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**TENDENCIES IN THE TRANSFORMATION OF DIGITAL
ENTREPRENEURSHIP IN MODERN RESOURCE-SCARCE
ECONOMY**

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Abstract

The article substantiates the growing role of information as a business segment of the Russian economy, highlights trends in the development of information business in Russia. Authors formulate preconditions to the expansion of information business in the information economy and identify prerequisites and requirements to the use of CALS (Continuous Acquisition and Lifecycle Support) as a factor in improving the competitiveness of businesses. Taking into account modern realities of the development of society, economy, information technologies and the constant growth of the volume of information in external environment, authors justify the emergence and institutionalization of such a phenomenon as information business. Being in fact one of the forms of entrepreneurship, information business has ensured the growth of capital, especially of owners engaged primarily in telecommunication sector. There for it is easy to conclude that key players at the level of the national economy are countries in which this sector is most developed: the USA, Singapore, Japan and India. Information business allows us to bring key economic sectors, including the defense industry, to a new level of technological structure implementation. And thus the paper presents the authors' view on the prerequisites and process of formation of automation systems for information generation processes, as well as methods for managing information lifecycle.

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1. Introduction

Over the past four decades, the market of information technologies has expanded substantially. Once it was focused on military needs and the limited range of applied scientific tasks, but now information technologies have become an integral part of the economy of most modern countries.

In the wake of the development of scientific and technological progress, the intense formation of a new trend in business activity – information business – has begun. Taking into account the growth of deficit of resources of all kinds due to the crisis in the global economy, this type of business stimulates the redistribution of material and human resources in a number of major economies towards the sphere of information exchange and technologies. The information business is really important because it is based on information technology, which is closely linked to almost all areas of activity of a modern man. In addition, the current concept of information society has been established as a kind of postindustrial society theory, based on Brzezinski (1970), Toffler (1999) and other Western futurologists (Masuda, 1980; Line, 1984; Meluchin, 1999). In addition, the year-on-year impact of information and information technologies on the efficiency of economic processes in the country increased due to the transition from an industrial economy to a post-industrial (information).

In light of the fact that the Russian economy is in the process of transition to a postindustrial (informational), information business development begins to play a key role in ensuring the competitiveness of the country's economy as a whole. In turn, to ensure the full development of the information business, a number of specific factors should be taken into account. These factors characterize the business itself, as well as the sector of information technology. Besides, they include the demand for this type of business and its products, high-tech and the emphasis on the immaterial production, dependence on the level of development of human resources, their training.

Working out a balanced mechanism for improving efficiency focused on the assessment the changes of the key qualitative and quantitative characteristics will contribute to the development of information business.

At the same time, one of the features of the information business is that in recent years, technology update (as a resource for economic activity) in comparison with other areas of human activity occurs relatively frequently. Therefore, the information business as an area of scientific research grows regularly with new qualities and characteristics, in some cases, significantly changing the balance of power in the market of information products and technologies. This requires attention from business community, state structures and public organizations.

At the present stage of development of the world economy information, a resource, a product, a factor, etc. are actively being used. Therefore, the study of patterns and trends of information business creation allows us to justify two main things. Firstly, information business is a promising economic activity in Russia and thus should be actively used. Secondly, production of high-tech products should be increased and the competitiveness of Russia on the world market should be improved.

The aim of this research is to develop an integrated approach to ensure the effective functioning and development of the domestic sphere of information business.

The object of the research – business activity in the sphere of manufacturing and marketing of the product using information and information technology.

The subject of the research – organizational and economic, IT and legal relations arising between the parties of the information business.

2. Methods

This research was conducted using methods of the system approach, which is based on the object analysis (information business) as an integral set of elements in the aggregate of relations and relationships between them, that is, the consideration of the object as a system.

The system approach with respect to information business covers digital type of activity, revealing the prerequisites, regularities and factors of the importance of information business in order to use them more effectively. At the same time, the system approach in this case is a method of setting tasks in the process of forming a new type of economic system – information economy.

This also led to use the logical method, since it includes the reconstruction of the object as a system (analysis of the development of information business in the US, India, Singapore and Japan was carried out in the historical context). In addition, authors used the expert method and thus highlighted a special role of telecommunication companies in the field of information business, presented a list of success factors for the development of information business, summarized the statistical data on the results of key economic indicators of the largest IT companies in Russia in 2015-2016.

3. Findings

In this report, information business is used to refer to the business, focused on active and comprehensive utilization of the results of scientific and technological progress in the field of information technology.

This definition includes "the results of scientific and technological progress" which is designed to focus on the peculiarities of information business (especially at the present stage of development of the world's leading economies) and to outline that under the definition we also mean regular scientific and technological innovation, which characterizes a market economy.

Information business itself is to be regarded as one of the most competitive business models in the era of information society. Under this model, an information value theory formulated by Daniel Bell is implemented: when the knowledge in its systematic form is involved in practical recycling of resources, and one can say that it is knowledge that is the source of value (Bell, 1986). Hereunder is the list of factors that have acquired particular importance in business information (as well as businesses in the information industry) for the development of the world economy:

- Information business is gathering momentum due to increasing importance of information as a factor of production;
- Information business uses technology based on knowledge, and thus can meet an increase in economic indicators while the importance of the labor factor or production costs remains the same or even decreases;
- Business in the information industry upgrades opportunities of the economics of commodity production to a new, previously unattainable level (Bell, 1986).

In this article, we suggest considering information business as an element of a new type of the economic system –information economy. In turn, under the concept of "information economy" we understand the final step of the post-industrial economic model with a shift in emphasis towards the information and knowledge as an independent element of the economic system.

We also highlight: the subject of information business (individuals and legal entities carry out entrepreneurial activities in the field of information business); the object of information business (business processes, as interaction and impact on those activities, provide the steady development of entrepreneurship of the subject of information business).

It should be noted that the development and the launch of a number of technologies and services played an important role in the development of information business:

- the Internet: search systems (Rambler, Yandex), e-mail systems (in particular, Mail.ru), social networks (Odnoklassniki, V Kontakte);
- the field of process automation: ERP/CRM system (1C, foreign vendors: SAP, Oracle, Microsoft);
- the field of hardware solutions: from the emergence of laptops and smart phones to hardware data processing centers (DPC).

In addition, telecommunication companies occupy a special place in the field of information business (Tables 1, 2). Often the telecommunications sector is considered as a separate market, mainly due to its volume comparing to the rest of the IT market, as well as with the history of its development.

Table 1. Biggest IT-companies in Russia (CNews100, 2015)

№ 2015	№ 2014	Company name	Business sector	Total revenue, incl. VAT, thousand □		Total revenue growth 2015/2014
				Y2015	Y2014	
1	1	NKK	Group of companies	140 914 904	136 200 698	3,5%
2	2	Lanit	Group of companies	102 794 267	91 372 682	12,5%
3	5	Gazprom Automation **	IT-services	60 675 952	59 635 059	1,7%
4	3	Technoserv	IT-services	51 786 182	45 153 787	14,7%
5	4	Softline	IT-services	47 533 036	38 009 542	25,1%
6	10	Kaspersky Lab ***	Software Development	37 548 540	26 996 670	39,1%
7	-	Luxoft***	Software Development	37 542 172	18 585 442	102,0%
8	6	1C*	Software Development	35 600 000	33 300 000	6,9%
9	7	ITG (Inline Technologies Group)	IT-services	35 537 000	33 261 000	6,8%
10	11	RRC Group	Distribution AO	34 616 344	26 579 047	30,2%

* According to CNews Analytics

** The figure adjusted for Y2014

*** Figures in US dollars for Y2015 are translated at the average exchange rate of the ruble to the dollar, CBR for Y2015 - 60.66; figures in US dollars for Y2014 are translated at the average exchange rate of the ruble to the dollar, CBR for Y2014 - 37.97

Table 2. Biggest IT-companies in Russia (TAdviser100, 2016)

№ 2015	№ 2014	Company name	Revenue,incl. VAT, million □		Revenue growth 2015/2014, %
			Y2015	Y2014	
1	-	Rostec	210 700	183 000	15,1%
2	1	NKK	140 915	136 201	3,5%
3	2	Lanit	102 794	91 373	12,5%
4	3	Technoserv	51 786	45 154	14,7%
5	4	Softline	47 533	38 010	25,1%
6	10	Kaspersky Lab	37 733	26 165	44,2%
7	6	IC*	36 000	32 250	11,6%
8	5	ITG	35 537	33 261	6,8%
9	13	RRC	34 616	26 579	30,2%
10	12	I-Teco	28 635	23 816	20,2%

* Estimated by TAdviser

At the same time, there is a close connection between the telecommunications sector and the rest of the IT market, and the number of companies operating exclusively in the telecommunications sector is considered to be members of the IT market. The area of information business, with the exception of the telecommunications sector, can be treated as a type of monopolistic competition.

Based on the main characteristics of the information business in terms of IT market and telecommunications sector, we can outline a significant dependence on foreign production technologies, which is a great threat to the development of both IT market and economy as a whole. Basically, the market is focused on the internal needs of the country, with the exception of software development outsourcing. This significantly reduces the rate of the IT market in Russia and does not allow participating in the distribution of world resources in the IT sector. At the same time, we should mention that the state recognizes problems of IT companies, and programs of information business support are being prepared and implemented.

On March 1st, 2016, IDC reported a decline in the IT market in Russia in 2015. "The Russian economy is still in recession that might be proved by the reduction of IT spending by both home users as well as organizations and enterprises", - said R. Farish to IDC Vice President in Russia and the CIS (TAdviser100: IT-market of Russia, 2016). The volume of the Russian IT market estimated in dollars decreased in 2015 by 38% to \$ 17.4 billion.

Transition from an industrial to an information society is characterized by establishing necessary level of industrial infrastructure and a shift in emphasis towards increasing the efficiency of information exchange. Services in this case can be considered as a source of forming a required volume of information and performing several acts based on the information received. This separation allows one to evaluate the contribution of IT and information businesses to the transition of economic structure to a new level.

At this stage, the information business starts to play a key role in the development of economy and society. This is especially relevant in the case of developed market economies.

Development of information business in foreign countries (organization and development of information business took place in the USA, India, Singapore and Japan were analyzed) is reflected in Table 3.

Table 3. Factor analysis of information business in some industrialized countries

	Origin and creation of information business	State regulation of information business
USA	<p>IT sector dates back to 50-60 years of the last century and originated in the USA because:</p> <ul style="list-style-type: none"> – in order to respond to the military needs, active scientific researches were carried out, – basic conditions for the potential disclosure of the most promising mathematicians, physicists, experts in other fields had already been created. <p>Initiatives for the development of technology parks and industrial parks played an important role in the development of IT in America. The most significant project is the Silicon Valley.</p> <p>A high level of development of financing instruments of the system of innovation and high-tech companies contributed a lot to the development of the information business in America.</p>	<p>By the mid 90-ies of the XX century, the state equally with private capital (the industry) made a commitment to finance development of new civilian technologies that met international standards and were competitive in domestic and international markets, especially compared to Japan and Western Europe countries.</p>
India	<p>An IT sector dates back to the mid-1980s. Due to the small domestic market size, the IT sector is mainly export-oriented (in both products and services), and for a long time India was involved in the global IT market just because Indian experts worked abroad (by 1990, this brought up to 85% of revenues).</p> <p>India's main advantages which stimulate the developments of IT sector in the country are the following:</p> <ul style="list-style-type: none"> – relatively low wages in the sector compared to the US and European countries; – number of qualified staff; – country's own potential in the field of software products and in the production of computer and communications equipment; – basic mathematical culture; <p>large Indian diaspora live and work in a number of advanced countries.</p>	<p>The Government of India supported the efforts to promote IT made by businessmen. However, the industry became a national priority only in the early 1990s – it was then that the state began to take steps to improve its return to the Indian economy.</p> <p>Here are main trends of government policy to support the IT sector:</p> <ul style="list-style-type: none"> – promotion of offshore programming – creation of special zones with favorable tax and investment climate – as a result, the share of products produced in these areas has risen to 40%; – implementation of the Programme of creation of "Software Technology Parks", which main task was to form favorable conditions for exporting (communication network development, legal support provision and so on). The plan of the Programme combines concepts of export support and of a free economic zone, as well as principles of similar parks in other countries.
Singapore	<p>Though Singapore looks like a tiny dot on the world map, in the world of high technology, including IT, this island state is one of the leaders.</p>	<p>As government understood the importance of IT for the modern world, the following strategic programs were launched:</p> <ol style="list-style-type: none"> 1. The computerization of the civil service (1981); 2. National Plan for Information Technology (1986); 3. IT Plan 2000 (Intelligent Island - Intelligent Island) (1991).
Japan	<p>The Japanese experience in information business is largely affected by the overall recovery of the economy in the postwar period - the so-called Japanese economic miracle – a historical phenomenon of record economic growth, which began in the mid-1950s and lasted until the oil crisis in 1973. During this period, economy grew up to 10% per year – the highest growth rate among the developed capitalist countries of the time</p>	<p>Hereunder are the main reasons of the "miracle":</p> <ul style="list-style-type: none"> – low taxes (there was no army in Japan, and thus no public funds had to be spent on the military purposes) – Japanese science was mastering new technologies, those which were inaccessible before World War II because of the isolation policy in Japan.

The development on information business succeeded due to the following factors:

- overall positive dynamics of economic development;
- highly competitive environment, high demand for innovations;
- economy focused on external markets;
- development of innovation centres;
- development of financial instruments to support entrepreneurship;
- impact of loyal diaspora structures;
- development of the network infrastructure;
- liberalization of the commercialization of R&D;
- language trainings for the staff.

For further progress, information business should focus on development of automation systems to master processes of information creation and information lifecycle management. Such changes will move to automation of the decision-making processes, to form a new level of systems, markets and entrepreneurship, to establish a new economic model – a cyber economic model. This will be a totally new phase of development of the economic system, next to the information economy. Transition to automation of the decision-making and information-creation processes would be a distinctive feature of the new economic system. CALS-technology might become a tool for organization and information support of all participants in the product creation, production and use. Thus, the purpose of application of CALS is to improve the efficiency of participants' operations by the measures aimed at 1) accelerating the process of research and product development, 2) giving the product new features, 3) reducing costs in products production and operation, 4) increasing the service level during the operation and maintenance process (Levshina, 2009).

The CALS strategy combines the following:

- modern information technologies;
- business process reengineering;
- methods of "parallel" development;
- standardization in the field of data sharing and electronic data interchange.

In developed countries, the CALS system is considered as a complex strategy to increase the efficiency of processes related to industrial production, directly affecting its competitiveness. Back in 1983, the Japanese scientist Okino (1983) published a paper in which he asserted that the production of material objects and the accompanying processes of design, technological training and management are so different from other types of human activity that they must be responded to by a special architecture of the program-methodological, mathematical and information support.

The competitiveness increase is achieved by reducing costs (price of the product), time of new models launch, increasing product quality due to support through the lifecycle. Application of the CALS strategy is a matter of an enterprise survival in an increasingly competitive environment, both on national and international market within the next few years.

Today, CALS-technologies are an essential tool for improving business efficiency, product competitiveness and the attractiveness. CALS-technologies are actively used, especially in the development and production of complex high-tech products, created by integrated industrial structures,

which include research institutes, design bureaus, principal contractors, subcontractors, suppliers of finished goods, consumers, companies to ensure maintenance, repair and disposal of goods.

At the same time, CALS-technologies help to produce quality goods under conditions of limited resources. This efficient problem-solving technology includes electronic description of the development process, production, assembly, and etc. and thus is fully compliant with international standards (their implementation ensures release high-quality products).

IT changes the relationship between the scale, automation and flexibility that causes potentially serious consequences. Mass production no longer matters for automation. As a result, entry barriers are loosened in a large number of industries.

The use of new information technologies, including CALS-technologies, in quality systems at all stages of the product life cycle (design, implementation and operation) has two main benefits. First, it contributes to the continuous improvement of quality. Second, it allows the company management to ensure that all technical, administrative and human factors that affect the quality of goods are under control and quality management system takes into account the needs and expectations of a consumer and makes the enterprise competitive.

Today an enterprise might use a new approach in organization of work on quality improvement – the transition from the implementation of specific activities, related to the improvement of product quality, to the quality management system. This quality management system is aimed at establishing and maintaining the necessary level of quality at all product stages (development, production and operation). The success will be achieved due to systematic quality control and deliberate action on the conditions and factors influencing it.

In Russia, a lot of attention is currently paid to identify risks and improve companies' business activities. Implementation of such management systems makes customers believe that the level of services and quality of products meet the high standards and norms of the world market.

Standards help firms to ensure that the management system complies with the organization's business processes and covers all the vital areas of business.

Now, it really becomes obvious that competitiveness of Russian products is reduced, though accompanied by a large volume of papers. Main trends are listed below:

- An increase in the number and complexity of goods leads to the rise of technical materials, different instructions for operation and maintenance of equipment. Though designers work on promotion of 'consumer-friendly' equipment, their success results in a large scope of new data and thus more papers;
- Rapid changes and modification of devices make guidelines and the technical information they contain irrelevant; instructions do not reflect the actual state of the products. The value of such huge amount of paper-based information is redundant. Besides creation, storage, and the use of such data is money and time consuming;
- An increase in the range and reduction in terms of development of new products requires the staff training and the need for its rapid retraining;
- Development of automated diagnostics and monitoring is relevant for build-in functions and for special services. To process the information that they give out these tools require electronic devices. They

also allow one to automate a number of issues for troubleshooting that can significantly improve the reliability the product and its failure-free operation;

– In order to integrate into the international production community the operation and maintenance of products and equipment should be improved. We should remember that requirements for operation technology are worked out by the manufacturer in order to ensure maximum efficiency; and thus must be met. For any member of the life cycle of the product (or information systems user), this problem is reduced to a simple formula: for further processing get the necessary information at the right time in the right form, at a particular location of the enterprise network.

That is why the idea of CALS launch in Russia is so relevant. These standards use the integrated information model (database) product and process while the paper-based and simple forms of electronic document are based on the use of electronic images of paper documents.

World experience shows that introduction of information systems to the enterprise should be preceded by a serious functional and information survey of enterprise activities, this will help determine the optimal process, the allocation of resources between functions, etc. At present time, it has become almost obvious that the software-methodological core of the integrated information system and, therefore, the basis for the application of CALS-technologies in the enterprise should be systems of PDM class (Product Data Management) (Krajushkin, 2000).

According to Western analysts CALS-technologies used in US industry allows one to save tens of billions of dollars a year, to reduce the timing by 15-20%. Thus, in industrialized countries CALS is actively implemented in large-scale programs, directed and coordinated by government bodies. Currently there are more than 25 national organizations (committees or Councils on development of CALS) in different countries, including the United States, Japan, Canada, Britain, Germany, Sweden, Norway, Australia and others, as well as in NATO. For example, a special document is published by NATO CALS Organization to describe basic directions of development of CALS NATO, so called NATO CALS Handbook (or the Guide to CALS) (Levshina, 2008).

Understanding the exceptional importance of CALS-technologies, Ministry of Economy of Russia launched a complex of research on development and testing these technologies in various industries.

4. Conclusion

Despite CALS concept was once developed for military needs, its approaches and principles are widely used in non-military sectors of the economy for high-tech products with a long life cycle. In fact the widely used term 'e-business' indicates the spread of CALS concept in all types of productive, organizational, managerial and digital commercial activities, using computer systems in a single information space.

Today an effective communication is impossible without CALS-technologies, both in domestic and foreign market, for both buyers and sellers. But the main thing is that CALS-technologies can significantly reduce production costs and simultaneously improve quality and ease of use. Thus, without CALS-technologies, enterprises producing high-tech products become uncompetitive in the international market, and in future even on the domestic.

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