Sustainable development of the field of information technologies through management of integrated systems

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Abstract. Sustainable development is applicable in various sectors of the economy, including the sphere of IT-technologies and telecommunications.

The features of this sphere are the territorial organization of the information space, landscape configurations, and service tools.

The innovative environment at the enterprises of IT-technologies and telecommunications allows solving customer problems by transforming methods and technologies in difficult cases.

Currently, the problem of telecommunication coverage of remote and inaccessible areas is being addressed through integrated management systems both in Russia and abroad.

The authors offer a number of recommendations to solve the problems of obtaining telecommunication services in difficult conditions. The latest technologies in the field of communications are considered, the principles of managing enterprises in the telecommunications sector are derived. It is concluded that in the Russian regions and the mountainous terrain of Tajikistan, the system integration of innovative solutions in the field of security and IT technologies creates the possibility of creating "the Internet where it does not exist".

It is concluded that it is necessary to create an integrated telecommunications management system in combination with the flexibility of applying technologies for effective management and increasing competitiveness, as well as for maintaining the sustainable development of enterprises in the field of IT technologies and telecommunications.

Key words: sustainable development, telecommunications, integrated systems management, innovation, information space.

1 Introduction

The end of the twentieth century demonstrated that a rapid entry into the digital economy contributes to the rapid change of technology in the field of communications.

Therefore, since the 90s of the twentieth century, the emergence of telecommunications has led to the fact that the world of business and the world of consumers cannot exist outside of IT technologies. Telecommunications is an important and ubiquitous service that IT companies can provide. This is facilitated by “digital footprints” of the population, the active use of Internet services to receive and transmit information about themselves and their actions, as well as the cheapening of the tools of the digital economy, which makes it possible to use them almost everywhere.

Over the past 30 years, telecommunications have developed so rapidly that in the face of a constant crisis, digitalization has become a steady trend.
Enterprises working in this field not only acquired brands that have become worldwide, but also determined the directions for their further development. These include, for example, Vinko-T, which is part of the InformInvestGroup holding company, MiraLogic, and other similar companies. System integration of innovative solutions in the field of information security and IT-technologies today is one of the modern directions of their activities. Our task is to analyze the principles of work of IT companies based on the work of small and medium-sized businesses in this area and propose principles for the management of integrated systems in the field of telecommunications.

1.1 Literature review
As a rule, IT-business is accompanied by popular literature or study guides, which, in particular, were written by domestic authors, namely: A.V. Andreichikov G.A. Titorenko S.V., Emelyanov Yu., F.Telnov, K.V. Rochev and other authors [1-4].

The issues of system integration of IT technologies are covered in the works of the following authors, namely: David Weatherol, Andrew Tanenbaum, Sean Smith, Jamie Bartlett [5-9].

However, practice is ahead of theoretical development and requires the formation of new ideas and the management of new technologies in the field of system integration. Therefore, the necessary solutions in this area were proposed by domestic and foreign researchers [11-18].

Options for capital flows in telecommunications were also considered [19, 21].

Public-private partnerships are proposed as additional methods in the field of IT-technologies [20].

2 Materials and methods
It is necessary to determine the category of "system integration". The content of this category indicates that the achievement of a systematic solution consists in linking components and elements into a single whole, taking into account interconnections in the environment and integration risks.

In this case, not only the integrity of the system appears, but also its hierarchy, as well as emergence (integrativity), that is, the appearance of new properties in the system in the absence of these properties in the components. The system integration IT company takes a synergistic approach in its activities.

So, it is important for the customer company to obtain such an information system in the framework of its activities, which includes:
- definition and characterization of the goal set by the customer;
- integrated equipment necessary for solving assigned tasks;
- selection of the necessary information system with an appropriate interface;
- construction of information system technology management;
- introduction of control over the activities of the integrated system.

The above organization of a unified CIS implies the use of existing IT programs to solve business problems [6].

Management and organization of system integration require the formation of certain principles and conditions in different regions of IT companies.

The authors compared the operating principles of various IT companies and proposed, as a promising approach to managing system processes, the experience of the Russian company ExpertPro LLC, which, according to the authors, reflected the state of small and medium-sized businesses in the field of IT technologies.

The features of this company is a comprehensive approach to the wishes of the customer, based on the advance and integrated application of existing technologies.

The company operates in a number of regions of Russia, including in the Rostov region and the Central Chechen Republic (Voronezh, Belgorod, Kursk, Lipetsk, Tambov regions). In these regions, broadband Internet access is often a problem. In rural areas and in dense forests in these regions, it is not always possible to apply the “last mile” operational methods of such organizations as MegaFon PJSC, Vimpelcom PJSC, ER-Telecom Holding, etc.
This problem is solved by the company through the use of active monitoring and round-the-clock technical support, using its own fleet of vehicles. The company is able to build both fiber-optic communication lines (FOCL) and radio relay flights (RRL). In addition, the possibilities of covering open / closed Wi-Fi zones with the use of "seamless roaming" and the ability to authorize users have been formed.

The information security of the customer is ensured by an additional degree of protection against information interception by third parties, the stability of their work without large traffic delays.

The company organized projects for the transfer of VPN L2 100 Mb / s over a distance of more than 10 km at frequencies of 2.4 / 5 Mhz in the conditions of a "tense" radio-frequency environment.

LLC ExpertPro has its own staff of software developers. Therefore, in conditions of intense competition, it implements projects on access control and management systems (ACS) for employees of enterprises and organizations. So, “intelligent” systems are being introduced to recognize employees and guests of enterprises, electronic bracelets are used to determine the location and health status of employees in large areas, which is important in the zone of forest and mountain ranges with a low population density, for example, in Siberia.

3 Results and discussions
The business principle of the company is the slogan “Internet where it does not exist!”. Which best defines the goals of similar companies.

Thus, the principles of modern innovative management have been formed and are being implemented in the company, such as:

- an integrated approach to system integration of IT technologies;
- reliance on own human capital and own intellectual resources;
- The use of the capabilities of large telecommunication companies in the synthesis with their growing capabilities;
- development of their own solutions on rough or hard-to-reach terrain, which is typical for Russian territories;
- application of digital technologies in the field of telecommunications;
- Individual approach to each client.

The potential of such companies includes work not only in the Russian territory, where several thousand customers are served, but also in the foreign digital space, which successfully competes in the price for access and Internet traffic. This applies, in particular, to mountainous and remote areas from the capital in the Republic of Tajikistan, where integrated telecommunication systems based on public-private partnerships are applicable. This approach is also characteristic of other states with insufficient Internet distribution.

4 Conclusions
In the context of the rapid growth of digital processes, IT-technologies are an actively developing form of business implemented in small and medium-sized enterprises. The distinctive features of the management of such a business are the use of system technologies and an integrated approach to solving telecommunication problems. Based on the analysis of the activities of a particular IT enterprise, we have identified the principles of successful work, including the synthesis of our own and third-party components in the provider, including the “last mile” method, the widespread use of our own projects, intelligence and equipment to solve telecommunication problems in difficult terrain and in spaces with low population density, stimulating the development of human capital in the company, a constant desire to grow and expand the range of customer service. In the management of IT business, the principles we have identified specify the strategic objectives of enterprises and allow us to solve problems of economic sustainability in a short time.

References
[1] Telnova Yu F 2016 Information systems and technologies: Scientific publication Under. M.
UNITY 303 p.

[2] Titorenko G A 2013 Information systems and technologies: M.: UNITY 591 p.

[3] Andreichikov A V, Andreichikova O N 2016 System analysis and synthesis of strategic decisions in innovation M.: Librocom 360 p.

[4] Rochev K V 2019 Information Technology Analysis and design of information systems Study Guide Ed. 2nd, St. Petersburg, Doe 128 p.

[5] 2018 How key trends in the IT-market are changing and developing, how it affects IT solutions and IT services. Interview with S. Ponarin with Rustem Khairetdinov, Vice President of Infowatch Group of Companies CIS electronic journal 3 (5) Electronic resource. Access Mode: www.cismag.ru.

[6] Shorov K M 2012 Integration of information technology in automated control systems in modern conditions Young scientist 4 pp 191-195 URL https://moluch.ru/archive/39/4500.

[7] Weatherloom David, Tanenbaum E 2014 Computer Networks (latest edition).

[8] Sean Smith 2016 The Internet of Risky Things: Trusting the Devices that Surround Us.

[9] Jamie Bartlett 2017 Undergraduate Internet. The dark side of the world wide web.

[10] Bezpalov V V, Barashkin M V, Zharikov R V, Zharikov A R, Lochan S A 2018 Economic security of regions as a criterion for formation and development of agricultural clusters by means of innovative technologies Scientific Papers. Series: Management, Economic Engineering and Rural Development T. 18 4 pp 431-439.

[11] Nosachev K V 2019 Modern approaches in the field of information systems and processes of the scope of governance: integration based on the construction of integrated information systems Innovation and investment 2 pp 73-75.

[12] Parushina N V, Lytneva N A 2016 Accounting and analytical system of management and control of personnel Basic research 8-1 pp 191-195.

[13] Lychkina N N, Fel A V, Morozova Yu A, Korepin V N 2018 Information management systems of a production company. Textbook and workshop Moscow. Ser. 58 Bachelor. Academic Course (1st ed.).

[14] Suleymannov A I 2019 Methodology for the development of automated integrated systems (ISU) International Student Scientific Herald 6 16 p.

[15] Kutelev P V 2019 Re-engineering business processes on the basis of management system of artificial intelligence Finance and credit Vol. 25 12 (792) pp 2889-2902.

[16] Biryukova V V, Biryukov V V 2019 Strategic management of the industrial enterprise: features of formation in the conditions of innovative competition Bulletin of Omsk University. Series: Economics Vol. 17 1 pp 13-22.

[17] Grigoriev E S 2016 Automated formation of the organizational structure of the enterprise for performance of the order Bulletin of a young scientist USTU 1 (5) pp 54-62.

[18] Kungurtseva V S, Titov A B 2018 Trends and problems of innovative development of information-communication systems in the conditions of digital economy. Scientific and technical statements of St. Petersburg State Polytechnic University Economic sciences Vol. 11 1 pp 54-63.

[19] Okolelova E Y, Shulgina L V, Trukhina N I, Shibaeva M A, Shulgin A V 2019 The mechanism of evaluation under the conditions of uncertainty of innovational project as a random process. In: Popkova E. Ostrovskaya V. Perspectives on the use of new information and communication technology (ICT) in the modern economy. ISC 2017 Advances in intelligent systems and computing, vol. 726. Springer, Cham, doi: https://doi.org/10.1007/978-3-319-90835-9_7 pp 56-63 ().doi: 10.1007/978-3-319-90835-9_7

[20] Shulgin A V 2014 Public-private partnership in the innovation environment and evaluation of its effectiveness FES: Finance. Economy. Strategy 10 pp 26-31.

[21] Romanova A I, Ilina E V, Dobroserdova E A, Shindina T A, Mironova M D 2015 The movement of capital in the field of information services Journal of Internet Banking and Commerce T. 20 S1 p 010. doi: 10.4172/1204-5357.S1-010