regulated by cognitive requirements or methodological instructions. Norms dealing with attitudes towards other persons as well as the whole system of science are subject to instructions of the scientific ethos.¹² Scepticism — the conviction that all truths play mainly an auxiliary function in the process of cognition but do not constitute dogmas (apart from the axiomatic systems adopted by deductive sciences) constitutes the main feature of the scientific ethos. The process of cognition does not cease as soon as certain facts are discovered — it is at that moment that it just begins to display vast areas of the unknown. Practical activity aims at filling the existing gaps by accessible means if they only can prove active. The fewer the problems and the more precise the standards governing the activity, the easier and quicker is it to perform the work. Nevertheless, technological studies prove that scepticism is never too far-reaching; it is indispensable because many practical tests must be carried out to achieve a standard of activities that limit the domain of the unknown to a minimum (nevertheless, the most excellent technical achievements "surprise" — designers failed to foresee all circumstances that the apparatus would have to face while already working).

Norms that have been worked out by individual bureaucratic institutions are in force mainly on the premises and within their specific form of activities. Norms of scientific behaviour are of universalist character: research work in radioactivity in Moscow, New York, or Peking cannot be governed by different norms; different norms cannot govern genuine studies of public opinion or studies on the development of per-

¹² R. K. Merton, *Science and Social Order*, in: *The Sociology of Science*, New York, 1962, pp. 16-32.

sonality under the influence of social changes regardless of the political system or the local structure of conditions accompanying the research. The attempts of some scientific institutions to create their own separate norms disregarding the universalist character of either methodology or the scientific ethos must lead to a deprivation (if not distortion) of the obtained results thus making them incomparable with effects achieved in different conditions.

The organization of international congresses, conferences, the exchange of specialists *etc.* protects that universalism. Conferences and international relations are of different significance to employees of non-scientific institutions. They are seldom connected directly with individual work; it is a rare case that they are connected with institutional or social requirements.

The effects of research become common property as soon as they are made known by the scholar. The observation of copyright is intended to protect the interests of authors who have no right to property. The reservation does not restrict the use of the results of the authors' activities. Maintenance of secrecy of research work for a certain period of time has been dictated by interests of the cognitive process. Economic, administrative, or military institutions are based on rights of institutional property and tend to implant those norms to scientific activity. Those institutions act according to their particular interests that, sometimes, encumber the cumulation of knowledge and cognitive progress.¹³ The application of that type of norms results sometimes in treating scientific workers as *institutionis adscripti*. The results of activities are submitted to the particular interests of the group or individuals managing the group instead of to the norms of universalism and "epistemological communism" (*i.e.* collective scientific property).

Thus (legally and fundamentally), it is not scientific problems or the research workers that originate the need to publish results but the institution. It is not the research worker who owns the workplace — it is his institution. The same concerns expenses for research, the formulation of cognitive tasks *etc.*

By accepting forms created outside of science institutionalization brings about a lot of trouble, stealing the time and wasting the efforts of the organizers of that activity.

Adopting models of non-scientific institutions the process of institutionalization of science very often identifies the individual social role of a scholar or a candidate for a scholar with that of a functionary of an individual organizational link for organized scientific activity. Trends towards identification of scientific workers with functionaries of scientific institutions instead with the "institution of science" submitted in

¹³ R. K. Merton, *Civilization and Culture*, in: *Sociology and Social Research*, New York, 1936, pp. 103-113.

its internal structure to epistemological determinants result in many organizational difficulties — with “uni-” and “multi-post” issues, with cumbersome restrictions of creative initiatives in the name of vaguely defined financial aims. That situation requires systematic co-ordinating initiatives. The assumption is often made that the social role of the research worker is similar to the social roles of other functionaries, that the performance of cognitive acts may be limited by time, place, or regulations. Very often it is forgotten that creativity constitutes a result of emotional-intellectual tension — this may be a public act, though it is always personal. The role of scientific workers seems more related to all social roles that are performed irrespective of direct participation in the group but as a result of participation in structures of values and symbolic groups. Those roles extend very often in time and space beyond all limits fixed by the institution. The individual features of personality and the degree of involvement (identification) are more important in the implementation of tasks than in performing specialized functions where strong or long-lasting emotional tensions are not required.

Though all social roles give a chance of full identification and are connected with the process of development of personality, not all of them require full identification and not all of them are conditioned to such a great extent by individual emotional-intellectual development (becoming intellectually and emotionally mature) as the role of a creative worker.

Biographies of scholars show that the treatment of the investigator's social role as the most important role of all very often made difficult the fulfillment of other social roles (family, social, or the citizen's role). This is neither an instruction nor a justification but, still, certain historical regularities (man of knowledge as a full man does not constitute a historical abstraction though this stereotype was less common) cannot be ignored.

CONCLUSIONS AND POSTULATES

The present article is intended to review the problems connected with the need for a rational organization of scientific activity, the need for institutionalization and far-reaching centralization, and at the same time to draw attention to the fact that models of an ideal type and practical models of big industrial and administrative institutions have been worked out and adopted by the organizers of science to a considerable degree. We emphasized the similarities and differences between the postulates of the bureaucratic model and elements of the historically formed model of scientific activity the institution of science — the cultural output and collection of scientific activities.

Let us think about the chances for the creation of rational types of scientific organizations convergent to tendencies of the postulated bureaucratic model but adopted to individual features of science because there arises the need to organize scientific institutions that comply with the condition of participation in the social system of division of work, in the stabilized economic-political system, and in the planned economy including appointment to posts and central financing and supervision over institutions that create the greatest opportunities for creative activity. The existing organization models universalized by economists and administration workers are based on stereotypes not always beneficial for the acquisition of effectiveness in scientific activity.

Effectiveness in activities that do not always result exclusively from positive co-operation (disputes, even conflicts and struggle in scientific work may be regarded as valuable forms of negative co-operative that promote the development of sciences) may be acquired by including specific features of the cultural structure of scientific institutions adapting the model of rational organization. The interpretation of the notion of "specialization" must be connected with the specific character of the activity it concerns. The specificity of scientific activity, and the internal division of work in the individual acting groups require precise analyses including epistemological aspects of the discipline, cultural features of the institutions as well as socio-economis and political-ideological postulates of the institutions co-operating with sciences.

The achievement of rational organization cannot be imagined without analysing science as: (1) a collection of historically formed systems of sciences that make use of definite criteria of individuation of cognitive values, (2) a collection of methodological assumptions of cognitive procedures regulating cognitive performances, (3) a collection of people particularly sensitive to cognitive values and consciously submitting to methodological requirements of their discipline; people involved in institutional connexions but independent and genuine in thinking. The notion of administering science ought to be replaced by the organization of joint action taking into consideration the available knowledge of science as a historical creation of human culture, as a supranational creation in its epistemological sense but national in the pragmatic and institutional interpretations.

Administration is, first of all, a technique of organization, not a form of discharging superiority or power. Therefore, some of the specific notions and models of collective and individual behaviours corresponding to them should be subject to revision. This concerns also many titles and functions, *e.g.* such "specialization" as an independent and auxiliary research worker or engineering-technical worker *etc.* Titles and names should be accompanied by personal models elaborated as a result of certain theoretical assumptions.

The position in hierarchy, ranges of competence and responsibility are closely connected with intellectual output and socio-ethical prestige, not with position in the organizational structure. Position in scientific institutions does not constitute such an important factor of prestige as in other social institutions. The criteria of, evaluation of scientific results can be explicit and precise if they are worked out by methodologists and experts in the epistemological structure of science as well as historians of science that analyse the past achievements and experiences.

Documentation systems play the most important methodological part in scientific activity; their role is different from that in economic or administrative activities, they do not serve to control individual performances but do control their own cognitive processes. Those systems assume a standardized form in many scientific disciplines when submitted to appropriate research techniques. The elaboration of documentary techniques convenient for the needs of research work, especially for the sciences would be of great help to many scientific workers. The sequence of cognitive performances and cognitive values, not the need for external supervision, should constitute the starting point. Standardization in the organization of individual and institutional documentation may be of great help but it should not be based on arbitrary decisions and individual experiences. Rational organization of research activity must not adopt non-rational assumptions.

The behaviour norms regulating relations between people and relations of each of those persons towards the cognitive values represented by a given system of knowledge as well as towards co-members and concerted advantages of institutional apparatus should take into account the properties of the scientific ethos.

The emphasis on the scientific ethos results also from the fact that scientific disputes and differences of opinion that lead to a "struggle" constitute a factor that imparts dynamism, similarly to sport competitions. Nevertheless, it is necessary to observe the rules of the struggle that brings to perfection instead of destroying. Thus studies that take into account the eminence of "negative co-operation" on the scientific ethos and the ethological structure of the particular institutions may prove helpful to understand factors determining scientific achievements. The mere fact of existence and functioning of scientific institutions need not mean that they yield the intended effects. Changes of names of departments, laboratories, centres *etc.*, changes of titles of research problems need not imply real progress in the accomplishment of scientific achievements. This phenomenon is connected with the issue of isolation of the social roles of scientific workers who are prepared to carry out a genuine policy supporting development of science and its utilization for social purposes. The formulation of research problems for the central plan, their priorities (division into priority sections or those

that are supported, tolerated *etc.*) ought to be based on the analysis of cognitive needs resulting from the development of particular disciplines of science, *i.e.* the organization of research activity (treated as the basic activity) as well as the social requirements in terms of scientific problems.

The assumption should be made that every social requirement can be satisfied as a result of scientific studies if it is previously interpreted in terms of the discipline (or disciplines) that is able to offer both the conceptual apparatus and the means (methods) leading to the organization of cognitive endeavours. The adoption of the assumption that science is incapable of accelerating the socio-economic development or the realization of classless society, that the scientific-technological revolution cannot constitute a supervised process, that socio-ethical and utilitarian values of the socialist system are not so important as it seemed to many ideologically committed people in the past (therefore the strength of socialism may be threatened) as regards social requirements and research plans resembles renouncing science as the basic force and dynamism of modern civilisation giving up the scientific socialism.

If we are inclined to interpret the institutional form of scientific activity not only as constant participation in a definite organized group but also in a macroinstitutional structure (of Polish and international science as a whole) whose spatial and epistemological range comprises the whole country and all isolated cognitive domains, then the organization of research work based on models worked out traditionally by institutions of artistic activities becomes possible. The perfecting of scientific workers and the improvement of the methodological culture should be based on the epistemological structure (criteria of individuation of research problems important as regards the development of a particular branch of knowledge about the world). Whereas the organization of research projects that satisfy social requirements should be based on a system of central planning of socio-economic, political, and cultural development of the nation. The planning of socio-economic and cultural development which is not connected with scientific output cannot fulfil expectations, the same as scientific activity which is not connected with genuine explicit analysis of the needs of the national economy and culture cannot serve fully the cause of development of the nation.