EKONOMIA ECONOMICS 3(15) • 2011

ISSN 2080-5977

Janina Godłów-Legiędź
University of Łódź

ECONOMICS AND SOCIAL ENGINEERING FROM THE PERSPECTIVE OF THE FINANCIAL CRISIS

Summary: In opposition to the negative connotations attached to the term social engineering in economics, the objective of this article is to call attention to the approach to engineering as a paradigm for scientific research as recommended by Steven L. Goldman. The history of economics and the experiences derived from the most recent crisis confirm Goldman's premise regarding the need for change in the approach dominant in Western science. From this perspective, in following the trail of the natural sciences and accepting a rationalistic-positivist view of science, orthodox economists have squandered the potential embedded in the methodological approach defended by heterodox economists, who are being pushed onto the margins. The engineering paradigm can protect macroconomists against modeling that is isolated from realistic premises.

Key words: social engineering, methodology, mainstream economics, financial crisis.

1. Introduction

"Engineering" is a term that is given various meanings in the social sciences. It is also a source of acute methodological and political controversy. The word stirs negative connotations among proponents of liberalism as well as social philosophers who are skeptical with respect to man's cognitive potential. It is identified with what Karl Popper called "utopian social engineering", which is linked with erroneous assumptions relating to knowledge and human rationality as well as totalitarianism and undemocratic methods of reforming society. Those practicing utopian engineering endeavor to establish an ideal state on the basis of ultimate objectives and as a strictly defined design for society as a whole. Popper argues that a design for the total reconstruction of society is methodologically at fault and politically dangerous. This is derived from the false assumption of accessibility of reliable knowledge and a possibility for the rational planning of the whole of society's life, where its implementation necessitates a strong centralized authority, which threatens dictatorship. On the other hand, supporters of socialism, who stress faith in the progress of human knowledge and the need for far-reaching reform, tie the term "engineering" with designs for perfecting social systems that are just as effective as the introduction of technological progress. Moreover, the term "financial

engineering" became commonplace in connection with the development of financial markets, while the development of new principles of accounting and their creative application gave rise to the term "account engineering".

It would seem that in light of the failure of central planning, which expresses the idea of total social reconstruction, followed by the financial crisis, where financial and accounting engineering played a part, engineering should be completely abandoned by the social sciences. In opposition to this conjecture, this paper shall seek arguments in favour of engineering as a paradigm for science and action. The objective of this article is to call attention to those aspects in the stance of the engineer that are diametrically different from those associated with Popper's utopian engineering, and even to argue that both cognitive value and that of the application of economic research would increase if, in their studies, economists would follow the path of engineers.

2. Why social engineering should not be identified with utopian engineering and why does the concept deserve to be rehabilitated

The first proof is delivered by Popper himself. He stigmatizes the position of the utopian engineer, but recommends a piecemeal engineering method. Bearing in mind the uncertainty of human knowledge, Popper rejects the path of total social reconstruction, but deems the continuous reforming of society vital. He criticizes Marx's concepts in which politics is in third place (after technology and class economic relations) and rather assigns political authority basic importance. He rejects the dogma that economic authority lies at the basis of social ills and argues that the primary source of any and all evil is any form of uncontrolled authority. It is for this reason that it is necessary to build democratic institutions to control economic authority [Popper 1966 pp. 327-328].

The piecemeal engineer believes that a human being is responsible for shaping his or her own fate, but in no way assumes that a quick and total reconstruction of the social world is possible. Unlike the utopian engineer, who is determined to eliminate all existing institutions, the piecemeal engineer gradually transforms the old institutions and plans new ones. "Only by planning, step by step, for institutions to safeguard freedom, especially freedom from exploitation, can we hope to achieve a better world" [Popper 1966, p. 341]. The acceptance of piecemeal social engineering is equivalent to the acceptance of state interventionism. The method recommended by piecemeal engineering requires any intervention to be achieved by indirect means involving the creation of a legal system of institutions protecting the individual. Piecemeal engineering rules out direct (personal) intervention. This is a long-term method, a method of trial-and-error that allows for discussion and continuous changes that experience brings to light [Popper 1966, pp. 330-331].

The second reason is linked to the origins of the term "social engineering". From its inception, this term was tied with the concept of using science and expert know-how in solving problems involving the rational utilization of labor in the company, not the idea of any revolutionary, total, and therefore unrealistic approach to social change. The term was introduced by the Dutch industrialist Jacob C. Marken in his work entitled *Industrial Social Organization*. Marken used the term to call attention to the need to apply specialized knowledge in solving the problems of managing people, just like technical experts solve the problems of managing material resources. In turn, Tolman, the author of *Social Engineering* (1909), wrote that the relations between capital and labour are best described using the word "mutuality", where the development of a spirit of cooperation between capital and labour faced with conditions of growing complexity in social relations requires the application of world experience in the field of labour [Tolman 1909, p. 366]. In his introduction, he wrote that "*Social Engineering* will serve as a handbook of suggestion and guidance for the practical application of the experience of others" [Tolman 1909, p. IV]. Thus, this proposed engineering was not to be based on the constructivist molding of social reality, but on the use of varied experiences, which means it could be in agreement with the liberal trial-and-error method.

The third reason for a rethinking of the meaning of engineering as a method for studying management and ways of influencing economic processes is the detailed examination of the stance and method of the engineer solving technical problems emerging in man's relations with the natural environment, on the one hand, and a critical analysis of the Western philosophy of rationalism and its methodology of scientific research, on the other. This third reason is the most important one and may tend towards a surprising conclusion: the approach of the engineer may serve as a good starting point for criticism, followed by desirable changes in the methodology of economic research. This signifies that the realm of the social sciences has fallen victim to the mistaken understanding of engineering as a method of proceeding applied in the solving of technical problems, which is tied with controversies around the differences between the methodology of the social and natural sciences. In light of its importance, this matter will be discussed more broadly.

3. The philosophy of engineering *versus* the western model of rationalism

Engineering is universally understood as the solving of practical problems on the basis of a direct application of the natural sciences. From such a perspective, criticism of social engineering is based on the argument that the complexity and specifics of social phenomena preclude any direct utilization of a theory formulated on the basis of the social sciences in the shaping of social structures. Nevertheless, man's engineering with respect to the natural world is not based on the direct application of

scientific theory, and it is worth adding that it does not have a tendency to take on the form of total reconstruction of the natural environment. Any such project is difficult to conceive and piecemeal projects by themselves, no matter how impressive, are also often the cause of significant difficulties. What is also controversial is the assumption that the object of study of the natural sciences is less complex than the object of the social sciences.

Engineering is also considered an activity forming a bridge between science and industry as well as between science and industry *and* society. Where science concentrates on explaining the world and is intent on building true theories explaining that which is, engineering is a sphere whose objective is changing the world where the logic of what might be and what is possible is applied. "Science is oriented and determined for 'what already exists;' engineering is oriented by purposes and objectives toward 'what is not existent yet.' Truth is the purpose of Science; to produce useful things and to generate human benefits is the purpose of Engineering. In science, truth is an end; in Engineering truth is a means for generating human benefit and usefulness" [Callaos 2008, p. 5]. The character of this division is not a dichotomy, however. The aims and methods of the scientist and engineers intermingle and are mutually supplementary. Engineering work delivers research material and may provide the basis for testing scientific theories. Science provides the inspiration for action aimed at transforming the natural and social environment. Thus, the postulate stating that science and engineering should not be ordered hierarchically or from the point of view of intellectual value and applicability is legitimate. The difficulties in organizing controlled experiments in the economy and the falsification of economic knowledge cause this postulate to take on a special meaning in the realm of the economic sciences. It would be worthwhile for the economist to take the position of the engineer for more reasons than just that "God put macroeconomists on earth not to propose and test elegant theories but to solve practical problems," as noted by Mankiw [2006, p. 29]. Engineering deserves attention as a method for proceeding in the study of economics, which assumes a strict relation between cognition and action – one that is based on contingency, the creative will, and probability.

Steven L. Goldman proposed just such a broad and, from the perspective of methodological discussions in economics, interesting look at engineering. Goldman presents engineering as one of two paradigms of the rationalism present in Western culture and science. Dominant since ancient Greek times, the paradigm of rationalism is based on necessity, certainty, and universality. Such an approach means that what is absolutely certain and universal is valued and sought, where the source of certainty is infallible reason. At the same time, it is assumed that it is possible and necessary to differentiate between so-called facts and values, where the cognitive process in science assigns priority to reasoning based on deduction and the creation of abstract models. In the paradigm of rationalism based on necessity and universality, a paragon of scientific cognition is mathematics.

This dominant approach is countered by the paradigm of engineering by Goldman, where chance, concreteness, and difficulties in separating facts from values are the primary qualities of the object of study and of human action. Unappreciated in "high" Western culture, engineering is "contingent, constrained by dictated value judgments and highly particular. Its problem solutions are context sensitive, pluralistic, subject to uncertainty, subject to change over time and action directed" [Goldman, p. 163]. The far-reaching difference between science (based on the ruling paradigm) and engineering is that in the case of the former, the truth to which the former strives is singular, while any project implemented within the framework of engineering is always pluralistic, open, and found in a defined context. Goldman argues that acknowledgement of the engineering paradigm and the relevant modification of the methodology of modern science would decrease the misalignment between theory and practice that emerged as a result of the dominance of an erroneous model of scientific cognition.

The difference between the discussed paradigms is also described by cited sets of adjectives portraying cognate concepts tied with the principles of sufficient reason (PSR) and of insufficient reason (PIR). Goldman couples the model of rationality dominant in modern science with PSR, where the model based on randomness is linked to PIR.

Table 1. Two clusters of cognate concepts: the principles of sufficient reason (PSR) and of insufficient reason (PIR)

PSR	PIR
Intellect	Will
Reality	Experience
Knowledge	Belief
Truth	Opinion
Certainty	Probability
Objectivity	Subjectivity
Universality	Particularity
Absolute	Relative
Necessary	Contingent
Deduction	Induction
Abstract	Concrete
Theory	Practice
Contemplation	Action
Understanding	Use
Prediction	Anticipation
Unique	Plural
Closed	Open–ended
Timeless	Historical
Utopian	Contextual

Source: Goldman [2004].

4. Faults found in the methodology dominant in the mainstream economics

A good illustration of the dominance in Western culture and science of the paradigm of rationalism based on necessity and universality may be the situation in economic research as well as in the teaching of economics. Economics also bears witness to the negative consequences of this paradigm. A striving to build universal and irrefutable knowledge in the mainstream of economics has led to a concentration of research on the state of economic equilibrium treated as the result of rational efforts and wonderfully informed economic entities to maximize utility and profit and to ignore the social and institutional conditions of management. Such a direction in economic research, clearly visible as of the marginal revolution, accompanied a growing fascination with mathematics and the progress of formalistic research techniques. Thus, economics itself grew distant from its Smithian origins. The consistent striving to formalize economic analysis and to bring the theoretical-methodological status of economics closer to the natural sciences has resulted in Smith's institutional concept of the market gradually being deprived of social content. The concept of economic equilibrium was formalized and disseminated as a perceiving of economics in line with the definition of Lionel Robbins, which ignores questions of knowledge, coordination, and institutions.[1] This was accompanied by a polarization of economic thinking. In concentrating on building universal models of economic activity, the new orthodoxy has ruled out institutions from its field of research and has become increasingly static and ahistorical, where heterodox economics has gained a monopoly on contextual and institutional analysis.[2]

As time passed, opposition to the progress of the main current of development of economics became the domain of the Austrian school – a school that for both political and methodological reasons found itself outside the mainstream in the wake of World War II. Of these, methodology should be assigned crucial importance. The specifics of the Austrian approach, especially what developed under the influence of the dispute over the rationality of the socialist economy, is based on the underscoring

[1] According to Robbins, "Economics is the science which studies human behavior as a relationship between ends and scarce means which have alternative uses" [Robbins 1945, p. 16]. It is Buchanan's view that the definition forwarded by Robbins has caused economists to concentrate on calculations and optimizations, and has transformed economics into applied mathematics. They have made their object of study abstract human behavior, while human behavior is, in fact, always subject to institutional conditions [Marciano 2007]. Schotter [2008], in turn, notes that the Robbins' definition does not take into account the importance of the ability of individuals to create institutions and leads to the false conclusion that competitive markets are the only coordinating mechanism.

[2] Richard Nelson [2002] must be agreed with when he states that concentration on a hypothetical state of equilibrium and the elimination of institutional aspects and questions of development are manifestations of a narrowing of the intellectual perspective of economics and a moving away from the approach characteristic of not only Smith and Marx, but also of Marshall.

of questions of knowledge, uncertainty, and institutions, as well as understanding equilibrium as a tendency making its appearance in economic processes, not an ideal ultimate state.

The methodological position taken by the Austrian school, especially by Hayek, is similar to that presented by Goldman. Hayek's stress on the limits of human knowledge and questions of uncertainty is in line with the paradigm of rationalism based on contingency as recommended by Goldman. There are also parallels in Hayek's critique of the economic methodology of the twentieth century and those made by Goldman with respect to the Western philosophy of rationalism based on certainty.

On the basis of economic research, two American economists – Roman Frydman and Michael Goldberg [2007] – recently presented the manifestations and effects of the dominance in Western science of the concept of rationalism as discussed by Goldman. The imperfection of knowledge from both the point of view of making economic decisions and in the construction of good models of the economy is at the center of their attention. They stress that the manner in which individuals make economic decisions and the results of those decisions cannot be fully defined beforehand. This stems from the very essence of the creative act (creativity assumes unpredictability) and the fact that individual decisions are not so much dependent on objective and rational premises, as assumed by neoclassic economy, as on individual perception of changes taking place in the social environment and subjective predictions of the effects of those changes [Frydman, Goldberg 2007, pp. 34-37).

Making reference to Weber, Schumpeter, and Knight, but primarily to Hayek, proponents of the theory of imperfect knowledge express their astonishment in indicating the irony found in the fact that over the past thirty years the development of the mechanistic model of economic decision-making was accompanied by a gradual breakdown of the system based on central planning. Contemporary economists creating deterministic models seem not to understand what Hayek and Knight have been arguing, which is that "the dynamism of capitalist economies could not be captured adequately with fully predetermined models that 'can be put on a computer and run'" [Frydman, Goldberg 2007, p. 34]. In indicating such reasons for the failure of economic modeling as the limited knowledge of economic entities, politicians, and economists creating models, the changeability of the economic environment, and the impossibility of bringing down economic problems to a state of quantitative problems solvable by computers, the authors of theories of imperfect knowledge confirm the need for methodological change in the direction of a paradigm, called the "engineering paradigm" by Goldman.

5. Engineering and economics from the perspective of the financial crisis

The discussion relating to the methodological status and condition of modern economics has taken on a new significance as a result of the most recent financial

crisis and the uncertainty of the world economy that is a consequence of that crisis. The crisis has significantly undermined faith in the achievements of the economic mainstream and the resultant authority of economic advisors and experts. Regardless of any diagnosis of the reasons for crisis, the reputation of economics has suffered. What conclusions relating to social engineering have be derived from this point of view? The response depends on the type of engineering being discussed. If reference is made to the concepts of utopian engineering built on the erroneous view that the engineer solving technical problems has uncritical faith in the potential to shape the natural environment and his or her actions involve the simple application of scientific theory, then the financial crisis may be deemed a result of actions inspired by a so-perceived stance on the part of social engineering. However, it should be noted that the appearance of social engineering requires epistemological assumptions characteristic of the paradigm of rationalism based on necessity. The utopian social engineer must assume that he or she holds the whole of knowledge necessary to execute his or her project and that such knowledge and the nature of reality facilitate complete control over environmental transformation. With this as a starting point, social engineering may be seen as the source of actions that led to the depth of today's financial crisis.

Uncritical application of new financial instruments, the creation of new forms of investment funds that promise high rates of return regardless of economic situation, the huge scope of applied financial leverage, and finally, allowing enormous growth on the part of the financial sector, all seem to bear witness to faith in the unlimited potential of human knowledge and control over economic processes. This is what, in the view of Goldman, is the dominant paradigm of Western science. The development of mathematical methods for defining risk and their application may be considered a direct result of this paradigm, as if the use of financial mathematic in some way guarantees victory over the truth that hope for high rates of return on investments must be tied with the need to take on high risk. Faith in the mathematical rigour of tools assessing the risk of financial instruments and the financial assessment of rating agencies created a rather universal illusion that everything is under control, where the actual course of events demonstrated that derivative instruments played a role in increasing the level of risk in the economic system.[3] Innovation on financial markets that promised a lowering of risk led to its increase three ways. Firstly, the use of new financial instruments led to the establishing of new ties in the economic system, thus making the system more sensitive to any changes coupled with the commutation of imbalance. Secondly, the short-sighted conviction that investment risk was lowered thanks to new solutions led to riskier behaviour, a decrease in economic discipline, and an ignoring of budgetary limits. Thirdly, the application of complex mathematical

[3] Numerous opinions of experts regarding the absence of an effective system of control over transactions that is a result of their complexity have been cited in the work of Kutera and Surdykowska [2009, p. 138].

models and advanced technology resulted in direct control over an increasingly complex system by man becoming illusory, where the asymmetry of information suddenly grew and monitoring systems failed to keep up with the rapid development of systems executing transactions subject to a situation of the significant weakening of the functioning of the price mechanism. The source of economic weakness involving a failure to see those consequences of financial innovation may be traced in the erroneous methodology of the creators of economic theory, a methodology flowing from the paradigm of rationalism criticized by Goldman.

A spectacular example of the unreliability of the dominant methodology was provided by the winners of the Nobel Prize for 1997 – Myron S. Scholes and Robert C. Merton – who were honored for developing methods of assessing derivative instruments. They argued that derivative instruments help in solving the problem of asymmetric information and that thanks to unregulated trading in these instruments customers will receive better financial services at a lower cost. In his lecture, Scholes [1997, p. 141] said, "Investment banks no longer merely structure and advise in transactions but instead have moved to a more packaged, integrated, convenient financial-solutions approach, directed at solving the complex problems of their clients around the world. The many advances in financial theory have enabled financial service firms to meet those complex needs more effectively and at lower cost than was possible previously. The marriage of business school and economics departments graduates with engineers, mathematicians, physicists, and computer scientists has led to more efficient and lower–cost financial engineering solutions to client problems".

Here, Scholes expressed faith – rather universal within the main current of economics prior to the onset of the crisis – in the almost unlimited possibilities of solving problems linked with uncertainty and contingency. The quintessence of this faith and the dominant paradigm of the economic sciences, in agreement with the paradigm of the whole of Western science based on necessity and infallibility of reason, is the dynamically developing field of finances known as financial engineering. It is in the context of the crisis and making reference to negative connotations linked with the concept of engineering in economics that criticism began to emerge with respect to not only financial engineering, but also to aggressive account and intellectual engineering.[4] "Utilization of the asymmetry of knowledge and information among the parties on the market to 'disperse' risk favoring one party to the transaction" has been deemed the essence of these various forms of bad engineering [Kutera, Surdykowska 2009, p. 113]. To this should be added the asymmetry between the image held by economists as to their knowledge and possibilities for controlling economic processes and their actual possibilities.

[4] Accounting engineering made its appearance as a result of the need for a balanced appraisal of derivative instruments and the introduction of new accounting standards, especially the concept of fair value. The consequence of this was an increase in the risk of erroneous balance appraisal and an increase in the range of discretion–based decisions [Kutera, Surdykowska 2009, p. 151].

6. The macroeconomist as an engineer

Gregory Mankiw, in calling attention to the role of economists in shaping economic policy, identified three types of tension occurring in macroeconomics: between Keynesians and new classics (1); between engineering understood as the use of economic knowledge as well as the activeness of economists in policymaking, and the directions and achievements of macroeconomics of the past thirty years (2); and between the short- and long-term point of view (3). He noted that economists of a Keynesian mindset demonstrate a greater tendency to concern themselves with consulting and economic policy and that progress in macroeconomic research made by new Keynesians and new classics has had little impact on economic policy and on the manner of teaching of macroeconomics.

In assessing the impact of science on central bank policies, the view that central banking has been strongly influenced by the rules-vs-discretion literature has been strongly negated. In discrediting the impact of the time-inconsistency approach on policy, he argued that observing a drop in inflation throughout the world is not tied to conducting policies based on inflation targeting strategies. As proof that inflation targeting is not a prerequisite for good monetary policy, he provides the example of policies as introduced by the Federal Reserve System under the leadership of Allan Greenspan. Mankiw simultaneously advances the opinion that Alan Greenspan has a rightful claim to be "the greatest central banker who ever lived". He goes on to maintain that "Greenspan proves, contradicting Kydland and Prescott, that central banks can produce desirable outcomes while wielding substantial discretionary powers" [Mankiw 2006, p. 41].

In counterpoising science and engineering Mankiw gave expression to not only his own conviction as to the utility flowing from engineering in its narrow sense, but also a generally positive assessment of economists involved in policymaking, applying the "limited discretion" strategy, who have a rather short-term point of view and fail to keep up with the newest theoretical concepts. "The fact that modern macroeconomic research is not widely used in practical policymaking is *prima facie* evidence that it is of little use for this purpose. The research may have been successful as a matter of science, but it has not contributed significantly to macroeconomic engineering" [Mankiw 2006, p. 43].

The crisis soon demonstrated the shortsightedness of the applied economic strategy and economists involved in it and, at the same time, showed the shortsightedness of Mankiw's assessments, cooling off his enthusiasm for the policymaking activity of economists. Under pressure from the effects of the financial crisis, in considering the relations between the economy and policymaking, Mankiw [2010] maintained that all economists (both those appearing in the role of scientists and those in the role of engineers) should follow the path of the wise advice given by Milton Friedman who wrote: "The role of the economist in discussions of public policy seems to me to be to prescribe what should be done in light of what can be done, politics aside, and

not to predict what is 'politically feasible' and then to recommend it" [after Mankiw 2010].

This is a position that is contrary to the view developed in new institutional economics, which stresses the importance of policymaking from the perspective of transactional costs. Ronald Coase, Oliver Williamson, and Douglass North stress that the terms of transactions and restrictions that politics apply to economic possibilities are just as real as the restrictions found in production technology. Thus, the distributive property of economic and political aspects cannot be assumed. From this emerges that "either the economist must include politics in the analysis from the outset, or the political analyst must redo the economics. If neither party is qualified to assess the pertinent aspects of the other's domain of specialization, the two should collaborate from the outset. A pure economic calculation followed by a purely political one does not appear to be a useful compromise" [Dixit 1999, p. 150].

The position of Mankiw also remains in something of opposition to the convictions presented in the article as to the need for methodological changes in economics to move towards the paradigm recommended by Goldman. A condition for scientific progress in economics that fosters economic development is not the same as the involvement of economists in economic policy (as Mankiw referred to it prior to the crisis) nor the striving towards the creation of an economic theory free of politics (which Mankiw suggested during the crisis). A precondition to progress is a critical look at dominant methodological convictions. Absolute agreement is due to Mankiw on one point: "As we look ahead, 'humble' and 'competent' remain ideals toward which macroeconomists can aspire" [Mankiw 2006, p. 45]. Unexpected by most economists, the crisis has proven this.

7. Conclusion

Looking from the perspective of methodological disputes in economics, from among the various meanings applied to the term "engineering", deserving of special note is the proposal for a broad consideration of engineering as a desirable methodology in modern science – a methodology rejecting the paradigm of rationalism dominant in Western science. Goldman's concept shows that well-known controversies in economic methodology tied with the concept of rationalism apply to all sciences. The history of economics and the methodological disputes it is undergoing confirm Goldman's thesis relating to the dominant approach and its need for change. It seems that orthodox economists are following the path of the natural sciences and have taken up a rationalist-positivist view of science, thus losing the potential found in the methodological approach defended by heterodox economists forced into the sidelines.

The insufficiencies of the approach reigning over the economy have been recently confirmed by the experience of the financial crisis. Thus, what has been confirmed is the need for a methodological concept where the accent is on a continuous interweaving

of action and cognition as well as where limits in the process of cognition and the solving of practical problems as faced by human reason are recognized.

In light of the paradigm-based look at engineering as proposed by Goldman, the scientist or engineer faces no dilemma as described by Mankiw. For the macroeconomist applying the paradigm of the engineering, practical action, the solving of running problems, the observation of tangible reality, and the need to take into account concrete targets and values are all valuable elements of research procedures providing protection against modeling that is bereft of realistic premise. The difficulties facing the mainstream of economics do not stem from the fact that there is a dearth of engineering understood as participation in the molding of economic policy. Difficulties stem from insufficient attention devoted to the realism of the assumptions of economic theory and from insufficient ties between scientific research and social practice, which means a lack of the attitude characteristic of the engineer operating subject to concrete technical and social conditions.

References

Callaos N., *The Essence of Engineering and Meta-Engineering: A Work in Progress*, 2008, http://www.iiis.org/Nagib-Callaos/Engineering-and-Meta-Engineering/Engineering-and-MetaEngineering.pdf.

Dixit A.K., *The Making of Economic Policy. A Transaction-Cost Politics Perspective*, The MIT Press, Cambridge 1999.

Frydman R., Goldberg M.D., *Imperfect Knowledge Economics*, Princeton University Press, Princeton 2007, http://press.princeton.edu/chapters/s8537.pdf.

Goldman S.L., *Why we need a philosophy of engineering: a work in progress*, Interdisciplinary Science Review 2004, Vol. 29, No. 2.

Kutera M., Surdykowska S.T., *Kryzysy gospodarcze a wiarygodność sprawozdań finansowych*, Difin, Warszawa 2009.

Mankiw G.N., *The macroeconomist as scientist and engineer*, Journal of Economic Perspectives 2006, Vol. 20, No. 4, pp. 29-46.

Mankiw G. N., "Crisis Economics", *National Affairs* 2010, No. 4, pp. 21-32.

Marciano A., Value and exchange in law and economics: Buchanan versus Posner, *Review of Austrian Economics* 2007, Vol. 20, No. 2/3, pp. 187-200.

Nelson R.R., *Bringing institutions into evolutionary growth theory*, Journal of Evolutionary Economics 2002, Vol. 12, No. 1/2, pp. 17-28.

Popper K., *Open Society and Its Enemies*, Princeton University Press, Princeton 1966, http://ebook-browse.com/popper-the-open-society-and-its-enemies-pdf-d82881756.

Robbins L., *An Essay on the Nature and Significance of Economic Science*, Macmillan, London 1945.

Scholes M.S., *Derivatives in a Dynamic Environment*, [Nobel Lecture], 1997 http://nobelprize.org/nobel_prizes/economics/laureates/1997/scholes-lecture.pdf.

Schotter A., *The Economic Theory of Social Institutions*, Cambridge University Press, Cambridge 2008.

Tolman W.H., *Social Engineering*, McGraw-Hill, New York 1909.

EKONOMIA I INŻYNIERIA SPOŁECZNA Z PERSPEKTYWY KRYZYSU FINANSOWEGO

Streszczenie: Wbrew negatywnym konotacjom terminu inżynieria społeczna w ekonomii, celem artykułu jest zwrócenie uwagi na zalecane przez Stevena L. Goldmana podejście do inżynierii jako paradygmatu badań naukowych. Historia ekonomii i doświadczenia ostatniego kryzysu potwierdzają tezę Goldmana o potrzebie zmiany dominującego w zachodniej nauce podejścia. Z tej perspektywy ekonomiści ortodoksyjni, podążając śladem nauk przyrodniczych i przyjmując racjonalistyczno-pozytywistyczną wizję nauki zaprzepaścili możliwości tkwiące w podejściu metodologicznym bronionym przez spychanych na margines ekonomistów heterodoksyjnych. Paradygmat inżynierii może chronić makroekonomię przed modelowaniem oderwanym od realistycznych przesłanek.

Słowa kluczowe: inżynieria społeczna, metodologia, kryzys finansowy.