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APPLICATION OF CYCLICALLY ORIENTED FORECASTING: MODERN APPROACHES TO BUSINESS MANAGEMENT

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We have identified the necessity to use cyclical forecasting in business and a sequence of development of this method based on innovation and expertise. We have further determined possible transitions between innovations which implies that technological advancement significantly facilitates growth. We have analyzed functional dependence of S-curve with the learning curve in identifying the zones with most potential growth, accelerated growth, and zone closest to asymptote.

Keywords: *management, recurrence, prediction, energy.*

Problem statement. Business management based on cyclically oriented forecasting is an integral part of the process of business organizations operation at the present stage of economic development, special attention should be paid to the effect of "periodicity in development" on management and technological processes. A significant effect over 5 recent years was caused by the global economic crisis. This crisis forced business owners and top managers to solve some tasks that required substantial revision of both the processes used in their business and business technologies. After all, these types of crises cause the transition from one technological structure to another and use of a new paradigm in business. The success of industrial and commercial activities in the current development of economic relations is possible under the condition that the expected changes are quite significant and global. Important objectives are set for both the owners of business entities of various levels, and for scientists dealing with retrospective analysis, study of the current state of the economy and forecasting problems.

Analysis of recent researches and publications. The study of business processes for significant period of time is marked by the presence of cyclical changes in their basic characteristics and parameters [1, 2, 3, 4]. In particular, for majority of industry fields one of the main factors that significantly affects this cycle, are the technical and technological innovations, that in turn cause changes.

Moreover, in literature there are different approaches to definition of the enterprise life cycle, starting from [8]. The author [9, p. 374] notes that "the life cycle

of the enterprise" is a period of time from its foundation and to the time when it stops operating or is updated on new foundations. S.V. Koryahina believes that "the life cycle of the enterprise is a set of steps that form a complete development circle during a certain evolution period of the company, after which its values and activities can absolutely change" [10, p. 26]. The definitions mentioned, and other definitions describe the process of cycling in business itself, but there are still a number of issues left concerning the problems of forecasting on the basis of periodic processes.

Previously unsettled problem constituent. However, a number of issues remain unresolved and they are directly related to the process of business management based on cyclically oriented forecasting.

Main purpose of the article. The objective of this paper is to determine the characteristics of business operation in modern conditions (effect of global economic crisis, operation in the "knowledge economy"). Research methodology is based on scientifically-oriented approaches to the study of cyclical processes and prediction of business development options. System approach to forming sequence of developmental stages based on production of basic innovations with the use of knowledge is applied.

Results and discussions. In the first place, forecasting has a significant impact on the development of high-tech business areas. These areas are the most dynamic. In particular, the use of achievements in business lead to the emergence of fundamentally new areas. Thus, the emergence of knowledge about nature of electric charge and magnetic field led to the discovery of electricity, knowledge about nature of nucleus led to the further development of nuclear power. In future it is possible (hypothetically) to develop this energy sector at the level of quarks and quanta, etc. In this series of transition from one basic innovation to another the most impact is caused by the category of "knowledge". Fig. 1 conventionally represents this process.

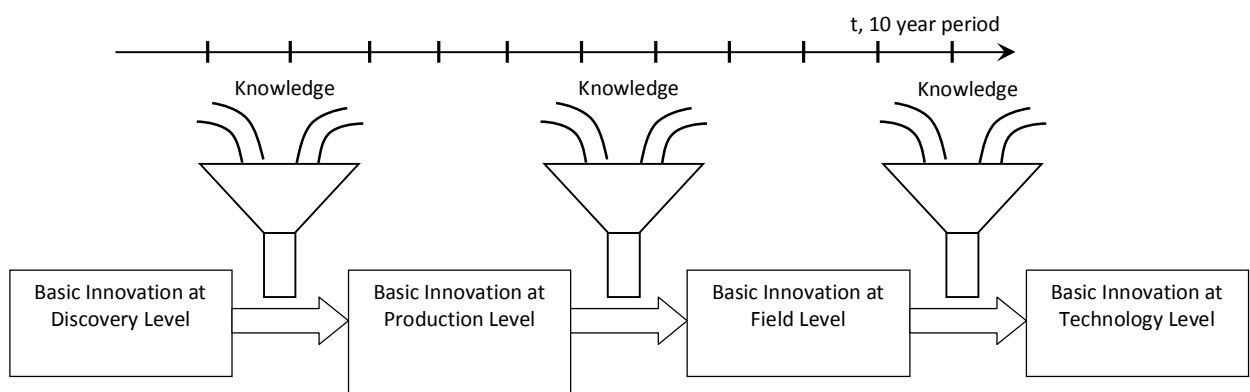


Fig. 1. The sequence of development of science and technology direction based on the basic innovations production with the use of knowledge

In our case, the process of transition to the next fundamentally new basic innovation is directly related to the use of certain knowledge, accumulated over a certain period of research. Today it can be explained with the term "knowledge economy", which is specific for the present stage of humankind development, and is especially popular for highly developed countries, newly industrialized countries and the so-called, smart-countries.

Efforts towards the development of selected technologies enable to intensify business activity of specific industry field, they can contribute to increasing of competitiveness level, and eventually to formation of a new industry. So, today in the field of energy it is possible to make significant breakthrough on the basis of achievements of cold fusion and elementary particles (basic research on hadron collider). By the way, the important part is state support for the development of knowledge-based and innovative business that needs to be implemented by the following ways:

- 1) adoption of relevant legislation;
- 2) resources provision for enforcement of fundamentals stipulated by law;
- 3) support for international cooperation, especially in the process at the stage of basic research.

The Laws of Ukraine "On scientific and technical activities" [5, p. 2 – 31] "On priority directions of innovative activity in Ukraine" [6, p. 2 – 93] for a significant period of time help to increase the efficiency of business and research activities.

These laws identify the priority areas of knowledge-intensive industries of information technology, computers, aircraft, aerospace technology, radioelectronics and others.

Business structures whose main activity is the realization of innovations constitute the basis of industrial complex in innovation directed economy, including "knowledge economy", the economy based on the latest knowledge. It should be noted that at the beginning of the intensive development of "knowledge economy ", namely in 2000, the world high technologies included biotechnology, medical technology, optoelectronics, computers and telecommunications, electronics and flexible automated production modules, new materials, aerospace technology, weaponry, nuclear technology [7, p. 314, 481 - 540]. At the moment nanotechnology, information and communication technologies (or infocommunication) were included to the list.

Technological factor significantly contributes to the development of practically all industries, opens the possibility to achieve higher values of financial indicators. This, in turn, helps to move the industry to a higher stage of development, and consumers get absolutely new products and services. However, one element of forecasting worth considering is such effect of increase as saturation region. In science, this functional dependence is characterized by S- shaped curve. Thus, the rate of indicator growth at some point starts to be limited by asymptote.

Particular attention in this aspect should be paid to consideration of "learning curve", which involves identifying the following three zones 1) zone with most potential growth; 2) zone of accelerated growth; 3) zone closest to asymptote.

Fig. 2 conventionally represents the learning curve function and its derivative, and typical zones for this function are shown.

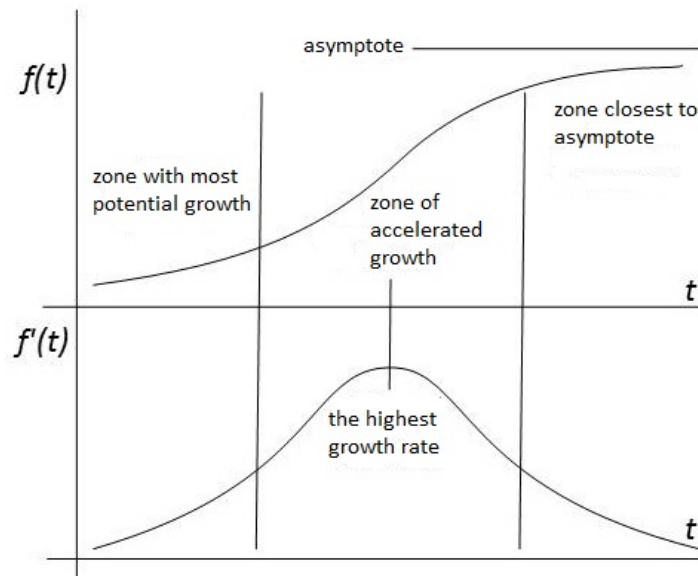


Fig. 2. Zoning of "learning curve" function and its derivative

Based on the information about possible development of a given area it is suggested to form specific requirements for certain elements of the management process. Fig. 3 shows the structure of the interrelation between certain elements included into business process.

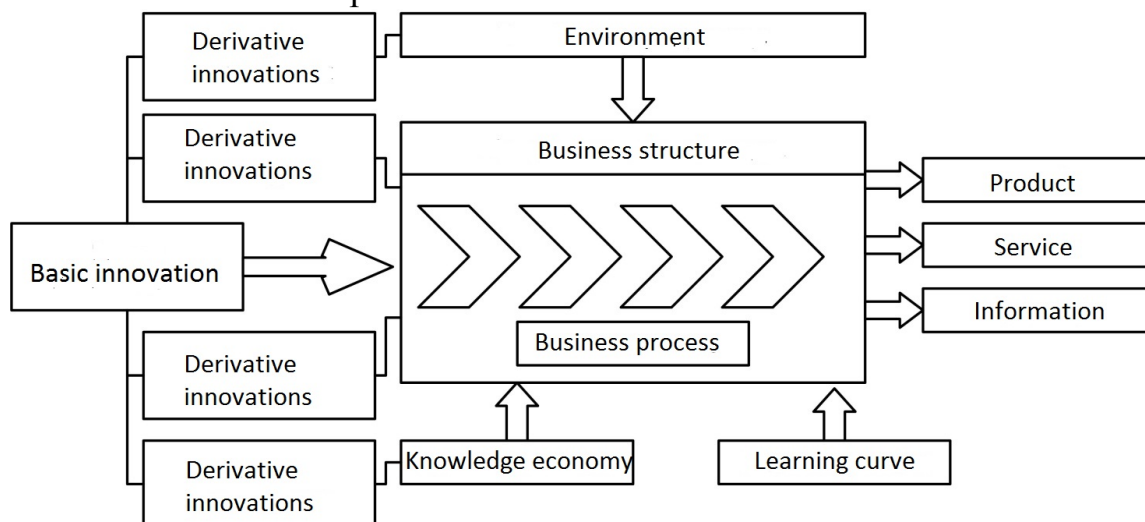


Fig. 3. Structure of interrelation between certain elements included into business process

Basis that starts the business process is the emergence of a specific basic

innovation. This innovation generates a number of derivatives, which, in turn, have an impact on other components of the business process. Thus, the process of technological forecasting should include tracking of basic innovations.

Conclusions and further researches directions. The scientific research has shown that the incorporation of the cycling concept in forecasting of possible variants in business development can properly reflect management and technological processes. Based on the logical generalization the sequence of development of science and technology direction on the basis of production of basic innovations with the use of knowledge was figured out. This sequence defined transitions from one innovation base to another. In this case the use of a basic innovation is associated with a term of "knowledge economy".

It is shown that the technology factor significantly contributes to the development, opens up additional opportunities and helps to transfer the industry to a higher stage of development. A separate study is conducted in the field of application and analysis of the functional dependence of S-shaped curve with the "learning curve" and identifying the zones with most potential growth, accelerated growth, and zone closest to asymptote.

The analysis of power industry production activities on the basis of S-shaped curve and the "learning curve" principles requires further research.

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**ЗАСТОСУВАННЯ ЦИКЛІЧНО ОРІЄНТОВАНОГО ПЕРЕДБАЧЕННЯ: СУЧАСНІ
ПІДХОДИ ДО УПРАВЛІННЯ ПІДПРИЄМСТВАМИ**

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Доведено необхідність врахування концепції циклічності у передбаченні можливих варіантів розвитку підприємницької діяльності, визначено послідовність розвитку напрямку науки та техніки на основі продукування базових нововведень з використанням знань, визначено можливі переходи від одного базового нововведення до іншого, означено те, що технологічний фактор суттєво сприяє розвитку та відкриває додаткові можливості і сприяє переходу галузі на вищу сходинку розвитку, здійснено аналіз функціональної залежності S-подібної кривої та «кривої навчання» з окресленням зон несуттєвого зростання, прискореного зростання та зони наближення до асимптоти.

Ключові слова: управління, циклічність, передбачення, енергетика.

**ПРИМЕНЕНИЕ ЦИКЛИЧЕСКИ ОРИЕНТИРОВАННОГО ПРЕДСКАЗАНИЯ:
СОВРЕМЕННЫЕ ПОДХОДЫ К УПРАВЛЕНИЮ ПРЕДПРИЯТИЯМИ**

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Доказана необхідність урахування концепції циклічності в передбаченні можливих варіантів розвитку підприємницької діяльності, визначено послідовність розвитку напрямку науки та техніки на основі продукування базових нововведень з використанням знань, визначено можливі переходи від одного базового нововведення до іншого, означено те, що технологічний фактор суттєво сприяє розвитку та відкриває додаткові можливості і сприяє переходу галузі на вищу сходинку розвитку, здійснено аналіз функціональної залежності S-подібної кривої та «кривої навчання» з окресленням зон несуттєвого зростання, прискореного зростання та зони наближення до асимптоти.

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