

Artículo de investigación

The comparative analysis of it-products for the insurance sector of the Russian economy

Сравнительный анализ ИТ-продуктов для страхового сектора российской экономики
Análisis comparativo de productos informáticos para el sector asegurador de la economía rusa

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Written by:

Eliseeva D. Yu.⁵⁰**Mnatsakanyan O.L.**⁵¹**Fedosov A. Yu.**⁵²**Kuchmezov K.K.**⁵³**Abstract**

The article is devoted to the comparative analysis of IT-products for the insurance sector of the Russian economy. Within the research the comparative analysis of the software products focused on the insurance sector of economy is carried out, the main criteria for the comparative analysis of information systems for the insurance sector are developed and proved, the expert assessment of four information systems for the insurance sector of the Russian economy is carried out by the method of the analysis of hierarchies.

Keywords: Information system, software, insurance company, expert estimation, comparative analysis method.

Аннотация

Статья посвящена сравнительному анализу ИТ-продуктов для страхового сектора российской экономики. В рамках исследования проведен сравнительный анализ программных продуктов, ориентированных на страховой сектор экономики, разработаны и обоснованы основные критерии для сравнительного анализа информационных систем для страхового сектора, проведена экспертная оценка четырех информационных систем для страхового сектора российской экономики методом анализа иерархий.

Ключевые слова: информационная система, программный продукт, страховая компания, экспертная оценка, метод сравнительного анализа.

Resumen

El artículo está dedicado a un análisis comparativo de productos de TI para el sector de seguros de la economía rusa. En el marco del estudio, se realizó un análisis comparativo de productos de software orientados al sector de seguros de la economía, se desarrollaron y corroboraron los criterios principales para un análisis comparativo de los sistemas de información para el sector de seguros, y se realizó una evaluación experta de cuatro sistemas de información para el sector de seguros de la economía rusa mediante el método de análisis de jerarquía.

Palabras clave: Sistema de información, producto de software, compañía de seguros, evaluación experta, método de análisis comparativo.

⁵⁰ Russian State Social University, Moscow, Russia⁵¹ Russian State Social University, Moscow, Russia⁵² Russian State Social University, Moscow, Russia⁵³ Financial University under the Government of the Russian Federation, Moscow, Russia

Introduction

Dynamically developing segment of the Russian economy that is the market of insurance services experiences certain difficulties with creation of an effective control system of the business. Today the modern control system of any business cannot be imagined without use of information technologies which are presented by the wide range of the simple standard software helping to solve some local problems more or less well, for example automation of accounting work or reserve calculation.

Today at the Russian market there is a number of the information products focused on the insurance sector: 1C Company, Parus, Inek-Strakhovshchik (Inek-insurer), Diasoft, Tops Consulting.

This research is directed to the solution of the following tasks:

1. Carrying-out of a comparative analysis of the software products existing in the market, finding advantages and disadvantages of the existing software products;
2. Development and justification of the criteria for evaluation of information systems for the insurance sector of the Russian economy;
3. Carrying-out of expert estimation of information systems for the insurance sector of the Russian economy by the method of the analysis of hierarchies.

The automated information systems are divided into three groups: corporate information systems (CIS); specialized functional insurance AIS; Internet insurance.

Corporate information systems are intended for automation of activity of insurance companies and presented by the following products: "1C: Administration of insurance company" and "Parus-Strakhovaniye".

The software product "1C: Administration of insurance company" is the co-decision of 1C and the ORTIKON company (updating in 2012). This ERP system is intended for complex automation of business management of insurance companies and allows to automate the main sites of the management and regulatory account, to operate sales of insurance products, insurance contract portfolio, insurance, reinsurance, to build simple

and periodic payment schedules, etc. The most famous clients are "RegionGarant", "ERGO Rus"(Russia)", "NASKO" (2011 Guide to ERP Systems and Vendors, 2011; Review of the Russian market of ERP 2017).

The corporate information system "Parus-Strakhovaniye" comprises such modules as financial management, property and liability insurance, reinsurance, the analysis and the reporting, the administrator, etc. The companies using this product are the insurance corporation Surgutneftegaz, the insurance group SHEKSNA, Guta Strakhovaniye.

Some insurance companies make the decision on development of their own corporate information systems for more selective accounting of specifics of activity of the company and for specific duties of the company. This decision is very expensive both in terms of finance, and in terms of temporary and labor investments. The companies using their own developments for activity automation are Ingosstrakh and RESO Garantiya (Guarantee).

The specialized insurance AIS are IT-products which automate separate types of insurance. They are AIS OSAGO (compulsory motor insurance), AIS "SM-Polis (OSAGO)", AIS DMS (VMI - voluntary medical insurance), AIS life assurance, consumer relationship management system (CRM-systems), call centers, systems of analysis and reporting of insurance company, decision making systems, etc.

At the market of automation of insurance business there are a large number of CRM solutions:

- Microsoft Dynamics CRM;
- WinPeakCRM;
- A solution for insurance companies of Adacta group such as AdInsure and LIFEBox;
- Solutions TOPS Consulting for insurance companies;
- BPMonline Insurance.

The high popularity of such decisions is caused by:

- Severe competition in the insurance economy sector; it becomes more difficult to companies to hold customers and to attract new ones;

- Necessity of fast forming of the set of documents on a certain type of insurance, increase in speed of carrying out operations, and the CRM systems allow to have an opportunity to serve the customer and to store necessary information about him in extremely short time.

Let's consider the Microsoft Dynamics CRM software product (the functionality of others is similar) providing insurance company with the following means (Mike Snyder, Jim Steger, Kristie Reid, 2011):

- Maintaining a customer's profile allows to analyze and store information on customer's needs (existence of the vehicle, birth date) on the basis of which further to build the subsequent strategy of work with the customer;
- Management of advertising campaign; the means of the CRM System allow to make necessary marketing selections, to conduct advertising campaign effectively, to analyze their results;
- Organizing of data warehouse and the further analysis; the head of the company possesses the full information on the existing customers allowing to plan and develop effective strategy of conduct of business;
- The capacious database which contains the full report on the services and products used by the concrete customer and all customers of the company;
- Quick access of all employees to the full information on customers and opportunities of interaction of concrete customers with insurers online; such possibility increases quality of service significantly and saves time;
- The other means allowing to increase efficiency of customer service and to optimize the current business processes of the insurer (Deforche Klaas, Kenny Saelen, 2014; Hanna-Reetta Hirvonen, Kingsley John, 2012; Marc J. Wolenik, Rajya Vardhan Bhaiya, 2009; Microsoft Dynamics AX).

The clients of the system Microsoft Dynamics CRM are the agency of insurance business "Grandis", insurance broker "Axiom Inre", Insurance house VSK.

Internet insurance is an interaction between insurance company and the customer, arising at sale of an insurance product and its service via

the Internet (Statistics and information on separate subjects of insurance business; ReportLinker. Russian Insurance Industry 2018-2022; OECD, 2017). The main types of Internet insurance services are:

- Independent contribution accounting by means of the virtual calculator;
- Online advising;
- Contribution of insurance premiums; Contract support and message about loss occurrence; Filing of application and issue of policy in electronic form, etc.

Implementation of information technologies becomes a principle condition for achievement and keeping the leading positions in the market by insurance companies. All the leaders of the insurance market have already reached high professionalism directly in the field of implementation of insurance operations therefore now success or failure of the insurer mainly is defined by technological equipment (Elsin A.A., 2016; Zvonova E.A., 2015). Because the speed and quality of processing of the growing flows of information, customer service depends on the level of technical equipment that is especially relevant when the company serves a mass flow of customers which amounts hundreds of thousands or even million a year (Tarasova G.M., Kalacheva I.V., 2017).

Establishment of main criteria for the comparative analysis of information systems

Automation of the main functions and processes in activity of insurance company allows not only to increase labor productivity of personnel and to exempt highly qualified specialists from completing of routine operations, but also to create necessary conditions for widespread introduction of marketing tools for the benefit of further development of business (Khitskov, E.A., et al., 2017). Insurance company for the solution of marketing problems of various classes and degrees of complexity needs different information tools and the software, at the same time it is possible to define also a problem that is at accumulation of computing power of most insurance companies, they continue to be behind seriously on information and technological equipment (Vasiliev, R.B., Levochkina, G.A., 2014).

The following IT developments for an insurance segment of the Russian economy are subject to study:

- "PARUS-Strakhovaniye";
- "IC: Insurance company 8 CORP";
- "Inek-Strakhovshcik (Inek-insurer)";
- "Diasoft";
- "TOPS Consulting for insurance companies".

For the purpose of carrying out comparative analysis of information systems in the sphere of insurance six comparative criteria were defined.

1. Cost which will determine the sum of the prices of all modules/expansions/versions of an information system which are suitable for the sphere of insurance.
2. The qualification of employees which is defined by assessment from one to three where 1 means high qualification, 2 means average qualification, 3 means low qualification. Assessment is defined by experiment: testing of demo versions of the software or poll of experts of the sphere of insurance which used these information systems.
3. Automation is defined by assessment from one to five where 1 means that automation is minimum and 5 means that automation is maximum. The mark is put down within the considered information systems from the minimum functionality to the maximum one.
4. Availability of the training materials which is defined by assessment from one to three where 1 means that documentation, the training materials, forums became outdated (they are senior than 2 years) or are absent, 2 means that there is documentation, the training materials, forums, 3 means that there is an exit technical support which trains personnel of the company. In presence of two or more services the marks are summarized.
5. Usability of the software is defined by assessment from one to three where 1 means that it is inconveniently, 2 means that it is normally, 3 means that

it is conveniently. Assessment is defined by experiment: testing of demo versions of the software or poll of experts of the sphere of insurance which used these information systems.

6. Modernity is defined by two marks where 0 means that it is outdated information system and 1 means that it is not an outdated information system. The mark is put down according to the time of latest update of the system where 0 means that update is more than a year ago, 1 means that update is less than a year ago.

The universal method of the analysis of hierarchies was used in the conducted research. The choice is caused by the fact that this method is universal and is suitable either for difficult tasks (planning, forecasting) or for simple ones (comparison of objects) (Rob J. Hyndman, 1997). The disadvantage of the method of the analysis of hierarchies is need of obtaining large volume of information. Because in this research the most part of information is presented in open access, this shortcoming is insignificant.

The comparative analysis of information systems in the sphere of insurance

It is necessary to estimate five information systems which are used in the sphere of insurance. The software of the Tops Consulting company had to be excluded from the analysis because of impossibility to obtain necessary reliable information. Therefore, we will consider the marketing company of manufacturing firm of this software inconvenient for potential customers. In this regard, the comparative analysis is carried out among four information systems.

Stage 1. Task structuring is detecting of elements which are required to be considered at the decision. In this case it is required to consider estimates of the objects by the criteria and also importance of the criteria.

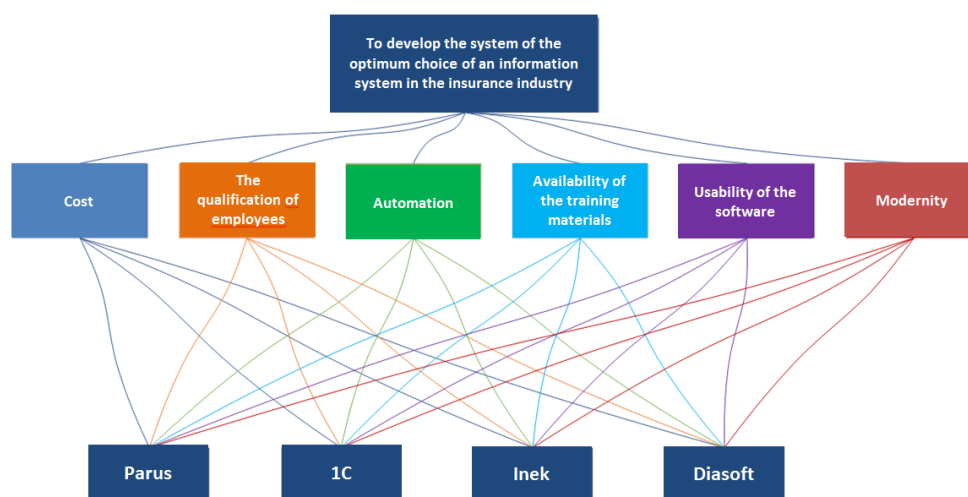
The systems which are selected for assessment differ in the cost, functionality, complexity of learning, the interface and age of a system. Basic data of a task are provided in table 1 (criteria are presented depending on an order of decrease of their importance).

Table 1. The basic data on the companies according to the chosen criteria

	Parus	1C	Inek	Diasoft
Cost, rub.	2 886 600	3 636 000	72 000	2 264 500
The qualification of employees	2	1	3	2
Automation	5	5	2	4
Availability of the training materials	3	5	1	2
Usability of the software	2	3	1	1
Modernity	1	1	0	1

Stage 2. Hierarchical view of a task is formed (refer to Fig.1). The hierarchy consists of three levels. At the first level there is only one element that is the purpose; at the second one there are

criteria by which the assessment is carried out; at the third one there are the compared objects, criteria included.


Fig. 1. Hierarchical view of a task

Stage 3. The expert estimations of preference of elements of a task are identified. At this stage the marks of importance of criteria and assessment of preference of objects are determined on each criterion. The method of paired comparison is used for this purpose that is the estimations of importance of criteria in the form of a matrix of paired comparison come to light. As a result of processing of a matrix of paired comparison there are local priorities (importance assessment) of

criteria and assessment of objects on each criterion is given.

The estimations of importance of criteria in the form of a matrix of paired comparison are defined. As there are several criteria and their names can be long, it is necessary to redefine for descriptive reasons the names of criteria (refer to Table 2):

- Cost – Cr 1,
- The qualification of employees – Cr 2,
- Automation – Cr 3,
- Availability of the training materials – Cr 4,
- Usability of the software – Cr 5,
- Modernity – Cr 6.

Table 2. The matrix of paired comparison of the estimations of importance of criteria

	Cr 1	Cr 2	Cr 3	Cr 4	Cr 5	Cr 6
Cr 1	1	3	5	7	5	3
Cr 2	1/3	1	3	5	5	7
Cr 3	1/5	1/3	1	3	5	9
Cr 4	1/7	1/5	1/3	1	5	7
Cr 5	1/5	1/5	1/5	1/5	1	5
Cr 6	1/3	1/7	1/9	1/7	1/5	1

Let's determine the costs of alternatives: $C_i = \sqrt[n]{\prod_1^n x_n}$, where i stands for the number of the line, n stands for the quantity of alternatives, x stands for the element of the matrix.

We have:

$$\begin{aligned} C_1 &= 3,41, \\ C_2 &= 2,37, \\ C_3 &= 1,44, \\ C_4 &= 0,83, \\ C_5 &= 0,45, \\ C_6 &= 1,07. \end{aligned}$$

Let's calculate the weight of alternatives: $V_i = C_i/C$, where V stands for the weight of alternative, i stands for the number of the line, C_i stands for the weight of the costs of alternative of i , C stands for the total of the costs of alternatives.

We have:

$$\begin{aligned} C &= 9,57, \\ V_1 &= 0,36, \\ V_2 &= 0,25, \\ V_3 &= 0,15, \\ V_4 &= 0,08, \\ V_5 &= 0,05, \\ V_6 &= 0,11. \end{aligned}$$

The alternative having bigger weight is considered to be the most preferable.

Further the assessment of objects on each criteria is carried out.

Assessment of objects by the criterion "Cost" is presented in Table 3.

Table 3. Assessment of objects by the criterion "Cost"

	Parus	1C	Inek	Diasoft
Parus	1	5	1/9	1/3
1C	1/5	1	1/9	1/7
Inek	9	9	1	9
Diasoft	3	7	1/9	1

Let's find the costs of alternatives: $C_i = \sqrt[n]{\prod_{j=1}^n x_{ij}}$, where i stands for the number of the line, n stands for the quantity of alternatives, x stands for the element of the matrix.

We have:

$$\begin{aligned} C_1 &= 0,65, \\ C_2 &= 0,23, \\ C_3 &= 5,20, \\ C_4 &= 1,24. \end{aligned}$$

Let's find the weight of alternatives: $V_i = C_i/C$, where V stands for the weight of the alternative, i stands for the number of the line, C_i stands for

the weight of the costs of alternative of i , C stands for the total of the costs of alternatives.

We have:

$$\begin{aligned} C &= 7,32, \\ V_1 &= 0,09, \\ V_2 &= 0,03, \\ V_3 &= 0,71, \\ V_4 &= 0,17. \end{aligned}$$

Assessment of objects by the criterion "The qualification of employees" is presented in Table 4.

Table 4. Assessment of objects by the criterion "The qualification of employees"

	Parus	1C	Inek	Diasoft
Parus	1	3	1/3	1
1C	1/3	1	1/5	1/3
Inek	3	5	1	3
Diasoft	1	3	1/3	1

Let's find the costs of alternatives: $C_i = \sqrt[n]{\prod_{j=1}^n x_{ij}}$, where i stands for the number of the line, n stands for the quantity of alternatives, x stands for the element of the matrix.

We have:

$$\begin{aligned} C_1 &= 1, \\ C_2 &= 0,38, \\ C_3 &= 2,59, \\ C_4 &= 1. \end{aligned}$$

Let's find the weight of alternatives: $V_i = C_i/C$, where V stands for the weight of the alternative,

i stands for the number of the line, C_i stands for the weight of the costs of alternative of i , C stands for the total of the costs of alternatives.

We have:

$$\begin{aligned} C &= 4,97, \\ V_1 &= 0,2, \\ V_2 &= 0,08, \\ V_3 &= 0,52, \\ V_4 &= 0,2. \end{aligned}$$

Assessment of objects by the criterion "Automation" is presented in Table 5.

Table 5. Assessment of objects by the criterion "Automation"

	Parus	1C	Inek	Diasoft
Parus	1	1	5	3
1C	1	1	5	3
Inek	1/5	1/5	1	1/5
Diasoft	1/3	1/3	5	1

Let's find the costs of alternatives: $C_i = \sqrt[n]{\prod_{j=1}^n x_{ij}}$, where i stands for the number of the line, n stands for the quantity of alternatives, x stands for the element of the matrix.

We have:

$$\begin{aligned} C_1 &= 1,78, \\ C_2 &= 1,78, \\ C_3 &= 0,3, \\ C_4 &= 0,86. \end{aligned}$$

Let's find the weight of alternatives: $V_i = C_i/C$, where V stands for the weight of the alternative, i stands for the number of the line, C_i stands for

the weight of the costs of alternative of i , C stands for the total of the costs of alternatives.

We have:

$$\begin{aligned} C &= 4,72, \\ V_1 &= 0,38, \\ V_2 &= 0,38, \\ V_3 &= 0,06, \\ V_4 &= 0,18. \end{aligned}$$

Assessment of objects by the criterion "Availability of the training materials" is presented in Table 6.

Table 6. Assessment of objects by the criterion "Availability of the training"

	Parus	1C	Inek	Diasoft
Parus	1	1/5	5	3
1C	5	1	5	3
Inek	1/5	1/5	1	1/3
Diasoft	1/3	1/3	3	1

Let's find the costs of alternatives: $C_i = \sqrt[n]{\prod_{j=1}^n x_{ij}}$, where i stands for the number of the line, n stands for the quantity of alternatives, x stands for the element of the matrix.

We have:

$$\begin{aligned} C_1 &= 1,32, \\ C_2 &= 2,94, \\ C_3 &= 0,76, \\ C_4 &= 0,76. \end{aligned}$$

Let's find the weight of alternatives: $V_i = C_i/C$, where V stands for the weight of the alternative,

i stands for the number of the line, C_i stands for the weight of the costs of alternative of i , C stands for the total of the costs of alternatives.

We have:

$$\begin{aligned} C &= 5,78, \\ V_1 &= 0,23, \\ V_2 &= 0,51, \\ V_3 &= 0,13, \\ V_4 &= 0,13. \end{aligned}$$

Assessment of objects by the criterion "Usability of the software" is presented in Table 7.

Table 7. Assessment of objects by the criterion "Usability of the software"

	Parus	1C	Inek	Diasoft
Parus	1	1/3	3	3
1C	3	1	5	5
Inek	1/3	1/5	1	1
Diasoft	1/3	1/5	1	1

Let's find the costs of alternatives: $C_i = \sqrt[n]{\prod_1^n x_n}$, where i stands for the number of the line, n stands for the quantity of alternatives, x stands for the element of the matrix.

We have:

$$\begin{aligned} C_1 &= 1,32, \\ C_2 &= 2,94, \\ C_3 &= 0,51, \\ C_4 &= 0,51. \end{aligned}$$

Let's find the weight of alternatives: $V_i = C_i/C$, where V stands for the weight of the alternative,

i stands for the number of the line, C_i stands for the weight of the costs of alternative of i , C stands for the total of the costs of alternatives.

We have:

$$\begin{aligned} C &= 5,28, \\ V_1 &= 0,25, \\ V_2 &= 0,55, \\ V_3 &= 0,1, \\ V_4 &= 0,1. \end{aligned}$$

Assessment of objects by the criterion "Modernity" is presented in Table 8.

Table 8. Assessment of objects by the criterion "Modernity"

	Parus	1C	Inek	Diasoft
Parus	1	1	9	1
1C	1	1	9	1
Inek	1/9	1/9	1	1/9
Diasoft	1	1	9	1

Let's find the costs of alternatives: $C_i = \sqrt[n]{\prod_1^n x_n}$, where i stands for the number of the line, n stands for the quantity of alternatives, x stands for the element of the matrix.

We have:

$$\begin{aligned} C_1 &= 1,73, \\ C_2 &= 1,73, \\ C_3 &= 0,19, \\ C_4 &= 1,73. \end{aligned}$$

Let's find the weight of alternatives: $V_i = C_i/C$, where V stands for the weight of the alternative, i stands for the number of the line, C_i stands for the weight of the costs of alternative of i , C stands for the total of the costs of alternatives.

We have:

$$\begin{aligned} C &= 5,38, \\ V_1 &= 0,32, \\ V_2 &= 0,32, \\ V_3 &= 0,04, \\ V_4 &= 0,32. \end{aligned}$$

Stage 4. The processing of the expert estimation received at stage 3 is carried out. The global priorities of all elements of the task representing the generalized estimations of importance (preference) of these elements come to light.

The general priority for each alternative is defined. For convenience all the amounts were tabulated.

The weight of alternatives for each criterion are presented in Table 9.

Table 9. The weight of alternatives for each criterion

	Cr1	Cr2	Cr3	Cr4	Cr5	Cr6
Parus	0,09	0,20	0,38	0,23	0,25	0,32
1C	0,03	0,08	0,38	0,51	0,55	0,32
Inek	0,71	0,52	0,06	0,13	0,10	0,04
Diasoft	0,17	0,20	0,18	0,13	0,10	0,32

To count the general priority for each alternative it is necessary to use the following formula:

$$K(B_n) = \sum_1^i X_{ni} * V_i,$$

where K stands for the general priority, B stands for the estimated object (alternative), n stands for the numerical order of the alternative, i stands for the quantity of criteria, X_{ni} stands for the element of the matrix situated in the line n and in

the column i , V_i stands for the weight of the criterion of i .

The value is higher, the general priority is higher, and, therefore, the information system with such value is more preferable than the others.

As a result the following values are received: $K(\text{Parus}) = 0,2055$, $K(1C) = 0,1913$, $K(\text{Inek}) = 0,4144$, $K(\text{Diafoft}) = 0,1888$.

The weights of the criteria:

cost (Cr1)	0,36
the qualification of employees (Cr2)	0,25
automation (Cr3)	0,15
availability of the training materials (Cr4)	0,08
usability of the software (Cr5)	0,05
modernity (Cr6)	0,11

Conclusion

The conducted research showed that the information system “Inek-Strakhovshcik” (“Inek-insurer”) has an optimum combination of parameters among all above-mentioned information systems offered for an insurance segment of the modern Russian market and allows to consider the maximum quantity of various parameters for successful business. The choice methodology offered by the authors is successfully proved, having found out the most acceptable software product from the presented range and it can be used for carrying out similar researches.

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