EVOLUTION OF THE IDEA OF SOFT SOCIAL INFRASTRUCTURE: THE LATEST ACHIEVEMENTS

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Abstract

The paper presents a summary of projects devoted on studying social capital and its role in the modern development and in particular on the search of empirical evidence of the formulated by the author in his previous studies hypothesis of the homeostatic nature of soft social infrastructure (SSI). The theoretical construction of the paper is concentrated around the assumption of the existence of two social infrastructures steering the behavior of social units - hard and soft. Soft social infrastructure is assumed to play the role of homeostatic instrument keeping sustainability stable. This metaphor coming from biology allows revealing hidden self-managerial mechanisms with broader scope of influence than sustainability. The features of these mechanisms are outlined; their influence on sustainability is analyzed. The multifaceted character of the problem requires complex approach, which is going beyond the standard analytical methods and looks for more advanced methods of modeling. The aim is to find more adequate explanation of the assumption of the homeostatic nature of soft social infrastructure and its influence on sustainability.

Key words: Evolution of the idea of Soft Social Infrastructure: the latest achievements.

JEL: J24, Q01, Z13.

1. Introduction

The formulation of the idea of soft social infrastructure has relatively long history. Probably it starts with the vague ideas of the role of feedback links in social development [5], passes by the reconsidering the essence of sustainability defined as “intergenerational equity in allocation and distribution of resources, correspondingly the notion of stability is reduced to keeping this intergenerational equity stable during its movement along the sustainability path” [4]. The impressive life within mixed cultures with unusual forms of social capital revealed new facets of the problem. It became obvious that social capital existed within some informal organizational forms, which we defined as soft social infrastructure (SSI). A new veil was removed before our eyes: we started already looking on social units as two-faced Janus.

As a matter of fact, the following objectives have been put since the very starting point of the work on this topic: to outline the link between social capital and sustainability behavior, to test the hypothesis of the homeostatic nature of SSI and to create suitable methods of measuring homeostacity in social systems. The data collection was organized aimed at carrying out structured interviewing of citizens in various cultural settings, phenomenological study of the role of social capital in development, which mean detecting idiosyncratic features of the problems during the interviewing, using factor analysis to outline the basic interrelations, applying maximum likelihood next due to the nature of the data to measure quantitatively the interlinks among the variables and inventing suitable methods of measuring homeostacity. As a result, we expected to find solid approvals of the existence of SSI and its feedback mechanism of self-regulation as an expression of its homeostatic nature.

The paper is organized in the following way: first we shed light on our Janus in terms of the hard and soft social infrastructures. In the next parts we summarize breifly the results of the projects devoted on the search of approval of the homeostatic nature of SSI. We conclude by outlining the future tasks for the forthcoming projects.

2. Two Sides of Steering Sustainability

Following the logic of classical growth models one can expect that social unit (community, firm, nation as a whole) is either on the sustainability path or moving toward it. On the other hand, in the language of complexity theory approach the basic function of the homeostatic mechanism is to keep social unit in the sustainability point at the "edge of chaos", that is between order and chaos. To test this assumption, we have to distinguish between two basic subsystems of feedbacks in social unit, which have different nature and speed of reaction. The first subsystem is based on the juridical rules and is represented by the incumbent institutions: government, parliament, ministries, etc. It defines "the rules of the game" and imposes control over the economic agents for their implementation. In conditions of scarce resources, it naturally ranks the socio-economic targets and defines the priorities in reaching these targets. The signals it sends to the system are as a rule slow due to the administrative and bureaucratic channels they have to pass through, they may be distortive due to political or corruptive interests, and certainly there is a need of time for adjustment. This is the mechanism, which keeps the unit on the side of the order. We call this subsystem hard social infrastructure (HIS). The formal, subordinated to the legal rules management of every social unit is based on this infrastructure.

There is also another subsystem of feedbacks built on the informal relationships among the members of the social unit. In our earliest studies we put social capital in the core of this system [4]. In the next

studies this vision was extended with adding new elements to it. It became obvious that such a system must possess hierarchy with horizontal and vertical dimensions; the signals it sent to the system should be quick to allow a rapid response on all changes (shocks) in the system. If the hard social infrastructure is sufficiently adaptive to materialize them in decisions, these signals must play very constructive role in ranking social preferences keeping the system "on the edge of chaos", that is in the zone of creativity. We define this subsystem as soft social infrastructure (SSI)[1].

Despite the critical elements in this assumption it has several strong sides - it allows representing the institutional structure of social unit distinctly decoupling formal from informal elements. Besides, this is produced independently on the level of aggregation - micro or macro. Thus, all the considerations expressed next can be referred to stability of equilibrium both for micro and macro systems.

The problem of stability of equilibrium is not a new problem for economic theory. Connected with the complexity theory however its analysis reveals new aspects. Due to the restrictions, which exist in various forms, there is always a need of ranking social preferences and giving priorities on those with highest social values. The efficiency of this prioritization strongly depends on the quality of interactions between the two social infrastructures outlined above: HSI – formal (hard) and SSI - informal (soft) infrastructures. As in the formal infrastructure we include the legal, economic, political, and social organization of society following the rules of the official juridical system, the more precise is the mechanism of this structure, the easier is to realize the aim of socio-economic policy in particular to reach sustainability. This seems to be well demonstrated by the established societies. The process of ranking priorities is accelerated when we include the second player – the SSI based on the complex of informal relationships.

The analysis of the interactions between the two infrastructures and in particular the role of SSI is complicated by the inability to construct sufficiently disaggregated model as it is a problem very specific for every unit. Examples are the Balkan and Eastern societies in transformation. As a rule, the transformation process increases the stochastic nature of their behavior and complexity theory seems to be among the best instruments of understanding this nature. On the other hand, we have to note that while the formal infrastructures are distinctly constructed in established societies and the societies in transformation try to adjust some elements of them for their own needs, the informal structures consist of many hidden and specific elements for every single unit and their study is difficult even in the conditions of the established economies. Complexity theory approach, as our experience indicates, seems to trace out relatively reliable ways in finding an acceptable answer.

The assumption of the feedback role of SSI, which helps social units to reach sustainability and keep it stable, is the first step in applying complexity theory for studying such issues. If this assumption can be proved, it would mean to allow the decision-makers taking into account one powerful, natural built-in homeostatic mechanism, regulating behavior of the whole system, which flexible and rapid reaction cannot be reached by formal infrastructure. For example, if the formal infrastructure can formulate the priorities how to reach sustainable point as an aim of social unit and undertakes adequate measures to reach it, unless this is supported by the feedback links of SSI the implementation of these priorities may not be stable. As the experience of the Balkans and Eastern countries passing already relatively long time of transformation indicates, the low quality of this mechanism could be a serious reason for failures to reach sustainable path and to keep stability in the movement along it.

Most of the studies relevant to the topic shed light on the role of trust as a basic ingredient of social capital, which helps ceteris paribus to realize the aims of social unit at the least cost in private and social terms [11]. From this perspective it is palpable that social capital can be generated between individuals possessing some personal qualities, propensities, allowing them to generate trust and thus forming social capital.

To generate social capital, the individuals in a community must be able first of all to mould an informal association and to be able to interact in two aspects: first – to feel they can communicate successfully in terms of sharing their expectations and to assess the pros and cons of the obligations and second - after they expect a success out of such a communication to be able to rank their joint preferences (priorities) to reach a common vision about the hierarchy of this informal association (who should stay on the top). It shows that to outline SSI there is a need to distinguish between its horizontal and vertical dimensions and that to generate social capital the individuals have to possess personal qualities [6] creating preconditions for both dimensions. At this stage we see that social capital has both individual and collective dimensions and to outline more distinctly the collective dimensions we need first of all to see the individual ones.

Many indicators can pretend to represent the social capital in individual plan. Simplifying the puzzle, we restrict ourselves to the following basic qualities:

[1] It should be kept in mind that similar category is also used in other social studies, where it has completely different meaning. See for example: Haughton G and Allmendinger P (2007), Thames Gateway Social Infrastructure Framework. Hurdles and Barriers, (2006).

- marginal propensity to help other people (MPH) needed for creating horizontal aspects of the informal association
- marginal propensity to recognize the natural leader (MPL) needed to create vertical aspects of the informal association to reach consensus in ranking social preferences [13].

To understand the pre-conditions under which an individual has the qualities to generate social capital we need to outline how the initial level of expectations and obligations possessed by the individuals is produced. This is the starting point of generating trust.

At this point we can summarize that to stay on the "edge of chaos" in reaching intergenerational equity in the allocation and distribution of resources high quality of the formal and informal social infrastructures is required. The problems are complicated by the fact that although interrelated, the principles they are constructed upon are very different, correspondingly the approaches of their study are also diverse. The reference to the system dynamics modeling seems to allow incorporating the feedbacks in the analysis, outlining the causalities and capturing both linear and nonlinear relationships into systematic interactions. Nevertheless, the different nature of both infrastructures restricts seriously the finding of common points between them.

To understand how social units, move to the "edge of chaos" we need to start with the fundamental problem of the formation of informal relations. As it was indicated above in our early studies [4] we put trust and its child social capital as core building elements of the feedbacks, omitting in such a way the explanation of how they are generated. Both trust and social capital are secondary, not primary elements in this process. Besides, social capital has not only collective, but also individual dimensions. The start of generating social capital needs at least two persons possessing given personalities, that is, having a kind of "human" capital, regarded in a very general way - not only within the traditional framework defined by the economic theory as skill, knowledge, and experience, but also including into it health and value system [3].

At this point we need to leave the purely economic categories and to enter into the psychological, ethical and other issues, which exacerbate the problems further. To apply complexity approach and in particular system dynamics modeling and to facilitate our considerations we extend the vision of human capital including into it the value system of the individuals. In our previous studies on this problem [3] we assumed that human capital is formed not only by education, accumulation of skill and experience (learning by doing), but also by means of two other fundamental forms of capitals determining the formation of value system: moral and cultural. The reasoning is as follows: as a complex of skill and health factors, human capital defines the quality of labor as input in production of goods and services. Being social animals however individuals can realize some common aims only by interacting among themselves with their human endowment. The final result of this interaction depends on the quality of social capital they could generate among themselves, which formation is inspired by cultural and moral capitals through human capital.

As an expression of informal relations generating positive externalities, social capital is the main ingredient of SSI. On the other hand, on the language of complexity theory sustainability can be regarded as an order, and social unit is reaching it starting from “the edge of chaos”. The scale between the order and the edge of chaos is a scale of various sustainable equilibrium states. They need to be kept stable and we assume SSI to play such a role by its homeostatic effects.

We should note – our attempts are not pioneering. Since a long time there is a search of homeostatic mechanisms in social units, particularly in the firms’ management. The first author explicitly formulating the chance of such mechanisms is probably Kenneth Boulding (1950), who assumes a “homeostasis of the balance sheet”. With the generalization of the role of informal relations in this process by means of the notion of SSI as one of the feedbacks supporting sustainability, the problem of the homeostatic nature acquires new dimensions. Complexity theory approach allows integrating the idea of homeostaticity with the other mechanisms of managing and steering the behavior of such complex organisms as the social systems. These presumptions were basic in the undertaking projects on these issues.

3. The Projects

Several projects have been initiated to test the presented above considerations in various cultural settings and periods of time during the transformation process: first, in periods of deterioration, when societies reached lowest points in the transformation period (end of 1900s), second, 10 years later and third, nowadays. The observations were carried out in different conditions so that their comparability was restricted.

The **first project** was realized within the "The Measurement and Achievement of Sustainable Development in Eastern Europe" project funded by the EU PECO programme and coordinated by CSERGE – UCL, the UK. The survey was carried out in 1997 during the riots period in Bulgaria and turning point in the transformation period. Although the study was devoted on Bulgarian monastery conservation, information was collected characterizing sustainability of development in general. The study indicated unambiguously that despite the obvious deterioration of human related forms of capital especially their material parts, the society gave high value of those elements of sustainability, which were closely related to the formation of the value system, in the particular relatively high WTP for the conservation of cultural monuments [9].

Several years later when transformation process passed through more advanced forms and there were apparent positive changes in the economic policy toward enhancing sustainability of development, new, **second project** was organized, which confirmed some of the results of the previous observations. A sample of minority (Roma) living in multicultural setting was selected to test among the other things the intercultural influences. As a matter of fact, it was an attempt to test the stability of mechanisms regulating sustainable behaviour of society and its influence on the chain – cultural, moral and human capitals. Thus, the second study was more directly oriented to sustainable development issues so it allowed producing more concrete information of the problem.

Two Fatih university funded projects should be mentioned in our next endeavors to test the homeostatic nature of SSI. Both were multicultural–oriented and studied various aspects of human factors of development including the elements of SSI and its homeostatic nature. The first one gave information about the role of **human capital in the formation of social capital in three Balkan countries with various cultures: Turkey, Bulgaria and Bosnia. The second one was more closely oriented to the mechanism of social capital formation and in particular to the influence of these interlinks on** the transregional economic space as a precondition for regional cooperation (Comparative study of the Edirne (Turkey), Alexandroupoli (Greece) and Haskovo (Bulgaria) area**). As result additional information has been collected, which is still in a progress and adjustment to various types of econometric models.**

All four projects were aimed among the other tasks to test various aspects of the stability of homeostatic mechanisms in SSI. Several representative indicators have been chosen and their interrelations have been studied by application of various methods. The observations and analysis of the collected data were organized around the following scheme:

- Defining the basic indicators characterizing homeostatic nature of SSI;
- Constructing questionnaire reflecting various aspects of these indicators;
- Testing the collected date by factor (principal component) analysis;
- Testing the regression-correlation relationships within the basic eigenvalues vectors and
- Constructing models by means of which the basic properties and relationships of SSI and the other socio-economic indicators are studied.

The basic indicators of the homeostatic mechanism of SSI were included in the questionnaires on form of a scale of extreme values (as for example trust – distrust; love – hate, etc.) The questions have been formulated with the assistance of psychologists to reflect important nuances of the indicators.

The first task was to identify the horizontal and vertical dimensions of SSI. First of all we defined the basic indicators of the horizontal and vertical dimensions of SSI and next we tried to identify them within the social unit object of study. The starting point was identifying the presence of the two basic properties needed for the existence of SSI: the level of marginal propensity to help other people necessary for the horizontal dimension of SSI and the level of marginal propensity to recognize the leader for the identification of the vertical dimensions of SSI.

Using the collected already data initially two studies have been undertaken for testing the hypothesis of SSI. The first study included sample constructed as a focus group of 46 Bulgarian citizens from various cities and towns for testing the emergence of SSI and the basic evidences of its homeostatic nature. Structured interviewing has been undertaken with phenomenological elements in case the respondents reveal some interesting details of the problem. The second test was exclusively oriented to the marginalized groups of population of avoid what we called “welfare effects”. Such an approach was dictated by the fact that these groups were expected to be free in maximum degree from the “conspicuous consumption” influences as their fight for the day-by-day survival was supposed to prevent them from “keep up with the Joneses’ behaviour. We expected by this approach to reveal the homeostatic nature of SSI in a pure form by minimizing “welfare” biases. Although the level of responsiveness was low (about 24 %) in the second sample 145 observations were collected mainly of Roma origin from various Bulgarian areas with multicultural (Bulgarian, Turks and Roma) setting.

Both questionnaires were constructed by the author who controlled the collection of data. They were divided in several parts: general perception and understanding of sustainability, social capital related questions including questions for testing homeostacity of SSI, and finally the socio-economic setting of the respondents. Data processing was aimed at extracting from the interviewers answer of broader problems than the homeostatic nature of SSI: how sustainable is the behaviour in society, the attitude to important social problems, assessment of the general socio-economic setting, etc. Although we concentrate below on the homeostatic nature of SSI, while other problems are subject of forgoing papers, some remarks are shared related to the methodology of the whole study.

The first questionnaire was constructed with more open ended questions allowing the respondents to share a broader vision on the problems. The aims were to produce “creative interviewing”, that is, to allow the enumerators to feel free in the collecting of more detailed information on issues, which during the interviewing could be eventually revealed by the respondents. The creativity was expected to come as a result of the training of the enumerators of in-depth understanding of both theoretical and practical problems of the study. The duration of interviewing

was restricted not to exceed 15–20 minutes to reduce the biases of formal answers. In many cases we applied video-recording of the interviewing for more detailed study of the answers. Part of the records has been used in documentary works.

The most difficult part of the study was the choice of a suitable model for producing a reliable test of the homeostatic nature of SSI. As a result, no model can yet pretend to give sufficiently good results due to the idiosyncratic features of the problem. There is a principal question. The most research methods normally reveal interrelations reducing them to linear or non-linear, but they do not estimate the feedbacks and their stability. Still it is difficult to say which methodology is the best for such estimations.

4. The Main Results

The analysis of the results of most of the samples indicates that there is strong interrelation among the social, human and cultural capitals. For example, (the second project), applying factor analysis (principal component) in the first eigenvalue the most important variables were the level of trustiness, the level of helpfulness in society and trust in the direct chiefs (the level of vertical integration). Social and cultural elements were important in the second eigenvalue, where the highest share had the possibilities to share the problems with the others and the visiting religious centers as a source of values. Social and cultural elements had high significance also for the other factors. In some aspect it is positively related not only our assumption of the homeostatic nature of SSI, but also the relevance of the chain: moral – cultural – human – social capitals for its formation.

As a whole the starting point for all observations were testing the samples initially by factor analysis (Varimax rotation – Kaiser Normalization) to capture how every component of the SSI was influenced by ingredients outside it, but having direct or indirect effect on it. To reveal the homeostatic nature of SSI it was not sufficient to pass the data through the well-known econometric schemes of OLS. They could not help to reveal the origin of SSI and the preconditions to its emergence. Besides, the application of the ordinary lest squares (OLS) regression-correlation analysis – traditional instruments of measurement the relationships - could not produce satisfactory results as they did not meet the requirements of the most of the statistic criteria: very low correlation coefficients, some of the estimates were not statistically significant, etc. This showed that serious methodological problems in the study had to be overcome.

In formulation the hypothesis of the homeostatic nature of SSI it was indicated that the deep roots for its emergence were in the quality of human capital and the ways it was formed. Thus the study focused firstly on the human capital dimensions and next proceeded to the SSI and its homeostatic features. At the same time, it was clear that for the aims of our study it was not sufficient to model human capital just as education and skill but to add to it at least such components as the health and value system of the individuals, which was additional problem to solve.

The very nature of the produced by interviewing data requiring probabilistic models (Logit) based on the maximum likelihood approach. For most of the samples a dependent (endogenous) variable TRUSTNESSD was formulated in dichotomy terms reflecting the propensity to trust, measured in 6-level scale with questions of various levels and nuances of trust: (1) belief in nobody, (2) always suspicious, (3) inclined to believe sometimes, (4) indifferent, (5) trustful although it brings often disappointments and (6) belief in everybody. As examples of independent (exogenous) variables for the formation of the value system of the respondents we can indicate: VALUEF – family as a source of values, VALUEART – art as a source of values, VALUECH – religion as a source of values, VALUEMED – media as a source of values (all 5 Likert-scale degrees). These variables were supposed to reflect the effect of the moral and cultural ingredients on the formation of trust.

The propensity to trust was regressed in the second model to the basic sources of value in society by means of the following Logit model:

$$\Pr ob(TRUSTNESSD = 1) = \frac{e^z}{1 + e^z}$$

where:

$$z = \beta_0 + \beta_1 VALUEF + \beta_2 VALUEART + \beta_1 VALUECH + \beta_2 VALUEMED$$

The results of this model, which are very similar to the other models, are presented below:

$$Z = -2.286 + 0.083VALUEF + 0.551VALUEART + 0.124VALUECH - 0.181VALUEMED$$

(1.265) (0.229) (0.275) (0.178) (0.204)

McFadden R^2 = 0.097

If we use as criteria the odds-ratio (probability of trustiness to probability of lack of trustiness) (0.933) the highest influence on it has art (0.62041) and religion (0.13676) as source of values, while the media and the street have negative influence, correspondingly -0.1938 and -0.2529. Ceteris paribus, marginal effect of art as a source of value is 0.09125 and of religion as a source of values is 0.02631. If both media and street could be excluded as a source reducing positive values in society the impact effect would account for 0.116. Due to these negative values, the impact effect as a whole cannot be positive, that means the negative effects of the media and the street on the value system overweight the positive effects of family and religion as source of value. It should be noted however that this conclusion is related to the observed sample (poor minority respondents), not to the society as a whole. Besides,

the results should be very cautiously interpreted because of the very low McFadden – the criteria of the level of relationships. Nevertheless, they are a warning indication of negative processes in society, restricting the formation of good quality social capital, correspondingly weak mechanism of homeostatic regulation (one serious reason to abandon in the next projects the idea of using sample of poor population for avoiding the welfare effect).

This was confirmed by the next test – the attempt to measure directly the homeostatic effect of SSI again in "pure" conditions that is within marginalised multicultural groups. The test was based on an artificial situation of "fallen tree on the street". The interviewees were asked if they have some common problem as for example fallen tree on the street how they expect to solve it. With all respondents answering this question only 3.5 % declare they do not care about it, 34.5 % do not react as they think they cannot do anything, 34.5% wonder what should they do, 13.8 % would consult first with their family and friends and no one move and try to do it together with the others.

The results of the experiment actually demonstrated low, close to nothing homeostatic mechanism in this social unit. This gives birth to another hypothesis - the welfare effect probably has U-shaped form on homeostaticity. It is quite possible that the extreme values of welfare (too rich and too poor) depress the homeostatic mechanism, moving in such a way the unit away from sustainability. Certainly additional studies are needed to test this assumption, but it may happen that actually the middle class is the basic carrier to the homeostatic behaviour, which underlines once again its specific role in social development.

At the same time, to look for an evidence of homeostatic mechanisms in the SSI a neuro-fuzzy model was initiated, in which the reaction of each respondent was presented as sequential layers. As initial inputs we used again the statement of a fallen tree on the street and indicators defining the reactions of the individuals. The outputs of this layer were used as inputs for the second layer and so one.

Many difficulties emerge during the test of such a model. First, there is no clarity about the number of necessary layers to define correctly the reaction of the affected sides. The solution of this problem required a search of the genesis of social capital, the psychological, individual and social factors, which determined the behaviour of the individuals so that they may or may not be able to generate social capital, the basic ingredient of SSI and only then to pass the test of the homeostatic mechanism. We see that despite the assumed homeostatic nature of the SSI it may not necessarily generate social capital to move the system out of disequilibrium in direction of reaching steady state. The detailed description of this story is left for other forthcoming studies.

The principal construction of the model is based on the assumption that the decision to join the club of removing the tree from the street is result of a complex combination of individual characteristics, which can be presented as multilayer model. The number of the layers is increasing with the accumulating of knowledge about the motivations to join the club. Thus, each layer has a weight matrix W, a bias vector b, and the output vector a. Every layer is composed by neurons explaining the behaviour of each respondent; with n respondents every layer has n neurons.

To avoid the numerous technical issues related to this study we report the midway results and comment the alternative solutions. There is still a need of gauging such number of layers, which corresponds to the stages of decision-making starting with the deepest layer of inherent motivations. The number of layers is as a matter of fact decomposition of the factors determining the decision to join the club. We have to note that this is completely voluntary decision based on the value system of individuals.

In the next stage perturbation factors have been introduced to test the stability of the homeostatic mechanism. As basic perturbation factor a multicultural sample was composed based on the assumption that the rise of number of cultures included into the model complicated the communication, thus introducing perturbations in the movement along the sustainability path. Such a heuristic approach was expected to be in some degree a proxy of the stability of the homeostatic effect. The sample was composed from data collected for the marginalized groups in areas (Burgas, Sofia), where population belonging to three cultures lives: Bulgarian, Turks and Roma.

Taking into account the theoretical postulates of the model that SSI is influenced by human capital, which on the other hand is formed as result of the interaction between cultural and moral factors, the layers of the model were constructed in a way to reflect the effect of these factors starting with the moral. All layers had similar inputs – the questions related to sustainability. The number of neurons in the layer was defined by the number of the members in each community. In such a way every individual in the community was regarded as a neuron element of the model.

The sample for this study included 145 respondents, but the number of real answers used in the model was less due to the incompleteness of some of the answers. The model was constructed as backwards type, that is we moved deeper into the problem by including additional layers with elements, which lead us to the origin of the motivation of joining the club. This study is still on-going and the final results are to be reported later.

In the last direction of the study of the homeostatic nature of SSI we moved closer to the problem by adjusting models of homeostasis used in biology. Of particular interest was the homeostasis model assessment of insulin resistance and B-cell function from fasting plasma glucose and insulin concentrations in man developed by Matthews et al. (1985). There is a big similarity in the support of insulin in

human body and the hypothesis of the homeostatic nature of SSI:

- Both tests are based on physiological studies to develop mathematical equations describing the homeostatic regulation as a feedback loop. In the biology this is the glucose, while in the SSI this is the level of trust.
- There is a big similarity in the computer software of the model that solves the equations, both to the insulin resistance and β-cell function as a function of fasting glucose and insulin levels on one hand and the level of trust and the other indicators of SSI on the other hand.
- Big advantage is the simplicity of modeling, which can be reduced to excel spreadsheet calculations.

As the next step to reach more reliable results we plan the adjustment of HOMA model with so called "hyperinsulinemic euglycemic clamp method", which is reported to correlate well with the HOMA results and is regarded as a "gold standard" for investigating and qualifying insulin resistance. Taking into account the fact that the role of insulin in human health is much broader than sugar regulation in the blood [10] it opens new horizons of studying the similarity of both biological and social mechanisms.

There are however problems with the way both tests could be carried out. The biology test includes 2 hours procedure with infusion of insulin with a given velocity and observation the effect on the blood sugar levels. Similar procedure seems impossible in the social test, nevertheless a focus group study is supposed to allow the increase of the value of some parameters in the model and observation of the possible reactions.

The present work in this direction includes adjustment of the HOMA calculator for estimating the sensitivity of insulin and β-cell function to the needs of the indicators characterizing SSI. The study is carried out with biologists, anthropologists and sociologists to compare similarity and differences in both homeostatic mechanisms. The preliminary results are very promising; nonetheless a broader overview of this work is an object of further publications. Moreover, that the developer of the HOMA calculator software does not provide any guarantee for the accuracy of this program.

As a whole the undertaken projects can be regarded as one of the pioneering works to reveal to role of feedbacks in the social systems, which trajectory of development formulated in the most general way as sustainability movement summarizes a big variety of possible outcomes. The application of complexity approach seems to be the most promising; the concrete simulation is expected to continue to neuro-fuzzy modelling technique and next to biological models. Finally, the comprehensive study of the problem requires a good multidisciplinary team of motivated researchers to encompass the maximum possible richness of human behaviour, which nowadays is determined by a complex of moral, cultural, ethical and ethnical issues.

5. The Challenges for Future

The present paper is an attempt to open the curtain of the hypothesis that SSI has homeostatic nature, which is expected to keep sustainability stable. Several methods have been tested to prove this assumption. Until now there is not clear evidence that such a mechanism really exists. Its formulation is result of the complexity theory approach, which allows analyzing the systems as self-regulating units with the corresponding feedbacks. As such feedbacks two social infrastructures have been formulated - hard and soft. Both however were assumed to play various feedback roles, in particular SSI was expected to possess homeostatic mechanisms keeping sustainability stable.

These assumptions have been tested by various methods, but no one of them gave definite approval of the homeostaticity assumption. Further studies are needed by a multidisciplinary team to test more advanced fuzzy-neuron models as they together with biology models are supposed to provide better evidence of this assumption.

The practical significance of such approval is enormous. The discovery of a mechanism allowing stability of sustainable path would reveal important managerial considerations. It means to give to the managers not only knowledge of a powerful, stable and sensitive mechanism, difficult to manage, but also a clue to support stability of social units. Knowing its features and trying to protect and further develop it gives a clearer vision of how to realize better the strategic aims of the system. This is possible when there is stability within and outside social units.

The consequences of such studies are going beyond the sustainability. They would reveal new sides of the complexity of the social relations in the present life. The knowledge of this complexity is important not only for the micro policy, but also for the overall economic performance and realization of the strategic aims of sustainable development at macro level.

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