**. Modern scientific and technical revolution and global environmental crisis. Cybernetics.**

The most important characteristics and trends of the Cybernetic Revolution:

1. The increasing amounts of information and complication of the systems of its analysis (including the ability of the systems for independent communication and interaction);

2. Sustainable development of the system of regulation and self-regulation;

3. Mass use of artificial materials with previously lacking properties;

4. Qualitatively growing controllability a) of systems and processes of various nature (including living material); and b) of new levels of organization of matter (up to sub-atomic and using tiny particles as building blocks);

5. Miniaturization and microtization[2] as a trend of the constantly decreasing size of particles, mechanisms, electronic devices, implants, etc.;

6. Resource and energy saving in every sphere;

7. Individualization as one of the most important technological trends.

8. Implementation of smart technologies and a trend towards humanization of their functions (use of the common language, voice, etc.);

9. Control over human behaviour and activity to eliminate the negative influence of the so-called human factor.[3]

The characteristics of the technologies of the Cybernetic Revolution:

1. The transformation and analysis of information as an essential part of technologies

2. The increasing connection between the technological systems and environment;

3. A trend towards autonomation and automation of control is observed together with the increasing level of controllability and self-regulation of systems;

4. The capabilities of materials and technologies to adjust to different objectives and tasks (smart materials and technologies) as well as capabilities for choosing optimal regimes in the context of certain goals and tasks;

5. A large-scale synthesis of the materials and characteristics of the systems of different nature (e.g., of animate and inanimate nature).

6. The integration of machinery, equipment and hardware with technology (know-how and knowledge of the process) into a unified technical and technological system;[4]

7. The self-regulating systems (see below) will become the major part of technological process. That is the reason why the final (forthcoming) phase of the Cybernetic Revolution can be called the epoch of self-regulating systems (see below).

Various directions of development should generate a system cluster of innovations.[5]

*The main directions of the Cybernetic Revolution*

We suppose that during the final phase of the Cybernetic Revolution different developmental trends should produce the effect of a system cluster of innovations as is often the case with the innovative phases of production revolutions. Thus, if we consider the forecasts for the final phase of the Cybernetic Revolution in our opinion the general drivers of the final phase of the Cybernetic Revolution will be medicine, bio- and nano- technologies, robotics, IT, cognitive sciences, which will together form a sophisticated system of self-regulating production. We can denote this complex as MBNRIC-technologies.[7]

Another question is in what sphere will the final phase of the Cybernetic Revolution start? Which one will be the first? First of all, one should remember that the ‘breakthrough’ sphere will be narrow as it happened during the Industrial Revolution (when the breakthrough occurred in a narrow field – cotton industry). In a similar way, we assume that the Cybernetic Revolution will start first in a certain area. Given the general vector of scientific achievements and technological development and taking into account that a future breakthrough area should be highly commercially attractive and have a wide market, we predict that the final phase (the one of self-regulating systems) of this revolution will begin in one of the new branches of medicine. Perhaps, it has already formed (as biomedicine or nanomedicine) or it can form as a result of involving other innovative technologies into medicine. However, the development will follow the path of spreading the self-regulating systems into different new fields, their integration and development of the complex of MBNRIC-technologies.

Our assumption that the first field will be a new branch in medicine is based: a) on the analysis of the latest achievements in technologies; b) on a number of demographic and economic trends (see below); c) on the regularities obtained from the theory of production revolutions which we analyze in the following section. This section will define these regularities and the way they can be used in forecasting.

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