

SOCIO-ECONOMIC DEVELOPMENT AND MANAGEMENT OF TECHNOLOGICAL CHANGES

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Abstract: Technological changes are considered as a dominant factor of socio-economic development. Information and knowledge are treated as a resource and element of an economic potential. The conceptual approach to the analysis of information resources management mechanisms and to the information subsystems organization within economic frameworks of various levels is substantiated. *Copyright © 2002 IFAC*

Key words: innovation, information technologies, structural stability, technological and organisational changes, transformation.

1. INTRODUCTION

The major factor of modern society development has become the intensification of manufacture, distribution, exchange and consumption of growing volumes of information. The need for the creation and application of effective and adequate mechanisms of its processing and target use in economic systems has significantly increased (*Castells, 1996*).

Today there is a requirement for information mechanisms of a new type adequately reflecting interrelations of the market subjects with the appropriate methods, frameworks, instruments, technical and economic, mathematical and linguistic means of information processing.

In connection with this the stabilization tasks of the transformed economics, the problems of socio-economic development in the epoch of a global economy make one address the problems in which the features of the informational technological basis of the modern economy are reflected.

2. KEY ROLE OF INFORMATION AND KNOWLEDGE IN SOCIO-ECONOMIC DEVELOPMENT

Information and knowledge are major resources of socio-economic systems development on various control levels. Thus, an informatization process (the systemic process of information mastering, as a resource of management and control) is a development process basis for modern economic and socio-cultural life, forming a post-industrial civilization - «information society».

Information is not only a resource, but also a rather valuable commodity, which provides solutions to many problems of any participants in the market relations. By estimations of information technologies, as well as products and services market development in the years 2000-05, within the next 5 years the world will witness a powerful growth of expenses on information technologies. According to the forecasts, this year for these purposes all countries of the world will spend 1,4 bln dollars, in 2003 - 2 bln dollars, and in 2005 the world will spend 2,6 bln dollars on products and services of information technologies. Thus, the costs of information products and services will grow at an average rate of 13 % per year.

A rapid increase in and differentiation of demand for all kinds of information products and services from economic subjects under conditions of a close interaction of global and regional economic processes are the stimuli for the formation and development of the information and communication technologies markets. It is necessary to note that raising the requirements for quality and time characteristics of information services is objectively caused by the necessity for the operative solution of urgent economic tasks, which size and complexity have essentially increased in the last few years. For economic subjects of regions and branches, the quality and speed of market information processing have become the major factors of their competitiveness. These and other modern transformations in economic system, the development of entrepreneur activity, market structure development shaping and caused by these processes the necessity for fast and competent decision making have resulted in essential changes both in scales, frame, functions and information

flows and in the organizational forms and methods of processing, representations and knowledge actualization.

As for Russia that the transition to steady economic development is possible only through a combination of modern technologies, science-intensive and resource-saving manufactures with the diverse perspective forms of information management mechanisms. The information resources management plays the main role, in effect, it becomes a major maintenance way of a company's effective activity, interbranch complex, and region. The creation of management adequate information mechanisms of diverse economic objects acquires a uniform methodological basis, with the time, information and knowledge being treated as a major resource and element of the socio-economic system potential.

The construction of management information mechanism of socio-economic systems requires a complex approach making use of achievements in various fields, a synthesis of various concepts and theories. Information is one of the universal kinds of resources necessary both for the process of decision making and the formulation of strategic, tactical and operative tasks of socio-economic development. Information resources in socio-economic processes are an integrated concept comprising a set of items, being formed during the economic subjects activity, connected with socio-economic processes in industrial and administrative spheres. Information resources used in regional processes can be considered as a part of a scientific and technical regional potential, which includes databases about various elements of the strategic regional potential as well as means of communications and information processing. Information resources are both separate documents and massifs of documents in information systems (libraries, archives, data- and knowledge banks, and other information systems).

The research of scientific and technical information representation methods in various information systems, especially in knowledge banks in various subject areas of the economic profile (for example, the regional economy, economy of industrial branches, finance, banking etc.) has revealed that each subject area has its specificity which should be taken into account by developed information mechanisms. In its turn, an intellectual systems application, computer networks, the development of electronic libraries, as well as the development of all kinds of information transfer and transformation, gives rise to essentially new ways of the economic activity organization on micro-, meso- and macro-levels.

The appearance and establishment of the information industry as an independent branch of economy allow speaking about an information society attributes

formation, which main property becomes the transformation of information products and services into an object of industrial activity. As a consequence, there appears a tendency of redistribution of an appreciable part of labour forces from the sphere of material manufacture into the sphere of information services. The result of information industry activity is the information products and services: information systems, information resources, information technologies, etc.

Thus, a transition to information society, first of all, is necessary to radically perfect the «technological basis» - technical, program and linguistic means of modern information environment, through which the users are connected to information processes.

The creation, development and maintenance of information space become an integral part of material manufacture ensuring the necessary control level and labour perfection. It forms the frame of economic and socio-economic relations adequate for the productive forces development level.

In information economy, there is a regular increase in goods and services output at the expense of a constant updating of the industrial technological base. The effective demand for these goods and services limiting the production volume is determined not only by a summed-up prospective demand, but also by the size of the expected costs of obtaining, estimation and application of new information. The frame of the cumulative demand moves toward the information needs and the cumulative offer is there to increase information goods and services. There have appeared new products and new services, new branches, new specialities and new workplaces: new in form, contents, and quality. The new information technologies have turned to the independent areas of commercial activity, information business being directed to the satisfaction of information needs of a wide circle of users.

3. STATE POLICY AND SUPPORT OF INFORMATION TECHNOLOGY CHANGES

As is revealed by the experience of developed countries, the necessity and inevitability of global society informatization is a key moment of forming and realizing a state information policy. In this case the new state program "Electronic Russia" (e-Russia) under the Ministry of Communications and Information and the Russian Academy of Sciences is of interest. It started at the level of the search for the way of the main task solution – the definition of Russia's place in electronic space, finding of the optimum solutions on the way to social-economic development. Thus, the choice of the optimum solutions and technologies becomes determining for

success the "Electronic Russia" program. Its basic directions are:

- the creation and development of a uniform federal information-communication socio-economic infrastructure;
- the creation and development of regional information systems and networks combined and interacted in uniform information space;
- the formation and protection of state information resources as a national property;
- the maintenance of national safety interests in the informationsphere.

As is shown by the purpose analysis and concept contents of the state programs informatization of the information techniques and technology development IN the USA and European countries, the information-communication infrastructure of the state occupies a special place among the basic infrastructures of modern manufacturing. This infrastructure plays a determining role in the organizational technological maintenance of both the unity and integrity of information space of the country and its successful integration in the global information space. Thus for Russia, the creation of a uniform information-communication infrastructure is a necessary condition for the territorial integrity and unity maintenance of the federal state on the basis of involving all Russian regions in the common socio-economic, political and cultural life of the country.

The content analysis of the state information programs in the western countries shows that the overcoming lag behind in this sphere, under the conditions of deep political and socio-economic transformations in Russia, calls for an information policy as a multifunctional complex problem of state management determining the basic directions and methods of its realization.

The solution of each functional task of a state information policy is multimeasurable and, basically, a complete decision should include legal and organizational-technological blocks.

The formation and development of the information legislation as a uniform system of mutually dependent normative legal acts at the federal and regional levels is the basic system-forming and integrating factor of a state information policy.

To reveal the organizational technological components of the information policy functional tasks solution, we will survey these tasks as generalized processes of information processing including the following basic stages:

- Collection, accumulation, storage, and primary processing (filtration): initial information actualization.
- Complex, statistical and analytical processing, creation of new (secondary) information.

- Using initial dimensions and secondary information for decision making, reflecting the prepared information and managing factors in documentary forms.
- Diffusion and transfer of the initial and secondary information, information influences and information documents on the taken administrative decisions.

Completeness, reliability, actualization, timeliness, non-contradiction, and the security level of information resources and balance of all these characteristics define the information quality of society's activity and authority systems. The unity and interconnection of the national information resources system is the necessary maintenance condition of national information space unity and integrity.

Thus, the formation and development of a uniform, interconnected system of national information resources represents a system-forming information policy directed to the integration of the state information space into a single whole.

Russian information market specific. The Russian market system being in a formation stage has a kit of characteristics included in the information market. Characterising the market information services it is possible to note (*Sazonova, 1999*) that:

- the most part of information services is of referential character and is carried out on the basis of databases available in the region, therefore the quality of services and their assortment, in effect, is completely determined by this database quality;
- the information centres are created in all regions of the country, but they essentially differ from each other on the technological and qualitative parameters, which naturally complicates information interchange and interaction between regions at this level;
- the principles of organizational projection and management of the information products and services market are insufficiently advanced;
- the horizontal information interaction and information resources for the mass population information service is weakly advanced;
- the information frames are non-transparency in principle, and are accessible, in practice, only to large businesses, but not to small and medium-sized ones;
- the legal basis for the infrastructure functioning and market information maintenance is insufficiently prepared.

Now the information production and services market is one of the most profitable and dynamically developing sectors in the world market. The significance of this market is not only economic, but also geopolitical, and in process of the transition to information society it will be

steadily growing, with the advanced countries waging an active competitive struggle for a position and role in this market, thus moulding their status in the global community. The Russian market of information production and services has been not quite successfully integrated in the global market.

Today, the Russian market partly meets the country's needs both in software and technical means of informatization and telecommunications. According to the foreign and domestic expert forecast, in the year 2002 its growth will reach 10 bln dollars. Thus, the maximum valuation of personal computers capacity alone will amount to 20-30 mln units, with a constantly increased share of home computers in the total park from today's 15-20% to 40-70%.

However, so far the Russian market of information production and services has proved insufficiently stable with some essential deformations taking place.

To achieve stability and steady development, this market, first of all, needs a legal and other normative regulation ensuring obligatory for all market participants equal conditions and their operational rules, and simultaneously stimulating the development, economic growth and increasing domestic manufacturer competitiveness. In this sense, the given market isn't an exception, and its regulation is to be carried out within the framework of the national economic policy, including a tax, investment and customs policies.

4. FORMATION OF THE INFORMATION MECHANISMS OF REGIONAL SOCIO-ECONOMIC SYSTEMS DEVELOPMENT

The economic forms of information interactions objects, contradictions and tendencies of development of the relations between their subjects, research of the contents and forms of mechanisms and external effects from the introduction of new information technologies in economy are initial prerequisites for the appropriate mechanisms formation of the economic system development.

In the process of information mechanisms formation on various economic systems level, the primary task is the maintenance of the information system parameters conformity to the needs of the economic system, for example, on a regional level. The information mechanism of a region's economic system development represents a set of rules and procedures of transformation of the external and internal information about conditions, environment, factors, resources, processes, and the results of their functioning necessary for the maintenance of a steady and balanced economic growth. The main principle of the information mechanism formation of

the economic system development is considered to be the conformity of scales, complexity, variety of information mechanisms for the economic systems. In (*Sazonova, 2002*) it was offered a complex, interdisciplinary approach to the formation of information mechanisms of economic systems development on various levels.

The creation of the uniform information space within the regional social-natural-economic system is one of the primary directions to the formation of regional communicative environment. The uniform regional information space can be determined as a set of interconnected and mutually concerted means and ways of formation, use, storage and actualization the data information and knowledge about the regional socio-economic characteristics (citizens, objects, resources, etc.), ensuring the compatibility and interaction of federal, regional and local information systems on this territory.

The management problems of specific regional social-natural-economic systems are necessary to be solved in the context of a concrete territory. However, the allocated territory borders, as a rule, cannot coincide with the borders of existing administrative-territorial formations. Thus, the persons responsible for economic decisions making in the region have to deal with huge volumes of different kinds of information. Traditional databases and information systems are obviously not enough for the reception of necessary data on a concrete territory. Such tasks are solved with the help of an information products creation which take into account a problem-oriented section of regional socio-economic parameters. The geoinformation systems (GIS) are a potent instrument in the regional information mechanisms management structure. Now GIS application areas are quite wide: in economy, ecology, military, navigation, etc.

The GIS structure includes various information systems having the basic property - an opportunity to process and analyze the space-distributed data. The region information resources are shaped, resorting to GIS opportunities on the basis of the data supplied by regional state information organizations, reference resources; regional information systems; the statistical information from the enterprises and their information systems, etc.

An important stage in the regional information system formation is the revealing and optimization of links between the integral frameworks, for example, industry branch and ecosystem, population and labour resources, budget and credit policy. For strategic decisions making on the problems of regional development and the choice of an adequate planning and forecasting strategy it is necessary to execute a series of standard procedures of processing the initial information as well as taking

into account the functional and organizational features of regional information systems including the peculiarities of their departmental subordination.

To maintain the effective functioning of regional economic systems, the author develops a mechanism to manage information resources by means of which subsystems and their information interaction are realized. The suggested mechanism provides the acceleration and perfection of some information-management acts and management functions providing the competitiveness of regional production, financial success of the enterprises and their regional-industrial complexes, the economically safe and steady regional development on the whole. The practice has shown that the developed information mechanism rather easily adapts to the needs of various economic systems, allows considering the specificity of their sizes and places in the macro-and meso-economic hierarchy.

This mechanism can be used in the subproject "Electronic Russia in regions". Thus, the project "E-government" in the Chuvash republic is launched to automate document flow, to introduce the republican information system on the basis of the SAP AG new program solutions. In regional and city administrations of the Chuvash republic, more than 30 municipal information systems ensuring departments of social protection, public health services, finance, and property have been created.

The republican information-analytical system (RIAS) realizes the concept of "E-government". The company Intel was adviser and solution designer for this project. The International Bank for Reconstruction and Development for this Chuvashiya project has allocated 2,5 mln roubles.

The central RIAS's component is the distributed integrated data bank with two large subject sections: the economic section containing the universal information on economy, finance, and organizations, and the other part containing every possible personal data about citizens.

In the near future plans they are going to create a free-of-charge popular service of access to internal information resources and republican electronic mail, to connect it to universities, schools, libraries, to open popular classes in the Internet, items of legal information, and Internet-booths. With OLAP technology it is planned to develop the intellectual analysis system revealing the interrelation and tendencies of socio-economic processes and forecast their development.

5. MANAGEMENT OF CORPORATE ORGANISATIONAL CHANGES

Understanding corporate information capabilities include (Marchand, et al., 2001):

- information technology practice – effective management of information technology applications and infrastructure for support operation, business processes, managerial decision making, innovation and security;
- information management practice – effective management of information life cycle: collection, organization, processing and maintenance;
- information behaviors and culture – forming culture, mindsets and behaviors of company staff for effective use information.

All of the informational opportunities favour more effective economic decision making: where and how economic resources for the future development should be concentrated.

The strengthening of competitive advantages at the expense of using telecommunications and connection systems allow already nowadays to have an effect of manufacturing goods and services growth with a high share of added value and intellectual rent, promoting a rise in manufacturing in the attended branches (Sazonova, 2001).

In this case there is a necessity for the re-estimating of the base factors of creation value. The proportions of the traditional industrial factor impact on the cost structure are decreasing: fixed assets, material resources and labour. At the same time, increasing the proportions of such non-material assets as know-how, knowledge, information, in the total cost of any products have become a steady tendency.

Hammer and Champy (1993), and Davenport (1993) were shown that information technologies lead to a radical reorganisation of the organisational structure of a modern company, representing a dynamic network of business co-operation. The requirement for a fast upgrading product assortment increases the importance of such functions as production promotion, marketing, advertising, selling, consulting, engineering, legal maintenance, the costs on which are the basic or significant share of value.

The efficiency of a company's activity is sharply limited by growing expenses for the interaction with other market subjects. To put the interaction in good order, there is a need for either a rigid control or an association into vertical structures and integrated unions, with the purpose of increasing reliability and predictability of economic relations. It is just on this that the basic emphasis in the domestic practice

of reorganisation of administrative systems and structures is made.

Internet-technologies development promotes the creation of more efficient forms of interaction (Sazonova, 2000). In this case, the mechanism of reducing costs on interaction among companies is started up, as well as standardisation of business processes and data exchange formats. How e-commerce can be incorporated successfully in business strategy and be integrated with existing information system effectively, are issues of immediate concern.

The comprehension of this fact results in principal changes in mutual relations among the market subjects. The Internet acts not only as an additional marketing channel, but becomes the business tool connecting business processes of the supplier, manufacturer and consumer, and it is also forming a new economic configuration, when the customer, not the manufacturer, becomes a key figure in business. In this scheme the expenses for interaction between the companies and, as a result, manufacturing costs are sharply reduced.

In this case intellectual and information components of the cost are sharply increased in the total cost structure of modern goods, as their shares define the relative good value. The value of those goods, where the share of an information component is higher, is constantly increased, in comparison with the goods having a smaller information component. This fact can be shown by the example of the production of traditional industrial branches, also by the example of the new goods with "idea".

All of this results in the necessity for the resource concentration of a traditional economic structure for pumping them over in the post-industrial component, both while reforming the industrial enterprises and as the economy on the whole. The significant role in this process should belong to the state. In this case the author considers the complex of measures, among which Internet-technology should become one of the basic priorities for the industrial policy.

Besides, the classical company contours are washed away, and for business organisation using modern information technologies, the combinations of unique technology, a well-known trademark and a wide clients' base become sufficient. With such an approach the chain of added value is created by technological modules of companies incorporated in a certain virtual structure of the period of order performance. Such virtual collectives form, as required, its certain cost for specific need satisfaction. Thus, there is no such physical collective as organisations, and there are only special distinctive abilities, which enter the system, appearing capable to make required value.

Using outsourcing, partial or complete transfer any business-functions or business-processes to outside persons and/or organisations, is characteristic of such structures. It is practically impossible to achieve the independently maximal increasing productivity of all company operations, and sometimes it is inexpedient. It is possible to perfect performance of key functions to entrust work to them who makes it better (Kanter,2001). Thus, for many companies to realise some work, the attraction outside organisations became unexpected and called for effective solutions.

6.CONCLUSION

In conclusion it is worth noting that a systemic process of mastering information as a resource of management and regulation is a basis for a modern economic and socio-cultural life development, forming a post-industrial civilization - «information society». The conditions of the transition to information society are both radical perfection of the «information technological basis» property - program and communication means of a modern information environment - and an adequate information display of the information products and services market, because the relevant information is the necessary condition for the effective use of all other kinds of resources.

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