

Modern social system theory and the sociology of science

POVZETEK (Moderna teorija družbenih sistemov in sociologija znanosti): V ospredju avtorjevega zanimanja je pomen moderne družbene sistemske teorije za razvoj sociologije znanosti. V članku se dokazuje, da je šele sodobna družbena sistemska paradigma dala epistemološke temelje za sintezo različnih pogledov znotraj sociologije znanosti. V sodobni sistemske teoriji je navzočih cela vrsta konceptov, ki so pomembni v pojasnjevanju znanosti. Avtor se v članku loteva predvsem analize tistih Luhmannovih izvajanj, naj si bo splošnega epistemološkega ali posebnega sociološkega značaja, ki so tudi sicer naletela na največ kritik in nerazumevanj med družboslovci na Slovenskem. Gre za odnos med individualnim in družbenim, za določitev razmerja med kategorijo razumevanja in pojasnjevanja znotraj njegove metode funkcionalne analize ekvivalentnosti in za pojem avtopoetičnosti.

KLJUČNE BESEDE: sistemska družbena teorija, sociologija znanosti, avtopoetika, epistemologija znanosti, razumevanje in pojasnitev

I.

With his social system theory, Niklas Luhmann not only greatly contributed to the general sociological theory, but to many sociological sub disciplines as well. His contribution to different sociological specialties, e.g. sociology of economics, sociology of law, sociology of education, sociology of religion etc., are all important for the theoretical development of those special fields. In spite of the fact that many critics complain that Luhmann's social system theory is speculative and abstract, it provides the firm heuristic basis for further theoretical and empirical research in different sociological fields. This is true for the sociology of science as well. In the field of the sociology of science, Luhmann's social systemic approach opened many essential epistemological topics. In my short essay, I'd like to comment briefly upon the link between the social system theory and the epistemology and sociology of science. These comments will be elaborated upon as critical answers to the most typical forms of criticism of the system social theory among social scientists in Slovenia. As is noted in the article of Ivan Bernik and Borut Rončević (2001) which is also published in this issue, Luhmann's social system theory has met, in the last decade, with a relatively great response among the social scientists in Slovenia. However, in this response, there was often a very generalized form of criticism, which has repeated out-of-date arguments against modern systemic thinking. I will partially confront those arguments.

Namely, from my point of view, Luhmann's statements concerning the theory of science, which have been elaborated by him in various books, firstly in the work with the title »Wissenschaft der Gesellschaft« (1990), are a rare attempt among the big sociological theorists to create a comprehensive epistemic basis of modern science. Although the sociology of science focused its research interest, from the very beginning, on the whole complex of problems concerning the social and cognitive organizations of the science system, the synthesizing of both perspectives did not occur before the appearance of the modern social system theory. However, in the same way as in the other sociological sub fields, before the modern system thinking, the incommensurability between the micro-sociological action approach and macro-sociological institutional approach was accepted in the sociology of science. As I shall try to show further, the modern social system theory, with its de-ontologised character of the basic categories, succeeded to surmount these classical forms of division. It is possible to state that traditional functionalist sociology of science has formulated the key categories for the analysis of the intra-social dimension in the scientific system, such as the social scientific stratification, scientific reputation, publication channels etc. The sociology of scientific knowledge, so-called ethnography of science, which has emerged in the beginning of the 70s, has supplied the extensive factography about the scientific cognitive praxis in laboratories. Both sociological discourses have tried to accommodate each other, but the productive theoretical coupling was never achieved. The epistemological frame for this coupling has been developed only with the occurrence of the modern system theory of science.

II.

The presentation following up will be limited only to a small part of the theoretical concepts elaborated by Niklas Luhmann. Namely, our primary attention is to address only those concepts in the context of Luhmann's theory, which raise most misunderstandings among the social scientists in Slovenia. Let us begin with the first example. The well-known claims against Luhmann's theory as the theory of antihumanism can often be found among the social scientists in Slovenia. Namely, according to the criticism of this group Luhmann's theory »...should treat the human only as the passive material of social systems« (Andrej Škerlep, 1997:14).

My point of view is opposite: although the German sociologist proposed very clearly a new conception of the basic social element (social systems consist of communication), he does not invalidate the human condition as a given one in all communications and all other processing. He specified very clearly the relation between the social communication system and what he called the »individual consciousness systems« as structurally coupled. The concept of structural coupling is based on the assumption that the social communication system cannot operate without individuals who communicate, but only the message (that is, the action) and not the actor is communicated. The action is expected to have different meaning for the sending actor (Absender), for the receiving actor (Empfänger), and for the social communication system (Kommuni-

nikationssystem), since these are different systems of reference. Luhmann, however, proposed to define communication in terms of the unity of sending information (Information), message (Mitteilung), and understanding (Verstehen).¹

The fact that Luhmann specified social communication as the proper domain of sociology, and sociology as a special theory of communication (the crucial point is that society should no longer be considered as composed of human beings, but as consisting of communications), has important heuristic consequences also for the subject of the sociology of science. In the forefront of scientific sociological investigation were put specific scientific communication networks. Namely, Luhmann had emphasized in different places that every social subsystem is reproduced by its specific network operations and the sociology has the task of specifying the dynamics of these network systems in terms of, for example, functional differentiation, reflexivity, and self-organization.

It is interesting that even some sociologists of science, who are theoretically quite near to Luhmann, complained about the removing of the individual component from the science system. For example, to expose how the modern system theory has missed the role of individuals in the scientific system, Wolfgang Krohn and Guenter Kueppers wrote: “Die Forschungshandlungen werden von Wissenschaftlern betrieben, also von Personen, die forschen koenne. Sie sind die Basiselemente des Wissenschaftssystems. Diese Entscheidung, komplexe und multidimensionale Entitaeten als Basiselemente einzufuehren (die mit Maturana und gegen Luhmann gefaellt worden ist) beruht auf Gruenden, die mit der besondern System – Umwelt –Relation von sozialen Systemen zu tun haben.” (Wolfgang Krohn & Guenter Kueppers, 1989: 31).

Luhmann answered directly against this sort of critics. He called the attention to the fact that social systems, in contrast to human agency, are not physically nor biologically constrained. This circumstances lead to the heuristic productive use of category “selectivity”, which is basic in the explanation of scientific progress. Let us look at his argumentation in the book “Wissenschaft der Gesellschaft”. Luhmann wrote: “Wenn man in alter Weise den Einzelmenschen als ‘Element’ des sozialen Systems Wissenschaft ansieht, fehlt jede Basis fuer die Behandlung von ‘Beziehungen’ oder ‘Interaktionen’; denn weder Beziehungen noch Interaktionen sind Menschen. Man muss also Referenzen einschmuggeln und mit Begriffen operieren, die auf der Ebene der Elemente des Systems nicht abgesichert sind; denn, um es noch mals mit andern Worten zu sagen, kein Mensch enthaelt Beziehungen zu andern als Teil seiner selbst und er kann auch nicht in der Form von Interaktion teilweise auserhalb seiner selbst existieren. Und zweitens fehlt jede Erklaerung fuer das hohe Mass an Selektivitaet (man muss von minimalsten Bruchteilen ausgehen), mit dem das, was physisch, chemisch, biologisch und psychisch im Einzelmenschen ablaeuft., fuer soziale Systeme in Anspruch genommen wird. Diese Selektivitaet ist jedenfalls nichts, was der Selbstorganisation des Einzelmenschen, etwa seinen Intentionen, zugerechnet werden koennte. Verkeht man diese Konsequenzen des Formprinzips der Differenz von System und Umwelt, laedt man sich vermeidbare Ambivalenzen und Widersprueche auf” (Niklas Luhmann, 1990: 275-76).

It could be said that the theoretical advantages of Luhmann's definition of the basic elements of the social system (the basic elements are communication networks, not individuals) are also seen in the recent discussions about the triple helix model. The triple helix is the sociological metaphor to describe the new form of relationships between science, industry and government. Staying in the frame of systemic terminology, in the emerging networks between scientific, political and economical subsystems, scientific communications are no longer performed only in terms of their »true« value as their intrinsic codification, but also in the term of their utility and power as other codifications. The last two forms of communication are no longer extrinsic to the scientific system. The authors of the book »The New Production of Knowledge – The Dynamics of Science and Research in Contemporary Societies« have called this »extension« of communication as the change in the »mode« of knowledge production (see more: Michael Gibbons et al, 1994).

The new mode of knowledge production, which has been described as »Mode 2«, should increase the dynamics and complexity of communications in the scientific system. Namely, Mode 2 operates within a context of application that problems are not set within the disciplinary framework. It is carried out in non-hierarchical, heterogeneously organised forms which are essentially transient. It involves the close interaction of many actors through the process of knowledge production and this means that the relations between different subsystems in the context of the new concepts (The Triple Helix, Mode 2 etc.) are no longer 'rooted' in human beings, but in interactive and reflexive discourses. Or as said Loet Leydesdorff, one of the authors of the Triple Helix Model in the sociology of science: »In the triple helix model, the recursivity of the selections can be supported by computer simulations, so that results can be assessed as valuable even if they are counter-intuitive to the 'natural' systems carrying the network. This 'artificial evolution' is expected to transform the economy at an increasing pace, since it can deal with more complexity than its predecessors.« (Loet Leydesdorff, 2001: 210).

Luhmann's theoretical approach regarding the determination of communication networks as the basic elements of social systems led to a lot of other challenges in the field of the sociology of science. Our intention here is not to retain only these sort of challenges. Our interest is to look at Luhmann's contribution to the development of modern sociology of science from the more general epistemological point of view.

III.

Luhmann was confronted, from the very beginning of his intellectual work, with the need to formulate an adequate methodology to discern the complex social reality. It is interesting that the methodological principles developed by him were often rejected as being abstract speculation, even some sort of theoretical obscurantism. From my point of view, the modern social system theory represents the adequate epistemological and methodological ground to surpass narrow empirical positivistic investigations of social phenomena. The epistemology of modern sociology is still too inclined towards

narrow empiricism and not to wider reflexive thinking. The deficiency of the more reflexive theoretical thinking pushes the sociological empiricism, especially in the case of dealing with science and its epistemological structure, into the danger of falling into »irrationalism of concreteness«. Demanding a comprehensive reflexive methodological approach, the modern social system theory has bypassed this danger. Social systemic thinking is counter-intuitive thinking. Guenther Teubner, one of the major experts on Luhmann's intellectual thought, has occasionally used the following illustration: »Luhmanns Buecher sind Variationen eines Themas in verschiedenen Kontexten, das Ausprobieren von Differenzen in verschiedenen Sozialsystemen, staendige Suche nach Isomorphien, so wie man es in Kanons und Fugen der alten Musik findet« (Guenther Teubner, 1999: 23).

The occurrence of proto-sociological elements in this type of thinking leads some sociologists to the conclusion that the most distinguishable characteristic of the social system theory is »its abstractness of abstractness« (Maca Jogan, 1995: 62). From my point of view, it is not justifiable to use this characterization for Luhmann's systemic thinking. At least two important arguments speak against this characterization. Firstly, Luhmann's theory established the important heuristic assumptions for further empirical investigations of different social phenomena. In this theoretical perspective the basic categories (e.g. the category of the social system) are not reified. They remain theoretical constructions based on hypotheses which demand further empirical verification. Luhmann's theoretical conclusions are based much more on the generalization of a set of crossed evidences stemming from various domains of sociological and historical observations than on a priori transcendental assumptions.

Secondly, the so-called heuristic or general methodological »potency « of the modern systemic approach is also approved by its capacity to overcome the traditional division between scientific explanation (Explanation) and scientific understanding (Verstehen). This division has long historical roots. As we know, the first reaction against this division in sociology has been expressed already in methodological writings of Max Weber. This famous sociological classic mind insisted to overcome the disjunction between the nomothetical and ideographical sciences.²

However, on grounds of the development of the method of functional analysis of equivalence, Luhmann revived successfully Weber's methodological principles. In this new form of functional method the analytical figure »problem – solutions of problem« plays the central role. The recursive use of the figure »problem – solutions of problem« can be traced back to the heuristic scheme »question – answer« in objective hermeneutics, however, by pointing out that the method of functional analysis of equivalence is oriented towards searching for more general (social) problems and that the hermeneutic interpretation is directed to the identification of individual phenomena. Luhmann himself, who constantly reflected on the problems of theory-building in the historical terms of philosophy, illustrated the close link between the »question – answer« and »problem – solutions of problem« figures when he used the following definition: »Das Schema Problem / Problemloesung knuepft an die soziale (logische) Unterscheidung von Frage und Antwort an, wird aber (wie auch 'Dialektik' im Laufe der Zeit von

Ramus ueber Kant und Hegel bis Bachelard und Popper) de-sozialisiert.« (Niklas Luhmann, 1990: 422).

In the context of the above mentioned regulative methodological principles, the social phenomena cannot merely be causally explained, but they must also be understood according to meaning (Sinn). Unlike many sociologists, Luhmann was entirely aware that explanation (Erklaeren) and understanding (Verstehen) in sociology should be constantly interrelated, in spite of the fact that both methodological approaches could be launched from the opposite poles of research work.

Luhmann's method of the functional analysis of equivalence contains the second epistemological principle which is also very important for the development of modern sociology (theory) of science. The new method of functional analysis paved the way to the modern post-ontological way of thinking in the theory of science. If we turn briefly to the basic idea of the functional analysis of equivalence, which shifts from causal-deterministic forms of explanations in science, then the best way to use his definition is in the book »Soziale Systeme«, not only on account of the basic role of this work in modern system theory, but also because of the potency of the definition. The method of functional analysis is described here in the following way: »Die funktionale Analyse benutzt Relationierungen mit dem Ziel, Vorhandenes als kontingent und Verschiedenartiges als vergleichbar zu erfassen. Sie bezieht Gegebenes, seien es Zustaende, seien es Ereignisse, auf Problemgesichspunkte, und sucht verstaendlich und nachvollziehbar zu machen, dass das Problem so oder auch anders geloest werden kann. Die Relation von Problem und Problemloesungen wird dabei nicht um ihrer selbst willen erfasst: sie dient vielmehr als Leitfaden der Frage nach andern Moeglichkeiten, als Leitfaden der Suche nach funktionalen Aequivalenten.« (Niklas Luhmann, 1985: 84).

Here, we will not deal with this new methodological approach in detail. Let us only say that in the context of the functional analysis of equivalence, alternatives can be contrasted with what actually happened. In this way the sociological explanation increases its interpretative flexibility. Sociology includes a theoretically unlimited number of logical possibilities. Theory can perceive more, and different alternatives. There are always fewer alternatives in practice than in theory. As we have already said, the method of functional analysis of equivalence has surmounted the classical causal-deterministic form of explanation in science, including the traditional functional analysis which has emerged as a modification of teleological explanation, i.e., of explanation not by reference to the causes which "bring about" the event in question, but by reference to the ends which determine its course. (see more: Carl G. Hempel, 1959; Ernest Nagel, 1961). Luhmann reversed the relation between categories of causality and function. Function does not appear as a particular kind of causal relation. Just the contrary: causal relation is a result of the application of functional order. In this way, the ontological exposition of causality in science has lost its meaning. The ontological exposition of causality is based on the assumption of the causal relation as the invariant relation between a certain cause and certain effect, which meant the exclusion of all other causes and effects. Instead of such a causal-deterministic approach, functional analysis of equivalence takes into consideration only one point (the cause or the effect), investigating

its functional equivalence. There are a lot of arguments for this new epistemological (methodological) position in modern science: every effect has an immense number of causes, and inversely, every cause has an immense number of effects. It might equally hold that every cause has an immense number of other causes, from which ensue an immense multitude of different effects. And finally, every causal process itself can be divided infinitely, or can be extrapolated into infinity.

The method of functional analysis of equivalence, which has been elaborated by Luhmann already before his turn to the theory of autopoiesis, offers a starting point for the development of a post-ontological scientific discourse. A lot of authors agree that Luhmann is the sociologist of our century with a most acute sense of post-ontological discourse of thinking, where stable metaphysical demarcation criteria have no place and where the only differences are events (see more: Jean Clam, 2000; Schulte Georg, 1993). Last but not least, from Luhmann's point of view, society (i.e. social communication) is the self-engendering reality. The condensations of social communication (in meanings, institutions, routines, systems, etc.) are purely circular and have no anchoring in any reality outside. It is very clearly seen in his concept of science as a self-referential system.

For those reasons, the judgments of some of the philosophers in Slovenia, such as those stating that modern systemic approach is the copy of the Aristotelian concept of theory, because "Aristotle's form of actuality was replaced by Luhmann only by a differentiated category of meaning (Sinn), which guarantees the autopoiesis of the social systems (Tine Hribar, 1991: 198), seem misleading. Aristotle's form of actuality is strictly unitary and metaphysical. It is not a self-organizationally emerging operation; therefore it would be difficult to draw a simple link between both theories. In Luhmann's concept of the self-referential system, there is no place for fixed and unmovable principles. There is no longer any Archimedean point from which specific systemic operations should be observed and performed.

IV.

There are three main concepts in Luhmann's theory which play the key role in the modern systemic explanation of science: the symbolic communicative medium of truth, the autopoiesis and the reduction of complexity (see more: Franc Mali, 1994). At this point I will not repeat the detailed reconstruction of all mentioned concepts. Notwithstanding, because the idea of autopoiesis is strongly connected with the post-ontological and de-substantial way of theoretical thinking, let me add in the last part of the article some remarks upon the category of self-referential (autopoiesis) it. It must be clear that the category of self-reference has made an important epistemological shift of the whole sociological thinking concerning subject-object relations. What is theoretically innovative in Luhmann's concept of self-reference, is, that he is facing the problem of how a person can construct a scientific theory considering that one can never be located outside the studied subject. Or as he stated in his book: »Gesellschaft der Gesellschaft«, which is the opus magnum of his intellectual work: »Die Kommuni-

kation ueber Gesellschaft – im anspruchvollsten Fall also Gesellschaftstheorie – aktualisiert eine zirkulaere Beziehung zu seinem Gegenstand: Die Definition ist schon eine der Operationen des Gegenstands. Die Beschreibung vollzieht das Beschriebene. Sie muss also im Vollzug der Beschreibung sich selber mitbeschreiben. Sie muss ihren Gegenstand als einen sich selbst mitbeschreiben. Sie muss ihren Gegenstand als einen sich selbst beschreibenden Gegenstand erfassen« (Niklas Luhmann, 1997: 17).

To the issue of the self-referential construction of scientific knowledge we could approach – as did Elena Esposito (1996) – with the help of the concept of autology. Autology indicates the condition by which the knowing system (scientific theory) itself is one of the objects it has to know: when it describes its objects it then also describe itself, and the description modifies the object to be described. In the context of autology self-referential circularity escapes from the paralysis and implies the operational moment.

To avoid the danger of the theory falling into paralytic tautology and internal implosion, Luhmann grasped at the concepts of paradoxes. The problem of the construction of the theory is for Luhmann to find a way to »use« even paradoxes, taking them as a starting point in these processes of the construction of theories. Luhmann tried to »solve« the main issue of modern epistemology, namely, how can one construct a theory considering that one can never be located outside the studies object, with the help of paradoxical figures.

It is not my intention here to present Luhmann's approach to the complex theory of paradoxes. Let me only briefly mention two points: firstly, Luhmann derived his basic theorems concerning the paradoxical structure of theoretical knowledge mainly from Georg Spencer Brown's protologic theory⁴ and secondly, his theoretical position also had important consequences on the development of the modern sociology of science. None of the theoretical schools of thinking in the field of the sociology of science can put itself in place of the supreme arbiter to judge, what is true and what is false in science, what is rational and what is irrational in science, etc. The modern social system theory of science is an anti-essential and de-ontological way of thinking, in context of which the rational criteria of science exist only for an observer of the science within science, and not by itself, therefore are they necessarily relative and particular. Finally, the entire systemic concept of autopoiesis gives to the idea of the autonomy of science new meaning. This is especially important for recent sociological discussions in post-socialist countries in transition (including Slovenia) because for them the central topic has to be the practical realization of the modern concept of scientific autonomy, which should take in regard the principle of functional differentiation as well as social integration. Although the opposite view is often circulated among the young group of sociologists in Slovenia, there is not doubt that Luhmann's theory of autopoiesis gave an important theoretical contribution to the recent discussions of intermediary structures of science and of all other forms of neo-corporativistic arrangements in modern societies. To conclude, I said in the beginning of my short essay that my intention is to briefly sketch the connection between the social system theory and the sociology of science. My first attention in this short essay was to show that Luhmann's contribution to the

sociology of science should be evaluated primarily from the general epistemological point of view. Unfortunately, this proto-sociological level of Luhmann's theorizing is often subjected to massive misinterpretations. Luhmann's basic epistemological ideas have often encountered on different misunderstandings among social scientists in Slovenia as well. The main difficulty of this sort of criticism is that it doesn't reveal the positive heuristic and methodological elements in the post-ontological and post-transcendental character of the modern social system theory.

Notes

1. It is interesting that some interpreters don't follow, in every case, the same labelling of all three elements in the triadic structure of social communication. For example, the French philosopher Jean Clam speaks about the »impartation« instead of »message« to avoid the confusion in the translation from German to English. »Impartation« has the advantage of replicating with relative fidelity the etymological composition of the German word - an advantage the word »utterance« (adopted rendering in English translations of Luhmann) does not have (see more: Jean Clam, 2000).
2. Max Weber wrote. »Wogegen sich die Soziologie aber auflehnen wuerde, waeren die Annahme: dass 'Verstehen' und kausales 'Erklaeren' keine Beziehung zueinander haetten, so richtig es ist, dass sie durchaus am entgegengesetzten Pol des Geschehen mit ihrer Arbeit beginnen, insbesondere die statistische Haeufigkeit eines Sichverhaltens dieses um keine Spur sinnhaft 'verstaendlicher' macht und optimale 'Verstaendlichkeit' als solche gar nichts fuer die Haeufigkeit besagt, bei absoluter subjektiver Zweckerationalitaet sogar meist gegen sie spricht... 'Sinnhafte' Deutungen konkreten Verhaltens rein als solches sind natuerlich auch fuer sie, selbst bei groesster 'Evidenz' zunaechst nur Hypothesen der zurechnung. Sie bedueerfen also der tunlichsten Verifikation mit prinzipiell genau den gleichen Mitteln wie jede andere Hypothese... Und umgekehrt sind statistische Daten, wo immer sie den Ablauf oder die Folgen eines Verhaltens angeben, welches irgend etwas verstaendlich Deutbares in sich schliesst, fuer uns erst dann 'erklart', wenn sie auch wirklich in konkreten Fall sinnhaft gedeutet sind« (Max Weber, 1968: 437).
3. It does not mean that the entire philosophical tradition was not a comprehensive reservoir of instructive theoretical figures for modern systemic thought. Notwithstanding, in the diachronic and historical comparabilities of theoretical thought it is necessary to avoid the danger of blurring the borders between different theoretical discourses. The analogies themselves remain pertinent as an elucidation only in the case, if they are used adequately.
4. Of course, there are other intellectual sources which had influence on Luhmann's explanation of the paradoxical foundation of scientific theory, among others theories of second-order cybernetics (von Foerster), theories of differences (Spencer Brown, Derrida), theories of emergence medium-form (Fritz Heider), and theories of horizontal meaning (Husserl).

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Avtorjev naslov:

Dr. Franc Mali,
Fakulteta za družbene vede, Univerza v Ljubljani,
p.p. 2547, 1000 Ljubljana,
e-mail: franc.mali@uni-lj.si

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