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Anti-Crisis Management Tools for Capitalist Economy

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Abstract

It is stated that the reason for ineffective economic crisis fighting is misunderstanding of processes prevailing in the economy, as well as lack of mathematical apparatus necessary for their description. This mathematical description was found using the analogy approach – it turned out that the electric circuit theory is the 'white box' for the 'black box' of economics. Mathematical description of processes in the electric circuit theory allowed describing mathematically the behaviour of the market participants and deriving the differential equation for the 'goods-money-goods' process. Its analysis enabled to reveal structural defects of the capitalist economy – its nonlinearity and destructive influence of the human factor. These defects cause economic crises due to instability of processes prevailing in the capitalist economy. Tools for management of the capitalist economy in the form of business-interfaces and new global computer network TV•net, which will provide for its crisis-proof development, are suggested.

Key Words

Computer network, crisis-proof economy, economic reforms, super-intelligence, subconscious thinking.

I. INTRODUCTION

The first economic crisis happened in England in 1825 [1]. Since that time the global economy is prone to this inevitably repeated disaster.

At first, after every next economic crisis, some of the prominent academic economists insisted that they know how to grapple with it. They were given the opportunity; however, each subsequent crisis disproved theoretical assumption.

At present, no one insists any more that they know how to grapple with economic crises.

II. CAUSES OF CRISES IN THE CAPITALIST ECONOMY

Nevertheless, economic crises must be combatted. There must be a solution to this problem, because there is at least one known variant of a crisis-proof economy. It was even implemented in practice. It is the socialist economy. However, it existed only in the totalitarian regime countries that have certain well-known drawbacks.

This is why, over the past decades, many attempts were taken to create a hybrid capitalist-socialist economy, and the solutions varied from country to country. However, these attempts were futile. Economic crises still occur.

A. Lack of capitalist economic theory

It is not surprising, because the global economic science is groping with the problem in the dark, being unable to describe economic processes mathematically. Over almost 200 years since the first economic crisis, economics has not realized that first and foremost it needs this mathematical knowledge.

It is impossible to imagine that without mastering not only theoretical radio electronics, but mathematics, as well, anyone would be able to assemble a TV set or a computer. As for economics, quite recently prominent scientists insisted that economics could do without mathematics.

However, economic scholars do not realize it and are making no headway by letting no young ideas, for instance, econophysics, into their science. However, this is the shortcoming of many other sciences, including physics, where monopolies referred to as ‘scientific schools’ successfully suppress scientific dissent [2].

As for the mathematical tools currently used in economics, they are based mostly on mathematical statistics and graphical methods of solving algebraic equations (e.g., the supply and demand curves). However, these mathematical tools allow defining only states. As a result, the obtained low-factor information about the significantly multi-factor economic processes is scarce and does not enable to understand what is going on in the economy. Therefore, economists have to cure the economy, to put it figuratively, using the mean temperature of all patients in a hospital. No doctor would ever do that.

This is why some scientists [3] doubt whether it is possible to develop economics as an exact science. Opinions were expressed that, apparently, a large variety of economic phenomena cannot be accounted for based on a limited number of fundamental laws. It was even suggested to substitute the principle of an integral economic theory for the principle of coexistence of competing concepts [4].

However, the trouble is that competing concepts cannot be developed without understanding the processes prevailing in the economy. Eventually, despite the attempts to use more and more sophisticated mathematical tools in economics in the recent decades [5], contemporary economic theory is not able to understand these processes and does not meet the criteria of the exact sciences [6].

B. **Structural defects of the capitalist economy**

Use of the mathematical apparatus discussed below, which is able to describe economic processes, allowed revealing a number of structural defects in the modern capitalist economy, which, in fact, cause economic crises.

1. ***Differential equation of the 'goods-money-goods' process***: In the exact sciences, the definitely existing objects of research (e.g., the ball lightning), with traceable but inexplicable external indicators of processes prevailing in them, are referred to as the 'black boxes'. The global economy, obviously, fully corresponds to the definition of the 'black box'. At the same time, the 'white boxes' in the exact sciences are understood as different objects of research with well-known principles of operation, which are the mathematical counterparts of the 'black boxes'.

As shown below, the 'white box' for the 'black box' of economic theory is the electric circuit theory where processes are described with differential equations. As for the 'black box' of the basic economic process 'goods-money-goods', the 'white box' is the process in the electric oscillation circuit (Fig. 1b) which consists of an induction coil L and a capacitor C [7], [8].

Indeed, processes in the induction coil L are described with the formula

$$U_L(t) = L\frac{dI_L(t)}{dt} \tag{1a}$$

or an inverse formula

$$I_L(t) = \frac{1}{L}\int_0^t U_L(t)dt \tag{1b}$$

where U_L is voltage drop at the inductance coil;
I_L is the current in the inductance coil;
L is the inductance value;
t is time.

At the same time, the behaviour of the vendor in the market is described with the formula

$$M_V(t) = T_V\frac{d[Q_V(t)P_V(t)]}{dt} \tag{2a}$$

or an inverse formula

$$Q_V(t)P_V(t) = \frac{1}{T_V}\int_0^t M_V(t)dt \tag{2b}$$

where M_V is the amount of money (or other means of payment) the vendor received for the goods sold;

Q_V is the quantity of the goods sold by the vendor;
P_V is the price of the goods sold by the vendor;
T_V is the production time per unit of the goods sold by the vendor;
t is time.

Therefore, the price of the goods set by the vendor equals to the cost of production divided by the quantity of manufactured goods.

Processes in the capacitor C are described with the formula

$$U_C(t) = \frac{1}{C}\int_0^t I_C(t)dt \qquad (3a)$$

or an inverse formula

$$I_C(t) = C\frac{dU_C(t)}{dt} \qquad (3b)$$

where U_C is voltage drop at the capacitor;
I_C is the current in the capacitor;
C is the value of the capacitor.

At the same time, the behaviour of the buyer in the market is described with the formula

$$M_B = \frac{1}{T_B}\int_0^t Q_B(t)P_B(t)dt \qquad (4a)$$

or an inverse formula

$$Q_B(t)P_B(t) = T_B\frac{dM_B(t)}{dt} \qquad (4b)$$

where M_B is the amount of payment means (money) the buyer spent on the purchase;
Q_B is the quantity of goods purchased by the buyer;
P_B is the price of the goods purchased by the buyer;
T_B is the service time per unit purchased by the buyer.

Therefore, the expenses of the buyer equal to the quantity of the purchased goods multiplied by the price per unit.

As can be seen, a perfect mathematical analogy is observed.

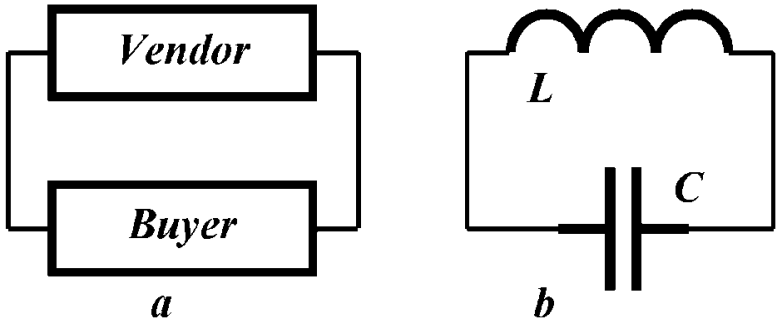

FIGURE 1. SIMPLEST OSCILLATION LINKS IN ECONOMICS AND RADIO ELECTRONICS [9]

Therefore, for the electric oscillation circuit (Fig. 1b) which consists of a series inductance coil L and a capacitor C, based on the second Kirchhoff's law, we get the expression

$$L\frac{dI_L(t)}{dt}+\frac{1}{C}\int_0^t I_C(t)dt=0 \qquad (5a)$$

Differentiating it, we get the differential equation describing processes in the electric circuit under consideration

$$\frac{d^2I_L(t)}{dt^2}+\frac{I_C(t)}{LC}=0 \qquad (5b)$$

For a similar economic circuit, which includes a series (see Fig. 1a) vendor and a buyer, based on the economic interpretation of the second Kirchhoff's law, we get the expression

$$T_V\frac{dQ_V(t)P_V(t)}{dt}+\frac{1}{T_B}\int_0^t Q_B(t)P_B(t)dt=0 \qquad (6a)$$

Differentiating it, we get the differential equation describing processes in the economic circuit under consideration

$$\frac{d^2[Q_V(t)P_V(t)]}{dt^2}+\frac{Q_B(t)P_B(t)}{T_BT_V}=0 \qquad (6b)$$

Taking into account that the electric current flowing through the series electrical elements and (Fig. 1b) is the same, i.e. $I_L(t)=I_C(t)=I(t)$, the differential equation (5b) can be simplified to

$$\frac{d^2I(t)}{dt^2}+\frac{I(t)}{LC}=0 \qquad (7a)$$

Similarly, in view of the same commodity-money flow though the elements of the economic circuit (Fig. 1a) $Q_V(t)P_V(t)=Q_B(t)P_B(t)=Q(t)P(t)$, the differential equation (6b) can also be

simplified to

$$\frac{d^2[Q(t)P(t)]}{dt^2} + \frac{Q(t)P(t)}{T_B T_V} = 0 \qquad (7b)$$

The solution of the linear differential equation (7b) is sinusoidal oscillations. Therefore, the 'goods-money-goods' process is an oscillation one, which was to be expected, because in the isolated economic circuit under consideration the vendor and the buyer periodically exchange goods for money, and vice versa.

2. ***Mathematical analysis of structural defects of the capitalist economy***: In fact, the process discussed above is only potentially an oscillation one. It is not known in economics, because it has never been implemented yet. Moreover, it cannot be implemented in a random way, just as a house cannot be built at random and vintage vine cannot be made randomly. We must know how to do it.

The non-linear factor. Unfortunately, it is not easy to use the analogy of the electric and economic circuits and processes. This is why we must be very careful when it comes to the practical implementation of the analogy in order not to upset it by any incorrect actions [9], [10].

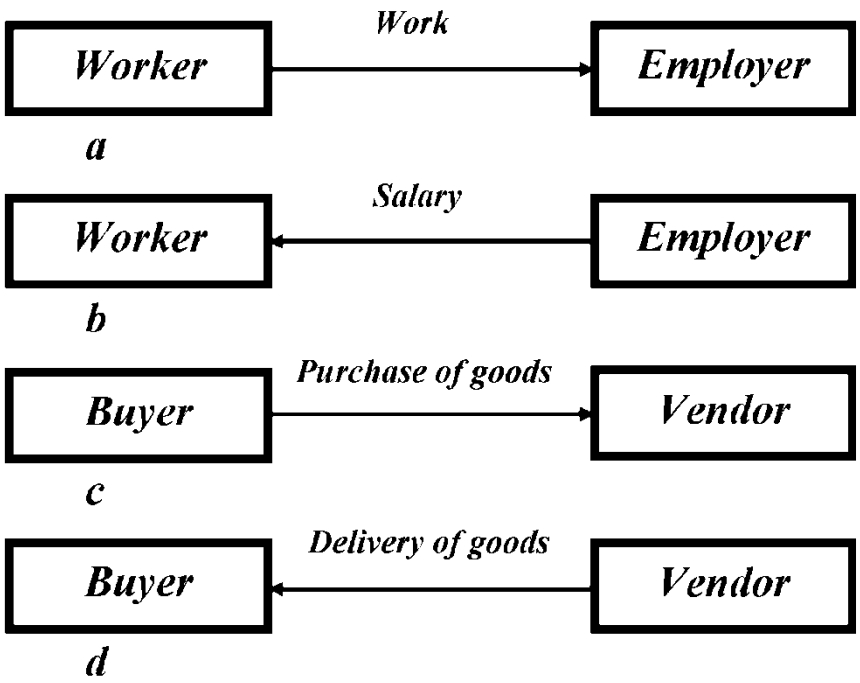

FIGURE 2. AN EXAMPLE OF CONTENT OF THE ECONOMIC OSCILLATION PROCESS [10]

In the electric oscillation circuit (Fig. 1b) the oscillation process, at any of its phases, has the same physical meaning determined by the motion of electrons. As for the economic oscillation link (Fig. 1a), each oscillation period includes similar processes, which, however, differ by content and follow each other in a certain order. For example, first (Fig. 2a), the vendor may be an

employer and the manufacturer of the goods, and the buyer may be an employee who produces the goods. Then (Fig. 2b) the employer pays the employee their wages for the work done. After that (Fig. 2c), the employee turns into a buyer and pays the vendor the price of the purchase. Finally (Fig. 2d), the vendor supplies the purchased goods to the buyer.

Many other variants of organizing the relationship of the buyer and the vendor are possible, especially given that the actual economic oscillation links are not isolated, and, therefore, in the corresponding multi-link and multi-related economic system various economic operations may be performed in different economic links.

However, this is not enough. Even if the procedure discussed above is observed, the 'goods-money-goods' process in the economic link can be an oscillation one, but not a sinusoidal one, if all payments by the buyer and good supplies by the vendor are not forced (for instance, on a daily basis, managed by a computer) according to the sine law. Otherwise, the process would be non-linear.

As for processes currently prevailing in the capitalist economy, they are definitely non-linear, because they do not meet the requirements discussed above.

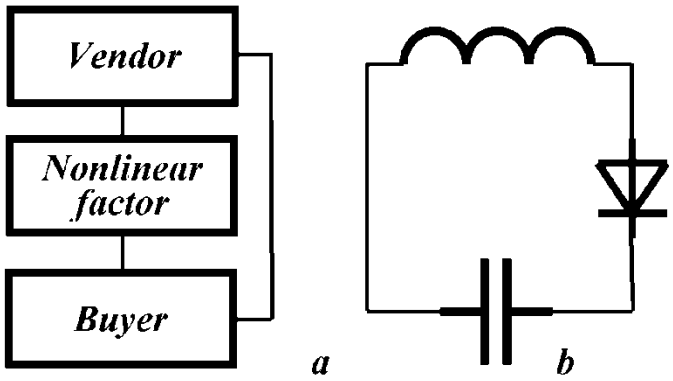

FIGURE 3. NON-LINEAR ISOLATED LINKS [10]

This is true for the economic oscillation circuit under consideration (Fig. 1a), which, in fact, has the form shown in Fig. 3a. Fig. 3b demonstrates its radio electronic counterpart. However, contrary to Fig. 3b, Fig. 3a does not have a non-linear element (a diode); it has a non-linear factor, which stems from disregard of the requirements for linearization of the economic process discussed above.

With respect to the foregoing, a natural question may arise – why do we need all these complications? Does the economy actually need all these harmonic oscillation processes? It turns out that they are necessary, because only they can be the basis for developing the economic theory belonging to the exact sciences. It is impossible to stabilize a non-linear and extremely complicated economic system, i.e., to protect it from economic crises.

Moreover, sinusoidal oscillation processes provide for significantly more efficient use of payment means than the current economy. Indeed, with the conventional methods of payment in the form of discrete (e.g., monthly, or as necessary) payments, money works inefficiently, because there is always either surplus or shortage of it to solve the current economic tasks. If sinusoidal schedules of payments and deliveries were used in economic oscillation systems, means of payment would be working continuously and entirely, and, thus, would bring more profit.

Adam Smith's 'invisible hand'. Unfortunately, the problem of revealing structural defects of the economy is not confined to the non-linearity of the actual economic potentially oscillation link. There is one more problem. It is referred to as the 'invisible hand' of Adam Smith **[11]**.

The matter is that, in accordance with the Cobb-Douglas production function [12] $Q = AL^{\alpha}K^{\beta}$, the production volume depends on two slowly varying production factors: (labour costs) and (capital costs). Since this is a steadily increasing function, crises are not supposed to occur in the economy at all.

Therefore, it is obvious that economic processes are influenced by the third factor, more powerful than the two accounted for in the Cobb-Douglas function. Economic scholars often refer to this third factor as the 'invisible hand', using the term introduced by Adam Smith [13]. However, all their attempts to identify it have failed.

Then, it is logical to assume that if this factor has not been detected among the objective reasons, it must be subjective, i.e., it is the collective human factor. This is why it manifests itself in the capitalist democratic society with its numerous civil freedoms, and, on the contrary, it was not observed in the socialist totalitarian society where these freedoms were suppressed. The same conclusion was made by Kenneth Arrow [14] and Allan Gibbard [15].

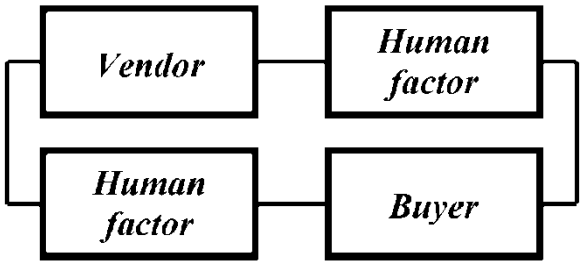

FIGURE 4. FUNCTIONAL SCHEME OF THE SIMPLEST ECONOMIC OSCILLATION LINK ADJUSTED FOR THE HUMAN FACTOR [9], [10], [11], [17], [18]

Indeed, the economic oscillation circuit plotted in Fig. 1a actually includes not only the vendor and the buyer, but also the corresponding human factors they introduce (see Fig. 4), because the actual market participants are ordinary people with common human foibles, habits and other peculiarities. Therefore, they are not always reliable, sometimes they are forgetful, often prone to emotions, illnesses, other random factors and unforeseen circumstances.

In view of the aforementioned circumstances, the process in the actual economic oscillation circuit will be described not with a linear differential equation with constant coefficients (7b), but with a linear differential equation with random coefficients (or, in other words, with a parametric differential equation)

$$H_V(t)\frac{d^2[Q(t)P(t)]}{dt^2}+H_B(t)\frac{Q(t)P(t)}{T_BT_V}=0 \qquad (8)$$

where $H_V(t)$ is the human factor taking into account the behaviour of the vendor,

$H_B(t)$ is the human factor taking into account the behaviour of the buyer.

At that, $H_V(t)$ and $H_B(t)$ are random functions of time. Therefore, the solution of the differential equation (11) is also a random function of time. Since the global economic system is described with a system of such (in fact, even more complicated, because more economic factors must be taken into account) parametric differential equations, it is impossible to predict its development. Consequently, crises in the contemporary capitalist economy are inevitable.

III. Crisis-proof management of the capitalist economy

In order to combat crises in the capitalist economy, the influence of the human factors must, obviously, be minimized, i.e., it is necessary to provide for $\lim H_V(t)\to const$ and $\lim H_B(t)\to const$.

By the way, fulfilment of the conditions $\lim H_V(t)\to const$ and $\lim H_B(t)\to const$ allowed eliminating economic crises in the socialist countries. This fact can be considered an experimental evidence justifying the conclusion.

The human factors and may be both internal and external.

The internal human factors are understood as spontaneous unpredictability of behaviour of market participants due to their unreliability, illnesses, forgetfulness, imperfections of contracts or verbal arrangements regulating their activities, rumours, panic, and other similar reasons.

The external human factors are understood as the unpredictable behaviour of market participants determined by the external influence of other individuals or corporate bodies – competitors, public officials, criminal structures and other similar reasons.

For instance, Isaac Newton wrote that simulating people ' s behaviour is a much more complicated task than predicting planetary motion [16].

Therefore, it is obvious that, in, order to minimize the influence of the human factors in the market capitalist economy, some new economic tools are necessary, because the existing economic tools have not been able to offset it. These tools must be different for the internal and

the external human factors.

A. Business-interfaces

We shall refer to a business-interface [19] as a new economic tool intended to eliminate the internal human factors. Contrary to existing contracts, business-interfaces not only regulate the relations of business-partners in detail, but also provide for some new mutual obligations.

The term is borrowed from computer engineering, where an interface is understood as a hardware and software means of connecting various functional elements forming arbitrary complex devices.

Thus, we shall understand a business-interface as a commodity-money means of connecting business partners, which is regulated by the corresponding documents to the slightest details and includes, along with the payment and delivery dates, payment amounts, product ranges, penalties and other conventional terms, other means providing for:

- the most possible linearization of economic processes that must be described with linear differential equations with constant coefficients or linear differential equations with variable coefficients (in this case, on condition $\lim H_V(t) \to const$ and $\lim H_B(t) \to const$), to which end non-linear elements and factors must be excluded from the economic system;
- temporal variation of the cash flow and good deliveries as close to the sine law as possible (it can be implemented using the corresponding software).

Obviously, banks must play the primary part in implementation of business-interfaces and, thus, in developing new crisis-proof economy; the activities of banks will be changing the economic outlook of their clients, as well.

Two particular examples of business-interfaces are suggested in [8], [9]. However, there can be at least several hundred business-interfaces corresponding to various economic situations.

Implementation of business-interfaces in economics may bring up the question of whether their use can lead to the excessive regulation of economic activity, in particular, to the suppression of rights and freedoms (similar to socialism). The question is quite natural. The answer is – no, it cannot, because business-interfaces will operate:

- only for the term of a transaction, i.e., from the moment it is made to the moment it is settled;
- only to the extent of the transaction;
- only for the business partners indicated in the transaction.

The latter, indeed, will have no freedom of disregarding the terms of the transaction; they will be committed to settle it, which will make the economy predictable and, eventually, facilitate the development of anti-crisis trends. In this respect, it is possible to use the following comparison: nature, providing for the variety of life forms, left all living beings no choice of disregarding their

obligations of breeding, and solved this task quite ingeniously. People must just as well demonstrate their ingenuity in developing the business-interfaces they need.

Thus, the economy reformed as suggested above will become both capitalist and socialist: at work, people will abide by the 'socialist' discipline, whereas outside work they will be completely free in a 'capitalist way'.

B. New global computer network

In order to minimize the influence of the external human factors, another economic tool is suggested, namely, the new global computer network TV • net [20] – [23], which is free from all the shortcomings of the Internet. This computer network will enable businesspeople to establish business connections without having to resort to third parties. Due to this, businesspeople will have guaranteed confidentiality of their business connections, and will be able to avoid the unwanted influence of any third parties, individuals or corporate bodies, upon their business.

Unfortunately, the global computer network Internet is hardly suitable for this purpose due to its numerous serious shortcomings. Indeed:

- the Internet does not provide for guaranteed information security, i.e., protection from computer viruses, cyber espionage, hackers and other network threats;
- the www service of the Internet does not allow obtaining and using any valuable information necessary for business and other intellectual activities, and, on the contrary, dumps a lot of junk information upon its users;
- it takes a lot of time to retrieve in the Internet any serious information (if it is there at all) necessary for business and intellectual activities;
- copyright and proprietary rights are often likely to be infringed;
- the Internet makes its users constantly purchase new short-lived software.

As for the global computer network TV • net, on the contrary, it will be free from all the shortcomings of the Internet:

- it will provide its users with complete and guaranteed information security due to absence of packet-switched communication and use of one-way broadband communication lines, as well as full control of its owners over the information uploaded in the data bases;
- it will provide its users with the most complete and quickly retrieved information by subscription (it will not be searched for in the Internet);
- it will provide for the utmost confidentiality of the users ' queries, because all information is broadcast simultaneously to all users (and they get it from the broadcast automatically using the corresponding selector software).

1. Business-oriented services: Business-oriented services of the TV • net computer network can be implemented quite quickly and at low cost, because their deployment requires mostly institutional activities. Almost everything necessary for it, apart from a small number of additional applications and some simple devices, is already available at the market. TV • net can

be implemented as a regional network anywhere, where there are television broadcasting networks, because instead of packet-switched communication it uses single one-way communication lines (television and/or fibre optic). High fidelity of information transmission is provided for by anti-noise coding, which has proven its efficiency in deep space communication.

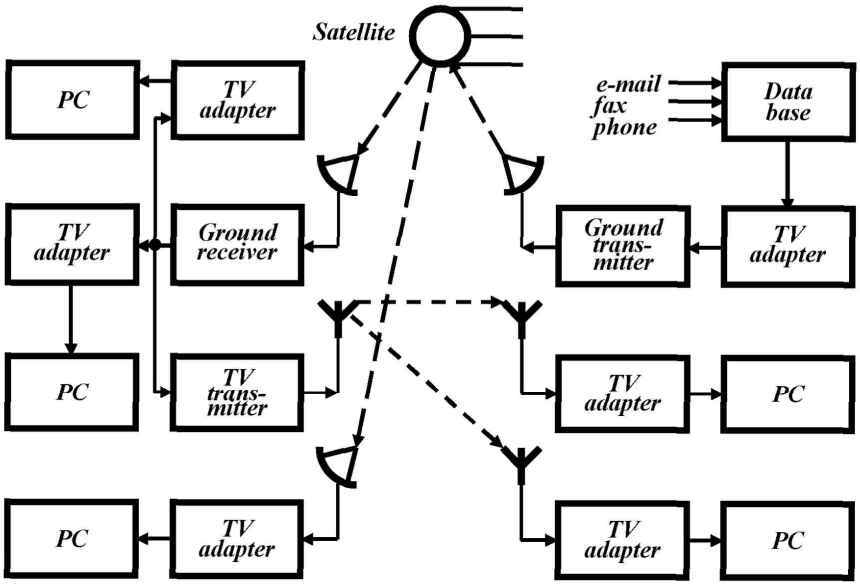

FIGURE 5. SIMPLEST IMPLEMENTATION OF THE TV • NET INFORMATION NETWORK WITHOUT FEEDBACK COMMUNICATION [10], [22]

The trading service broadcasts to the buyers subscribers of the TV • net information on the advertised goods and services, specifying all the details important for the buyer. This initial information is uploaded into the database via any communication lines (including the Internet) by the vendors, who are also subscribers of the TV • net. Advertisements on any other types of business partnership can also be submitted to the database.

In the database, the obtained information is processed and transmitted via a TV adapter, where it is properly encoded, to the TV transmitter of the respective region. The TV transmitter broadcasts this information regularly to all the TV • net subscribers of the corresponding region (this connection is not shown in Fig. 5, and further in Fig. 6, 7 for simplicity). Besides, the same information is fed to users of other regions via satellite repeaters (ground transmitter, satellite, ground receiver).

Users receive the information broadcast via the TV • net to their PCs through TV adapters, similar in terms of their function to modems in the Internet. Subscription to the TV • net is completely identical with that to the pay-to-see television. The only difference is that instead of the TV channels the users indicate the headings they are interested in, based on the respective classification system. The TV adapter extracts the information under the corresponding headings from the received signal and feeds it to the user ' s PC, where it is stored in the personal memory and can be browsed through whenever it is convenient for the user. Having reviewed the information, the user can make their choices based on the relevant criteria, either manually or

using certain applications, and makes their purchases.

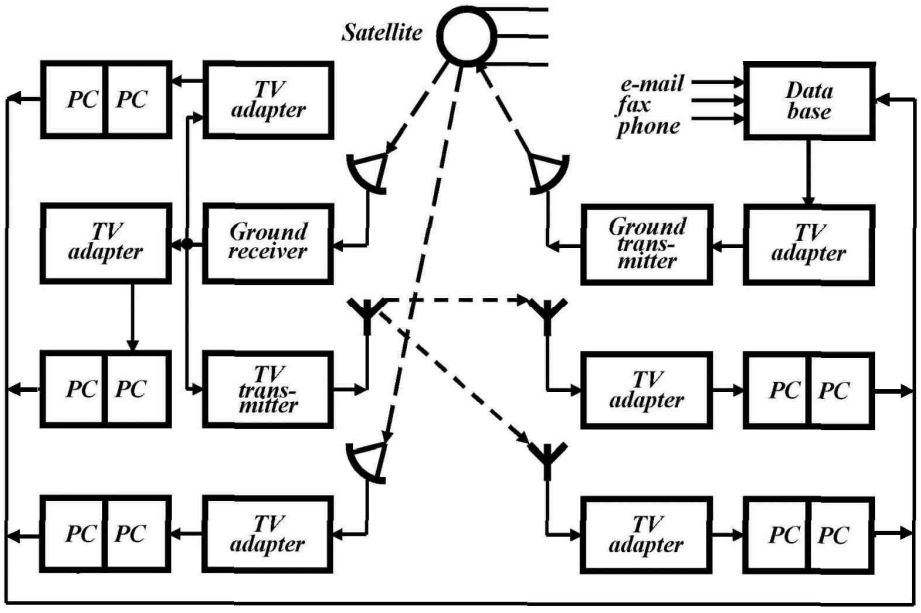

FIGURE 6. SIMPLEST IMPLEMENTATION OF THE TV•NET INFORMATION NETWORK USING FEEDBACK LINES

At the same time, it is noteworthy that users are connected to the TV • net via a single one-way communication line, and are not connected to the Internet. This guarantees absolute information security. Similarly, watching TV bears no threats. Therefore, hereinafter these users will be referred to as the protected users, as opposed to the unprotected users connected to the Internet. In case a protected user needs to submit any information via feedback lines through the Internet (e.g., order a door-to-door delivery), they must use another (i.e., the unprotected) PC (see Fig. 6). However, the protected PC and the unprotected PC must not be connected to each other with any communication line (at least, not with a bidirectional one).

The exchange service operates in a way similar to the trading service, with the only difference: it is not fixed market, but auction price market. Therefore, it is necessary to use the variant of the TV • net implementation with feedback lines (Fig. 6).

The administrative service of the TV • net computer network provides for guaranteed information security of banks, state institutions, corporations and any participants, who are now quite vulnerable to the network threats of the Internet.

In large institutions, many protected computers receive information; therefore, it is expedient to connect them to the TV • net information network via a local area network (Fig. 7). At the same time, the protected PCs connected to the TV • net and the unprotected PCs connected to the Internet must not have inter-computer communication, although they may be used by the same users and be located on the same desktop.

2. *Intellectually oriented services:* The objective of human intellectual activity is to reveal, based on the available information, the trends (e.g., in administrative or economic management)

and regularities (e.g., in science) in the situations and processes under investigation. These are the tasks solved by the analytical services of banks, corporations, intelligence offices, military staffs, as well as by scientists.

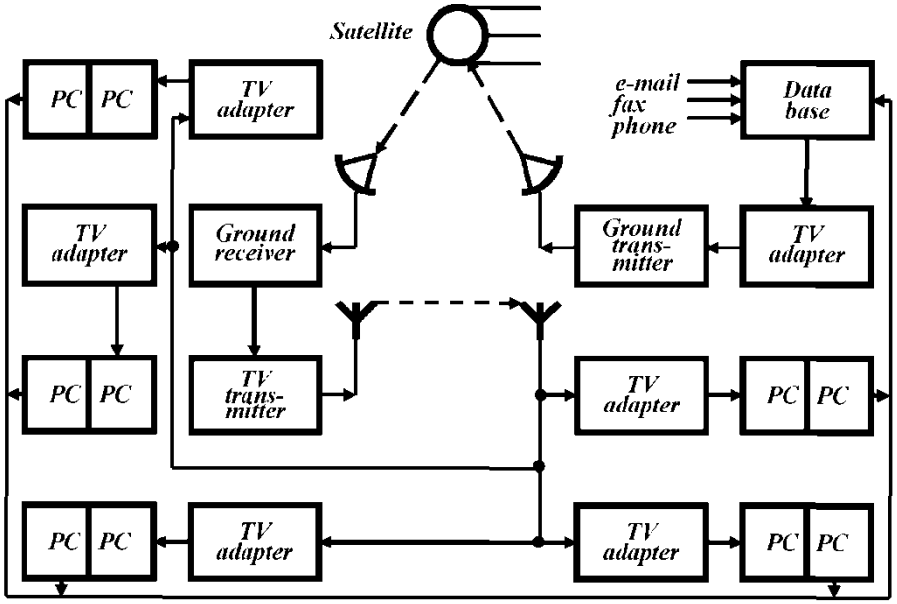

FIGURE 7. SIMPLEST IMPLEMENTATION OF THE TV•NET INFORMATION NETWORK USING LAN AND FEEDBACK LINES [10]

Correct assessment of situations and relevant managerial decisions depend on the results of analytical activities. Analytical service is just as important in scientific work. Since human rational thinking is low-factor, so far almost all known natural laws, with a rare exception (here belongs, for instance, Newton's version of Kepler's third law) are described with functions of not more than three variables. However, nature cannot be so primitive as to have only these simple regularities. Actually, it is the people who are unable to comprehend more complicated regularities with their intellect. You can make sure this is really so – just try to imagine any multi-dimensional object, for example, a four-dimensional cube (a tesseract or octachoron).

These tasks are solved by the analytical service discussed below, as well as the educational service, because developmental teaching is an integral part of fostering creative thinking.

The analytical service is intended to help users in revealing trends and regularities. Therefore, working in a way similar to the trading service (Fig. 5), the analytical service also supplies its subscribers with information, but of a different kind. However, being within the framework of the usual rational low-factor thinking, there is not much it can do to solve the problem, except for interpolation and extrapolation algorithms, algorithms for revealing correlation relationships and some others. Although, it will be quite useful in this respect, anyway.

However – and this is most interesting – the analytical service will allow implementing the multi-factor human-computer super-intelligence, which will make it possible to reveal multi-

factor trends and regularities. Certainly, this will enable users to make decisions that are more efficient in their sphere of activity.

Let us specify that human-computer super-intelligence [24] – [26] is understood as a new task alternative to the deadlocked task of creating artificial intelligence that aimed, in particular, at developing a sort of computer super-intelligence based on the computer thinking emulating human rational thinking.

Thus, let us give our reasoning. At present, a conventional definition of intelligence – either human or computer – still does not exist. Therefore, we will understand human intelligence as a set of subsystems, which includes low-factor rational thinking (active in the waking state), multi-factor unconscious thinking (active round the clock, but most of all in the state of sleep), and a number of other subsystems. The major part in this set is played by the subsystem of multi-factor subconscious thinking. It is referred to as subconscious for the reason that many people do not even realize it exists. Many other people do not understand what it is for. People do not even know why they (and not only they, but also all living beings) sleep, because they believe that in sleep they are uselessly idle.

However, nature does nothing in vain. This is why nature makes people sleep, in order to make it possible for the multi-factor unconscious thinking to process the information accumulated in the waking state by turning off all information input and output senses, as well as the low-factor rational thinking (so that they do not interfere). This is why there is a saying: " If you have a problem, sleep on it " . This is why, when someone is sick, his or her temperature is lower in the morning than at night. This is why many scientific discoveries were made in sleep. Thus, if people did not sleep, they would not survive as a biological species.

As for the much more primitive, but much faster low-factor rational thinking, nature gave it to people to use in active everyday routine for life support – getting food, performing some work, bringing up children, defending themselves from enemies, and so on. It is referred to as low-factor because it is based on processing of visual images, which are not more than three-dimensional. However, almost all real-life processes (in economics, medicine, operation of scientific and technical systems, making weather forecasts and so on) depend on a large number of factors.

At the same time, artificial intelligence tries to emulate human low-factor rational thinking. Nevertheless, eventually, it was challenged with an ambitious task of excelling human intelligence, i.e., computers were to be taught to solve intellectual tasks without a human, instead of a human and better than a human. However, this is a utopia. Actually, over the decades of research devoted to artificial intelligence, scientists have not even managed to teach a computer to tell a dog from a cat.

This is why, in view of the phenomenal successes of engineers and scientists in the advancement of computers, it is time to formulate a new problem – the problem of development of human super-intelligence, which is understood herein as the development of human-computer systems capable of solving multi-factor tasks.

The matter is that the human intelligence created by nature was not intended to solve

scientific and other intellectually demanding problems – thousands years ago people were busy with other things. However, if people turned out to be able to solve intellectually demanding tasks, this testifies only to the fact that human intelligence is highly advanced and has huge (basically unexplored) possibilities for further development, both by means of intellectual training (which is constantly done by scientists) and by means of additional use of computer resources (which is suggested herein).

Thus, in terms of implementing human super-intelligence, we are interested in the possibility of intentional, contrary to the process of unpredictable intellectual insight, use of multi-factor unconscious human thinking in the waking state. How can a computer be useful in solving the problem? In order to answer the question, let us analyse the way a scientist thinks. It is easy to see that they perform a repeated cycle of the following operations:

- first, they gather all the information available, study it and single out the significant factors relevant to the problem under investigation;
- then they look for a mathematical dependence among the significant factors revealed before and the desired result;
- then they test the revealed dependence by using it to explain the known experimental data and to perform new experiments, which are supposed to confirm the mathematical dependence under investigation;
- if the results of the new experiments do not agree with the mathematical dependence, further research of the available data is performed, and the significant factors are reviewed;
- and so on.

As can be seen, the stages of information gathering (both in a library and in the Internet) and detection of significant factors are quite tedious, even more so that the necessary information may turn out to be in the field of other sciences. At this stage, the analytical service of the TV • net computer network can be quite useful.

At the next stage of searching for mathematical dependence, a computer may be even more useful, because a human cannot comprehend functions of more than three variables.

Finally, at the last stage of harmonization of the revealed mathematical dependence with the experimental data, a computer is also very useful, because it can quickly review all possible variants and draw the attention of the researcher to the circumstances that need to be given special consideration.

However, at any of the stages a computer cannot operate without a human, because only people are able to solve indeterminate problems (let us recollect the task of telling a dog from a cat).

The educational service is also an intellectually oriented one [27], first, because creative thinking is fostered in the process of training, and, secondly, because creative people often have to get additional training or re-training in the course of their professional life.

Thus, taking into account that intellectual work is getting more and more demanded in the modern society, the primary objective of education must be the intellectual development of

people.

The educational service that solves the problem operates as follows. Using the computer-television broadcasting network – the TV • net (see Fig. 5), its users, independently or via their educational institutions, receive and download to their PCs:

- textbooks and work-books supplied with a large number of hyperlinks to other sections of textbooks (other textbooks, as well) and FAQ sections;
- supplementary further reading;
- problem books with detailed solutions of typical problems and advanced problems;
- learning and development and other software.

Having received the information, the users master the material on their own or with the help of a tutor. At that, if users have questions that cannot be answered with the help of either a tutor or the FAQ section, they can submit their questions to the database via feedback lines (Fig. 6) and get the necessary explanations.

IV. SUMMARY

Thereby, it is possible to develop economic theory that meets the criteria of the exact sciences. It is also possible to create the global crisis-proof economy.

However, economic scholars are not able to do it on their own, without the help of radio electronics, information technologies, and software development professionals. This problem must be solved by consolidated efforts.

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