Economic Problems of the Anticipation of Technology Development

Wiktor H. Adamkiewicz
Maritime University, Gdynia, Poland

Abstract
The aim of this paper is to interest scientific circles in the issue of the present level of technology development. The author thinks that it is absolutely indispensable to do research on the anticipation of further development in this scope of human activity.
This issue constitutes an important problem of our civilisation. The author has published many results of the research within this scope. This research has been carried out for 18 years. On its basis the author has introduced the notion of „The System of Instrumental Civilization" (SIC). This system deals with technical objects production and technology development. Moreover, it deals with the production of services, e.g. banking services. It develops more and more rapidly because of the progress of globalisation. It works on the principle of competition among its particular elements. It is very important that the system remains independent of the considerations on global economy. The development of the system is based on technical problems. Engineers are required to develop new technologies, which are to serve new production. The way the development of technology is realised is also essential. Technical objects are designed. The essence of designing is to make use of experience and practical examinations. A new technical object undergoes some trials. Additionally, its performance in practice is also to be tested.
Keywords: economy, technology development, anticipation, creative activity, management process.

1. The Problems of Anticipation in the Real Systems of Operation

The problems of anticipation result from the necessity to create the systems, which would have the ability to survive in the determined time intervals. Anticipation abilities of the system are the abilities to anticipate future states of the system and its surrounding, which has an impact on the existence of this system.

2. Technology as an Essential Element of the Global Development of Civilisation

The research on globalisation should consist in determining these elements, whose development is inevitable. This means: such elements, whose development cannot be hindered. Therefore, the important task is to make an attempt to determine the hierarchy of processes that have a fundamental meaning for the development of human civilisation. The important element is technology development, which gathers pace. Practical examinations are developed within this subject matter. A huge amount of

money is spent on them. They are carried out by rich companies, which later make money on patents and the copyright. The revenues of the USA include mostly these elements. The boundaries of the development of technical means are farther and faster shifted in the directions, which were previously thought to be „Science fiction". The parameters that technical means can achieve nowadays exceed by far a popular picture of technical science.

3. The Necessity of Anticipating Technology Development

On the whole globe scale there exists a large system as a whole. It may have the designation „The System of Instrumental Civilization" [SIC] (Adamkiewicz, 1995c). The main properties of the SIC system, such as social, economic, organisational and technical are independent of the regional differences. The SIC system is still in transformation and develops independently of the boundaries. The main problem is that the SIC system absorbs more and more resources only for its needs, only for the support of its self-existence and for future development. One may think that this great universal system has a great impact on all people irrespectively of various divisions, which exist among their groups. The essence of Instrumental Civilization is that each man makes use of various technical devices.

Not long ago, there were no grounds for analysing the impact of people's use of various goods on the world economy. Contrary: the analyses were oriented towards the system that would meet their needs, that is a production system. It has remained so up to the present day. Nowadays people do not make analyses of the effects of mass development of new products from the globalisation point of view. This refers to all companies. Yet, multinational corporations operating in many countries dominate. Competition forces companies to launch new products. From the technical point of view these are products of higher and higher quality. At the same time, they are designed „from one day to the next". Some companies withdraw from the market the products that did not sell, because they want to take the competitors by surprise with their new products. There is a constant fight for the position in the market. It is also quite ordinary when a company goes bankrupt, which causes in turn the growth of some other company...

Such a description of the global situation is, of course, a simplification of the problem. Yet, it is sufficient to state that the discussed companies base their development solely on microeconomic analyses. Thus, they operate in the same way as very old companies competing with one another according to Adam Smith's theory that was elaborated 250 years ago for the ideal market, which was at the same time a local market.

The above statement is also a simplification of the problem. These companies do not only make use of Adam Smith's theory. They also make use of some elements of management sciences. In this field the considerations are not any longer simplified. In management sciences there appears a phenomenon of theoretical isolation consisting in considering problems from the point of view of one scientific branch, e.g. economics, sociology, ergonomics, information technology and etc. The existing theories are applied without taking into account economic changes, a technical progress and the character of an organisation.

These considerations can be summarised with the statement that interdisciplinary research has not been carried out in management sciences for many years. The applications of the systems theory consist in doing research according to the principles of one scientific discipline and then including in this research other scientific disciplines, but according to the principles of the discipline, which constituted the basis of the research. It is worth adding that management sciences that were created a long time ago by people dealing with management practice had a systems character.
Nowadays it is necessary to start research on the present shape of the global economy. There is no permanent possibility for the development of companies operating in a similar way. These companies produce goods in quantities, which exceed the market needs. The reason is obvious: increasing competition. If there was any research on the present global situation, the companies would notice the range of changes. There would appear a necessity to ANTICIPATE the development of technology and products.
It is also possible to say that the development of technology should be controlled. Theoretically, this is not possible in the conditions of the market economy. The world economy is not, however, fully the market economy. It is not the market, which exists exactly according to the rules created by Adam Smith, either.

EXAMPLE. A drastic example is the development of nuclear bomb production. How many countries produce a bomb? What effects can this bring about in near and distant future? As far as a nuclear bomb is concerned it is good to recall what was it like with its first attempt. Hardly anybody remembers that most physicists of the USA claimed that the attempt with the bomb would cause the air to disappear from the whole planet. These remarks were neglected and a group of engineers did carry out the attempt. I am recalling this example in order to make scientists a little bit more modest.

4. Tasks of Creative Practical Activity

Tasks of practical activity are based on the principles according to which some objectives can be realised purposefully. These tasks are based mainly on previous experience. The experience allows using the prognoses concerning the future of activity. Creative practical activity consists mostly in creating or preparing for example the following objects or activities: a new product or its innovation, a new technology or its improvement, changes in the organisation of a production process or a management process, changes in the process of controlling finance and many others. This activity requires the following aspects during a creative process:

- economic,
- financial,
- social,
- psychological,
- technical,

In a creation process it is necessary to take into account all these aspects together.
Working on any objects and activities means designing. Designing has extensive literature, which does not have a scientific character. It is a set of advice and methods of performing various activities and it refers to conceptual preparation of various kinds of

undertakings. Not only projects of technical goods and technological processes. In designing one cannot distinguish separate principles for creating technical objects, organisational structures or planning various undertakings and other activities, which appear in bigger and bigger quantities.

5. The Essence of Creative Practical Activity

Project reasoning is based on specific technology of planning future events. The result is high effectiveness of activities, which is obtained by performing tasks in the way that is, unfortunately, complex and time-consuming. Its essence is the application of the sets of contrasting criteria and an iteration procedure, that means returning repeatedly to the beginning of the predicting process after obtaining new data or as a result of unsatisfactory evaluation of the achieved results. Unlike what is commonly thought, designing does not consist in making precise calculations. It is, admittedly, the most spectacular part of a designing process and as such it is most frequently shown in media. Calculations always refer only to some fragments of the project realisation. The calculations results serve solely to determine the boundaries of realisation possibilities. Majority of designing works constitute, on the other hand, a specific kind of creative activity. It consists in taking into account many different criteria of the thoroughly immeasurable character, that is: they cannot be expressed by numbers. Therefore, each decision taken during the whole course of a designing process is multi-variant and therefore the principle is to carry out the whole project in a few variants simultaneously. In short, the essence of a designing process can be presented in the following description of the procedure, which contains the successive steps:

- determining the sets of measurable and immeasurable criteria of project assessment,
- realising the designing process in an iterative way, that is verifying the effect of each designing decision on the basis of the appropriate criteria and returning to the previous decision in order to get the designing projects closer to the set objectives,
- performing a few variants of the project,
- choosing the project for the realisation on the basis of the analysis based on the accepted set of selection criteria.

A practical way to start various kinds of undertakings consists in determining as precisely as possible the boundaries of the planned action. Briefly speaking, these barriers include:

- formal possibilities of realising the undertaking,
- physical possibilities of the realisation, which are determined by nature parameters,
- technological possibilities – an access to the appropriate techniques of manufacturing,
- technical possibilities – the equipment possessed or real chances for obtaining it, economic possibilities,
- professional and mental possibilities of direct executors,
- social possibilities.

The barriers were enumerated in a hierarchical order, that is from the most restraining ones. The present civilisation has formed a lot of legal barriers, which limit the development of technical means of activities. Their aim is to ensure safety and health to people. Some branches are dominated by these regulations. An example can be: shipping. The recommendations resulting from above are troublesome and costly. This is so because they must consist in taking into account in the designing process the valid norms, regulations and recommendations, especially:

- building regulations, including technical regulations concerning various kinds of objects,
- regulations of Technical Supervision – within this range there are: power supplying installations, cranes, pressure installations, transport installations, installations for transporting liquids and gases, for storing materials, raw materials and products which must be supervised as far as safety and operation conditions are concerned,
- fire control regulations,
- sanitary regulations determining the principles of governing the land, installations, buildings and machines,
- regulations concerning safety and hygiene of work,
- regulations concerning environment protection,
- regulations concerning obtaining the permissions to start, use and preserve buildings, machines and installations,
- local administrative settlements concerning the use of land, power supply connections, piping systems, water supplying services and others.

This list does not take into account the necessity of being well acquainted with the norms and regulations concerning the production of some determined goods and technological processes, as well as quality norms, etc.

6. Designing in a Management Process

Because of the increasing globalisation of the markets and the expansion of the competitors there appeared a necessity of looking for the effective sources to lower production costs. This, in turn, is connected with the necessity of modernising companies. As a result of the occurring changes new trends came into being within management sciences. One of them is the management strategy called "Management by Projects". Its essence is the application of designing methods to plan economic undertakings. Generally, the history of this reasoning can be described in the following way. About 30- 40 years ago some people and institutions dealing with the use of network analysis methods in various branches of human activity started to organise themselves on an international scale. These methods belong to the set of basic techniques used by designers. Within this sphere engineers and representatives of social sciences cooperated with one another. Therefore, there was a confrontation of the methods used for predicting. The methods of designing various structures, including organisational structures, were developed. People dealt with designing undertakings and with the effective ways to realise the projects that had been

developed. At the same time they dealt with a number of various similar problems. In this way, a strategy „Management by Projects" came into existence.

7. Summary

7.1. High-Risk Society

Within this subject matter there are many definite examples that can be presented. Here are some of them:
The nuclear catastrophe in Czarnobyl (Soviet Union – Russia). It turned out that powerful and detailed administration as well as control in this country could not prevent this catastrophe. It turned out that there are no possibilities for a more careful observation of the process of nuclear fission. The trust in the power of modern technology and its usefulness for progress was lost. It was also disclosed that the problems resulting from the lack of possibilities to control technological and organisational processes cannot be separated territorially or politically.
The attack on the World Trade Center consisted in making use of forces, which were created by contemporary technical civilisation. Terrorists, according to Eastern martial art, made use of the opponent's forces. So, the source of threat lies in the Genes of technical power liberated unconsciously by a Western man.
Information technology specialists claim that in few years a modern society will not do without the net. Its failure will be a catastrophe of the same consequences as a war.
The appearance of HIV epidemic in the world has shown that our conviction that medicine and natural sciences have great possibilities is wrong. It does not really matter if the hypothesis that a HIV virus came from Doctor Salk's laboratories in San Diego or that it was transferred from African countries by a Canadian debauched flight attendant of some airlines is true or not.
As Ulrich Beck, a German sociologists, emphasises: most phenomena and processes, which in the other half of the previous century were accepted as the victory of the reasonable mind and social organisation over chaotic matter, already in the 1990s showed that they produce as many positive effects as unexpected and dangerous consequences.
It turned out that traditional natural sciences offered the mankind only an illusion of effectiveness. In the 20th century these sciences gave this illusion only because they could very accurately predict the results of experiments in the laboratory conditions.
As it is seen technology has dominated us. Yet, intellectual and philosophical abilities to cope with the effects of this situation do not keep pace with the scientific and technical development.

7.2. Economic Activities

Economics describes certain static reality, whereas the real world (including the economy) is a very dynamic category. Therefore, we must be careful with the statement that we understand the course of economic processes. The fact that we learnt the rules

governing economic processes in the past does not mean that we understand how they will behave in future (The Nobel Prize Winner in 1993, professor Douglas C. North). In his opinion the essential role in the development of economic activity is played by institutions. The lack of the appropriate institutional structure is a problem that most developing countries cope with.

The essential element of the development is also an ability to adapt to the present cycle in the existing economic situation. These cycles also depend on technological changes. They frequently cause shocks in the present economic situation, which are connected with the serious changes in carrying out economic activity. It was so after inventing a steam machine and then electricity. Recently, in the 1990s a similar situation was created by an information technology and communication „revelation".

I strongly believe that sociological analyses should constitute a preliminary basis for taking various political and economic decisions. Especially, the effectiveness of economic activities certainly depends considerably on the appropriate evaluation of social awareness. Such evaluations are nowadays made solely on the basis of decision-makers' intuition and their conviction that each society can be shaped according to their views. The erroneous effects of such decision can be clearly noticed.

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