MERTON'S CONCEPT OF THE ETHOS OF SCIENCE

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Merton's norms

According to Merton, the institutional goal of science is to expand the field of recognized scientific knowledge. Merton developed a model for analyzing the external, social and internal, scientific and rational history of the development of science and arrived at the normative concept of the 'ethos of science'. 'The ethos of science is that effectively toned complex of values and norms which is held to be binding on the man of science'(R.K, 1973, p.605). Logically necessary, it explains the success of procedures for justifying scientific knowledge and recognizing this knowledge as good and valuable. The first, the internal goal of science, Merton in connection with methodical rationality, was achieved with the help of the procedural effectiveness of the method, the second goal was the presence of a special scientific morality, in which the knowledge obtained according to the rules is considered correct and well regarded will be correct.

In 1933-1935 Merton worked on his dissertation, 'Science, Technology and Society in Seventeenth Century England', which became one of the first works on the historical sociology of science. Since that time, reflections on science as a social institution have played an important role in Merton's research. The subject of scientific norms was first addressed by Robert Merton in his article 'Science and Social Order' (1937). He gave the main presentation of the concept of scientific ethos in the article 'Normative Structure of Science'. There is no doubt that Merton was influenced by the events of the late 1930s and early 1940s. According to many researchers, the principles of universalism and organized skepticism arose because of analyzing the period of Nazism and Soviet science. First, it was the reaction of the American sociologist to the theory of the superiority of the Aryan race also on Soviet science. Merton was convinced that science can only function normally in a democratic society (R.K, 1973, p.606). In his opinion, the ethos of democracy includes the principle of universalism as guiding and dominant.

The ethos of science, Merton calls it, is an emotionally rich set of values and norms shared by scientists. These norms are expressed in the form of regulations, prohibitions, preferences, and permissions. They are legitimized in terms of institutional values. The ethos of science is created by four institutional imperatives: *universalism, communism, disinterestedness and organized skepticism*. The norms formulated by Merton are usually written in CUDO (CUDOS), from the initials of each of them.

C – 'Communism': This instructs the scientist to transfer the result of his labors immediately for general use. Scientific discoveries are the product of social collaboration and belong to the community. They form a common property in which the share of the individual 'producer' is very limited. In fact, there is no such thing as 'ownership' in science. The tradition of the same name does not grant the discoverer any exclusive rights or privileges to use this discovery. A scientist's need to make some use of his intellectual 'property' is satis-

fied only by the recognition and respect he receives as the author of the discovery. The result of the research is public property and should be accessible to everyone. Researchers must see themselves as contributors to the general database of the scientific community. Results should not be withheld from other researchers; they should be published in full as soon as possible.

U - 'Universalism': The reliability of new knowledge is determined by impersonal criteria, adherence to observations, and previously confirmed knowledge. The value of a scientific contribution does not depend on the nationality, class or personal qualities of the scientist. Universalism means the independence of the results of scientific activity from the personal characteristics of a scientist who makes a further contribution to science. Limiting the progress of science based on anything other than lack of scientific competence is direct harm to the development of knowledge. Universalism manifests itself in the proclamation of equal rights to study and a scientific career for people of all nationalities and social status. It determines the international and democratic character of science. The evaluation of a scientific result should be based solely on an extra personal criterion, without prejudice to the researcher's ethnic or racial origin, gender, scientific reputation, or affiliation with a scientific school etc.

D – 'Disinterestedness': The striving of scientists for priority creates a kind of competitive environment in science. Such a situation may require some special measures that are specifically taken to outshine the opponents. These actions can distort the normal course of the study and accordingly the results. This norm instructs the scientist to build his activity as if he had no other interests than understanding the truth. Merton presented the disinterestedness requirement as a warning against measures being taken to achieve quicker or broader professional recognition within academia. In general, this disinterestedness, in its broadest interpretation, asserts that it is unacceptable for a scientist to adapt his or her professional activity to the goals of personal gain. Researchers should be emotionally detached from their field of study and seek the truth without initial prejudice. In addition, research results should not be influenced by non-academic interests (e.g., religious, political, economic, personal).

O (OS) - 'Organized Skepticism': This is both a methodological and an institutional norm. Merton himself viewed the organized skepticism towards the method of natural science, which requires detailed objective analysis in relation to each subject and precludes the possibility of uncritical acceptance. There is nothing sacred to science that is safe from critical analysis. At the same time, the norm of organized skepticism is also a policy requirement for scientists. The norm of skepticism directs the scientist to question both his own discoveries and those of others, and to publicly criticize any work he finds flawed. The imperative of organized skepticism creates an atmosphere of responsibility and institutionally reinforces the professional integrity of scientists prescribed by the norm of disinterest. Researchers must not only criticize the work of others, but also their own work. Potential sources of error, doubts and gaps in research should be exposed publicly, and the scientist should be his critic. The above combination of norms represents the goal of science, the advancement of scientific knowledge, and the norms are a means to achieve that goal. The scientist must do what is useful for science.

According to Merton, the norm system plays a functional role, scientists accept it as a guide to action, as an internal environment, when the goal of their scientific activities does not differ from its institutional goal, the development and accumulation of certified knowledge. The scientific ethos is a necessary condition for the existence of normal science. The study of the ethos of modern science, according to Merton, is only a limited introduction to

a more complex problem, namely a comparative study of the institutional structure of science. Its institutional goal is the dissemination of certified knowledge(R.K, 1973, p.269).. Institutional morality arises from the aims and methods of science.

Merton is considered the founder of the 'behavior' approach, since he was the first to shift the subject of the sociology of science from the realm of the products of scientific activity to the realm of that activity itself, from the realm of knowledge to the realm of cognition, while the cognition process as an activity is considered according to rules. Attempting to state these 'rules' in an explicit form more clearly than they exist in the minds of members of the scientific community is of great credit to Merton. His ideas proved to be very contagious. Bernard Barber, Norman W.Storer, Warren O.Hagstrom, and others who developed the original Mertonian proposals founded an entire school in the sociology of science. It should be admitted, however, that all norms of ethos are designed to ensure the quality of the product of scientific knowledge. In the ethos of science, Merton did not take into account the personal motives and needs of the scientist, his concept was based on the rationality of scientific ethics, in science they do what is useful for their development.

Development of ideas (CUDOS +) and sociological ambivalence

In 1952 Bernard Barber's book 'Science and Social Order' was published with a foreword by Merton. Barber analyzed in detail the relationship and mutual influence of science and society. As the author noted, 'Science is not only dependent on the surrounding society ... but conforms more closely to some types of social structure than to others'(Barber B, 1952, p.63). Barber regards the state of science in the Nazi German Reich and in the Soviet Union as examples of deviations from generally accepted norms in science.

In his opinion, science cannot only be built up from technically rational operations but must contain certain moral values and be subject to clear ethical standards. No matter how immoral the means of achieving the ends of science may sometimes be, moral values are constantly present, if not always consciously, in the daily practice of scientists (Barber B, 1952, p.84-85). Values, Barber believes, are close in spirit to the norms of science (Barber B, 1952, p.62-66). They are implemented differently in specific communities. In his opinion, the idea of considering scientific norms as a special virtue of scientists alongside the values of society is moral provincialism. The achievements of science and the success of its ethos promote adherence to moral values throughout society (Barber B, 1952, p.85).

In a series of papers from the late 1950's and early 1960's, Merton moved to the task of investigating not what a scientist should do but what he does. The idea of the norms and values internalized by a scientist because of his dedication to science remains, but now the 'pathology' of science deals with the consideration of competition, distrust, envy, covert plagiarism, etc. According to Merton, the Pathology of science contributes to the motivation of the scientist, creating 'ambivalence', the duality and contradiction of motives and, accordingly, of behavior. In examining priority conflicts and multiple discoveries, Merton 'was convinced that actual relationships among scientists differed significantly from accepted norms'(R.K, 1976).

The idea of the 'sociological ambivalence of scientists' is that in their daily professional activity they are constantly in tension to choose between potentially conflicting requirements of prescribed behavior. All of this creates real and potential contradictions and situations that are close to contradictory. To describe the real world behavior of scientists, Merton introduces, in addition to the norms of scientific ethos, nine other pairs of mutually opposed norma-

tive principles. The idea of 'sociological ambivalence' is that scientists, in their daily professional activity, are constantly in tension to choose between the polar imperatives of prescribed behavior. So, the scientist:

1. The scientist must be ready to make his newfound knowledge available to his peers as soon as possible. But: He must avoid an undue tendency to rush into print.
2. The scientist should not allow himself to be victimized by intellectual fads, those modish ideas that rise for a time and are doomed to disappear. But: He must remain flexible, receptive to the promising new idea and avoid becoming ossified under the guise of responsibly maintaining intellectual traditions.
3. New scientific knowledge should be greatly esteemed by knowledgeable peers. But: The scientists should work without regard for the esteem of others.
4. The scientists must not advance claims to new knowledge until they are beyond reasonable dispute. But: He should defend his new ideas and findings, no matter how great the opposition.
5. The scientists should make every effort to know the work of predecessors and contemporaries in his field. But: Too much reading and erudition will only stultify creative work.
6. The scientists should pay scrupulous attention to detail. But: He must avoid the excessive accuracy of the pedant, fastidious only when it comes to inconsequential.
7. Scientific knowledge is universal, belonging to no nation. But: Each scientific discovery does honor to the nation that fostered it.
8. Scientists should recognize the prime obligation to train up new generations of scientists. But: He must not allow teaching to preempt his energies at the expense of advancing knowledge. Of course, this is just as persuasively in reverse.
9. Young scientists can have conditions other than being apprenticed to a master of the scientific art. But: They must become their own men, questing for autonomy and not content to remain in the shadow of great men(R.K, 1976, p.33-34).

The ideas of ambivalent standards that determine the real behavior of scientists, and moreover the detailed elaboration show Merton's real attitude towards the basic norms of scientific ethos. He understood that the behavior of any scientist in any situation is primarily determined by his character, personal experience, scientific and social intuition, etc. Real actions are contradictory, and there will always be one of two opposite formulations, retrospectively confirming the correctness of the chosen path or its error in his concept, the most important idea is not the opposition of polar norms as interpreted by individual studies, but the idea of the functional value of the tension between these norms.

Rebirth - John Ziman's system of norms

John Ziman, a British physicist who has become an influential researcher on the problems of science, notes that there are two scientific communities, the traditional academic and the new post-academic, that have gone beyond the framework of scientific laboratories and work closely with them Government, industry, financial structures. In 1994 he proposed a system of norms that he believes characterizes post-academic scholarship.

In a 1998 article, 'Why must scientists become more ethically sensitive than they used to be?' Ziman writes that academic scholarship was almost an anarchist's dream, that reliable public knowledge was produced by an active, orderly republic of free citizens with no central government. The knowledge functioned through a set of established practices such as peer review, respect for pioneer priority, citation and reference to the bibliography, promotion based on scientific advances, etc. Although these practices were never codified or system-

atically introduced, they functioned effectively. According to Ziman, Merton's analysis was overly idealistic, but his 'concept provides the best theoretical framework for understanding how these practices interact to produce knowledge that we call purely scientific'(J, 1998).

Ziman decodes Mertons CUDOS as follows: Community - 'the fruits of academic science should be regarded as universal knowledge', Universalism - 'contributions to science should not be judged by race, nationality, religion, social status or any other irrelevant criteria'. Disinterestedness - scientific claims must be free from 'personal and social factors which may affect the research initially and its final result'. Originality - 'every researcher must bring something new to science' and skepticism - a careful examination of the research results in order to answer the question, 'Which conclusions can be trusted and which should be challenged?' (J, 2000, p.33-42).

The list of norms proposed by Ziman is a neosystem of scientific ethos, an attempt to develop Merton's concept. Ziman's system PLACE: Proprietary, Local, Authoritarian, Commissioned and Expert work. He believes that these systems are so simple and clear that they need no explanation. They reflect the activities of modern organizations engaged in research and innovative development. According to Ziman, their ethos is incompatible with academics. Ziman says many of the professional challenges that arise in academic research can be interpreted as a practical confrontation between the implicit requirements of CUDOS and the more explicit principles of PLACE. In some circles it is believed that the latter ethos has completely replaced the former in the process of modernization and rationalization.

The two systems of standards reflect different typologies of a scientist's career. If Merton's system is linked to an individual career in search of recognition and prestige (CUDOS), then Ziman's system of norms is linked to an organizational career, an attempt to achieve the highest possible place in the organizational hierarchy.

At the core of Ziman's book Real Science (2000) is the decision to view Merton's social norms as conforming to a particular epistemic organization of science (J, 2000, p.33-42). Most important, according to Ziman, is the interplay of social norms and epistemology in the way epistemological norms are generated from, and in turn shape, the institutional activities governed by the norms of CUDOS. This, according to Ziman, is 'the least discussed but most powerful sociological feature' (J, 2000, p.237).

of academic science. He tried to explain how important it is to know the essence of these processes as a basis for understanding the institution of modern science.

Merton's CUDOS	Ziman's PLACE
Communism - The results of labor belong to everyone	*Proprietary Work* - Work subject to specific ownership
Universalism - scientific result should be based solely on an extra-personal criterion	*Local work* - Working to solve local problems and reward them appropriately
Disinterestedness - Research results should not be influenced by non-scientific interests.	*Authoritarian work* - work defined by the manager
Organized Skepticism- Researchers need to criticize not only the work of others, but their own work as well	*Commissioned work* - Custom work
	Expert work - skilled work

Conclusion

Robert Merton was a primary in many areas of sociology, including the sociology of science. For Merton, the realities of scientific life are one thing and scientific ethos is another. It derives from the aim and methods of science. Everything that is rational for the functioning of science is accepted as the norm.

Merton's scientific ethos is an ideal model for the scientific activity of classical science. In his paradigm, knowledge of nature does not carry a subjective component, it depends on the object itself and can be verified empirically, hence the norm of universalism. Adherence to the principle of universalism, both in relation to people and to science, is beneficial to the movement of knowledge. Knowledge grows in proportion to the amount of knowledge already held, meaning that as the amount is replenished faster, the rate of growth increases, hence the norm of Communism. To balance trading and ensure the quality of scientific contributions, a norm of organized skepticism is introduced. All established rules apply while preserving the autonomy of science, whose only purpose is the reception and accumulation of truths. The norm of disinterestedness steers scientists in the desired direction.

The main merit of Merton is a clear explanation of the core values of science and the ideal principles of scientific activity corresponding to them, as well as an unshakable confidence in their effectiveness. This confidence gradually entered the collective consciousness of the scientific community and is still an important part of the mentality of people who sincerely devote themselves to science, especially as a creative search for new knowledge.

The search for the right ethos in science has once again highlighted the dilemma between theory and practice. Perhaps the model proposed by Merton is just an abstract construction that cannot be obtained directly from observations, the result of logical deduction, and a means of deriving new sociological theorems. If Merton started out with a project, the construction of a certain ideal type, without later trying to operationalize it, then many other researchers chose the opposite path. Perhaps the task of finding genuine ethical norms simply does not have a solution for a single scientific community, or there are multiple such solutions.

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Abstract

Science is not only a system for the development of knowledge, but also a field of activity of a certain professional community, one of the social institutions of society. Science as a social institution and as a field of activity has become the subject of sociology of science, whose emergence as an independent specialty of Western sociology dates back to the early 1960s. Merton answered the question of the social conditions and prerequisites for the Formation of a normative and ethical core of modern science. The most important conclusion is the thesis that scientific knowledge is public and not private.

R. Merton proposed a systematic sociological study of scientific activity, developed based on a fundamentally new analytical concept. His general scheme of considering science as a social institution made it possible to build a system of theoretically coherent empirical research and study scientific activity as an integral phenomenon. The main mechanism that determines the functioning of science is a set of norms that apply in the scientific community and regulate the professional activities of scientists. R. Merton is considered the founder of the 'institutional' sociology of science since the main thing in his concept is the development of the idea of science as a social institution.

The development of the concept of the scientific ethos created by Robert Merton and his followers is an interesting object for analysis as an expression of science intended to determine the laws by which the scientific community lives and certified knowledge is created.

Товч агуулга

Шинжлэх ухаан бол мэдлэгийг хөгжүүлэх тогтолцоо төдийгүй нийгмийн институтуудын нэг болох тодорхой мэргэжлийн нийгэмлэгийн үйл ажиллагааны талбар юм. 1960-аад оны эхэн үеэс өрнөдөд шинжлэх ухааны талаарх социологийн судалгаа эрчимжиж, шинжлэх ухааны социологи бие даасан салбар болж хөгжсөн юм. Р.Мертон орчин үеийн шинжлэх ухаанд баримтлавал зохих ёс зүйн үндсэн норматив зарчмыг боловсруулах эхийг тавьсан. Түүний хамгийн гол суурь зарчим нь шинжлэх ухааны мэдлэг хувь хүнийх байх ёсгүй харин нийтийн хүртээл байх ёстой юм.

Мертон аналитик үзэл баримтлалд тулгуурлан шинжлэх ухааны үйл ажиллагааны социологийн систем бүхий судалгааг санал болгосон. Түүний гаргасан ерөнхий загвар нь онолын хувьд уялдаатай эмпирик судалгааны тогтолцоог бий болгох, шинжлэх ухааны үйл ажиллагааг нийгмийн салшгүй үзэгдэл болох үүднээс судлах боломжийг олгон, шинжлэх ухааныг нийгмийн институт болгон авч үзсэн. Шинжлэх ухааны үйл ажиллагааг тодорхойлдог гол хүчин зүйл нь шинжлэх ухааны орчинд судлаачдын үйл ажиллагааг зохицуулдаг хэм хэмжээний цогц юм. Шинжлэх ухааны социологийн салбарыг үндэслэгч Р.Мертоний үзэл баримтлалын үндсэн санаа нь шинжлэх ухааныг нийгмийн институцийн түвшинд хөгжүүлэх явдал юм.

Роберт Мертон ба түүний үзэл санааг үргэлжүүлсэн судлаачид шинжлэх ухааны академик мэдлэгийг бүтээх орчинд баримтлах хууль дүрэм, хэм хэмжээний зарчимыг боловсруулахад гол анхаарлаа хандуулсан.