FORMATION OF THE MECHANISM OF INNOVATIVE DEVELOPMENT OF INSURANCE COMPANIES IN THE MARKET ENVIRONMENT

Ensuring the efficient operation and development of companies in the insurance services market in the context of globalization and growing international competition is possible only through the development and implementation of innovations. The object of the study is the services of insurance companies. Theoretical and methodological foundations of the formation of the mechanism of innovative development of companies in the insurance services market in modern economic conditions have been studied. A rating analysis of insurance companies in Ukraine was carried out and their innovative development in the market environment was substantiated. Based on the insurance protection system, an analysis was made of the use of the resources of the insurance company and the level of earmarked funds. Analysis of studies has shown that the leading insurance companies are financially stable and provide high guarantees for the preservation, accumulation and timely payment of funds. The activity of the leading company in the insurance services market of the PJSC "Insurance group TAS" (Ukraine) is considered. The analysis of experts and its position in the market of insurance services is carried out. The results of the analysis allow us to state a stable increase in its market position in terms of insurance premiums, payments and reserves. The forecasting of economic indicators based on trend models, based on the idea of extrapolation, was carried out, the results of which indicate that the gross amount of the insurance company in the planned year will increase by 21.09 % compared to 2019. It is proposed to ensure the innovative development of the insurance company through the implementation of the "Full Business Protection" program. It has been proven that its implementation will allow the insurance company to ensure continuous and stable operation. The components of the strategy of innovative development of the insurance company have been formed. A mechanism has been formed for the strategic innovative development of insurance companies, which includes 4 blocks: planning, implementation, analysis and control

Keywords: innovative development, insurance company, insurance products, trend model, insurance premiums

Iryna Litvinova
Corresponding author
PhD, Associate Professor*
E-mail: irina.litvinova.1972@ukr.net
Oksana Davydova
Doctor of Economic Sciences, Professor,
Head of Department*
Viktoria Kozub
PhD, Associate Professor**
Serhiy Kozub
Doctor of Philosophy in Economics, Chief Forensic Expert
Laboratory of Economic and Commodity Expertise
in High-Profile Proceedings
National Scientific Center «Hon. Prof. M. S. Bokarius
Forensic Science Institute»
Zaliutynska str., 8, Kharkiv, Ukraine, 61177
Tetiana Chernukha
PhD, Lecturer**
*Department of Hotel and Restaurant Business***
**Department of International Economics
and Management***
***Simon Kuznets Kharkiv National University
of Economics
Nauky ave., 9-A, Kharkiv, Ukraine, 61166

1. Introduction

As a result of globalization processes, there have recently arisen opportunities for the openness of the national market of countries for the export of modern products, services and technologies, and the expansion of the investment process. This led to the need to ensure the innovative development of state-owned companies as the most important factor in the development of the country's economy. The innovative development of companies is a management process based on the continuous search and use of new ways and areas of realizing the potential of companies. This happens in the changing conditions of the external environment within the framework of the chosen mission and the accepted motivation for activity, which is associated with the modification of existing and the formation of new services. Innovative development of Ukrainian companies is due to increased competition, promotes the development and implementation of innovations. This controlled process is the result of the rational use of company resources and a complex and mul-

tifaceted object of management, taking into account the directions of changes necessary in management. At the same time, it can be argued that the management of the company's innovative development is not limited to defining the goals of the innovation strategy, but requires assessing the company's capabilities to implement them. It follows from this that the innovative goal forms a vector of development, which should ensure the achievement of the set goals. At the same time, it is observed that a company can get the best results only if it meets its goals with the existing innovative potential, with the use of which the company develops. The choice and implementation of an innovative strategy depends on the state of the company's innovative potential, the formation of which can be carried out at the expense of the components and elements of the internal environment. A set of material, financial, social, informational and other resources forms the innovative potential of the company and characterizes the readiness for innovative development, and also affects both the structure and directions of the innovative strategy. In the countries of the world there are many companies of different levels and volumes of insurance portfolios. They have certain development prospects and their own client base. Therefore, the issues of innovative development of insurance companies are now becoming particularly relevant. The rating of the country's insurance companies requires an assessment of market experts and an analysis of insurance services. Research on this issue is relevant and appropriate, since their main aim is to ensure security, stability and consumer protection from potential risks. Therefore, the study and selection of directions for the innovative development of insurance company services in modern conditions is a priority research task.

2. Literature review and problem statement

World experience shows that one of the most important indicators of the economic situation of any market-oriented country is the development of the insurance industry. The authors of the work [1] determined that increased competition and changing consumer expectations for insurance services are becoming the main factors determining the development and dissemination of innovations in the insurance industry. But from the point of view of the authors, it is advisable to pay attention to the study of the components of the strategy of innovative development of companies in the insurance services market. Insurance via the Internet and mobile applications is gaining momentum, which is associated with improved consumer access to the Internet and becomes an additional reason for the growth of online insurance sales. When offering mobile applications to create new insurance distribution channels, insurers should first of all focus on the expectations of their consumers (current and potential) [2]. Therefore, studies of the mechanism of strategic innovative development of companies in the field of providing insurance services remain relevant. An analysis of technological innovations in the insurance industry is considered in [3]. The research is aimed at providing characteristics to the driving factors of the innovative development of the insurance industry. At the same time, insurance is one of the most innovative industries in the world. But its increased dependence on other industries has both positive and negative consequences: expanding the possibilities of insurance services, as well as the risk of personal data secu-

rity. The paper considers a SWOT analysis, with the help of which the strengths and weaknesses and existing threats of innovations in insurance activities are assessed. However, studies demonstrating the influence of the factors under consideration on certain types of insurance products in the market environment have not been carried out enough. This confirms the feasibility of conducting research to analyze the rating of insurance companies by types of insurance products. The emerging auto insurance market is in a phase of strong growth and is expected to accelerate in the next few years. From an international perspective, Europe and North America account for the vast majority of auto insurance services and active policies. The leading markets include the US, Italy and the UK. Consumers and commercial fleet managers are increasingly opting for insurance that uses telematics devices to track driving behavior. With such devices, consumers can pay lower insurance premiums and improve driving quality, while insurers can attract safer drivers with less risk. These benefits encourage us to explore changes in the insurance market and quickly expand program availability. However, there are no results of the influence of this method of auto insurance on insurance premiums and insurance payments, which emphasizes the relevance of further research in this direction [4–6]. In [7], the influence of managerial decisions on the composition of life insurance participation assets on the cost of the policy from the point of view of policyholders is considered. The influence of the risk situation of the insurer is also considered. Insurers in these contracts invest a significant part of their capital in long-term assets (corporate and government bonds). The impact of market risk associated with the composition of assets on the fair assessment and assessment of risk has been studied, attention is focused on credit risk and its interaction with equity and interest rate risk. However, insufficient attention has been paid to the analysis of the positions of companies in the insurance services market, which indicates the need to study this issue. The application of the market valuation methodology to the most common non-commercial life insurance contracts promoted in the UK is given in [8]. Such agreements are also valid in other European countries and Japan. These contracts contain comprehensive warranties and option-like features that are not analyzed elsewhere in the literature. The paper focuses on the fair execution of these contracts. However, the evaluation results are limited to the types of insurance products, which leads to the expansion of research in this direction.

In [9], the place of the insurance market in the financial system is determined. The analysis of the insurance market of the country in 2011-2016 was carried out according to the main indicators: the dynamics and volumes of gross and net premiums, the number of insurance companies, insurance payments, considered insurance reserves, assets and how the authorized capital is increased. Analyzed macroeconomic indicators such as the density and depth of insurance, the level of insurance payments. Their optimal values in the development of the insurance market are determined. The problems of the modern national insurance market are revealed and the ways of innovative development are proposed. It should be noted that the authors made a thorough analysis of the insurance market, however, forecasting economic indicators based on mathematical models by calculating the parameters of the trend model remains relevant. The problem of a comprehensive analysis of the main indicators of the competitiveness of insurance companies and determining the

factors that determine the level of competition in the market becomes extremely relevant. Using the concentration index and indicators of market competition, the authors assess the competitive environment of the Ukrainian health insurance market, identifying the advantages and disadvantages of its application [10]. Without refuting the importance of the research, it remains relevant and appropriate to determine the positions of companies in the health insurance market in terms of insurance payments and insurance reserves. Consequently, insurance provides reliable protection of the property interests of entrepreneurs and the population from potential risks in case of unforeseen circumstances, as well as to solve social problems. This allows to state that the conduct of a study devoted to the analysis of the positions of companies in the insurance services market, forecasting economic indicators based on trend models in order to ensure the innovative development of insurance companies is justified.

3. The aim and objectives of the study

The aim of the study is to develop the conceptual foundations for the innovative development of the company in the insurance services market in modern economic conditions. To achieve the aim, the following objectives were set:
– conduct a rating analysis of insurance companies;
– determine the positions of companies in the insurance services market;
– carry out forecasting of the gross amount using a trend model;
– form a mechanism for the innovative development of insurance companies in the provision of services.

4. Materials and methods of the study

The basis of the study is the analysis of the activities of the insurance group and the identification of potential reserves for innovative development. The following methods of scientific search were used directly to solve the problems posed in the work: informal (logical) and formalized (mathematical). Namely: methods of induction and deduction, analysis and synthesis to generalize the existing scientific and theoretical approaches to the innovative development of insurance companies. The analysis of experts and positions in the market of the insurance group was carried out, taking into account the requirements of sustainable development, determination of key environmental factors. They influence the choice of the strategy of innovative development of the insurance company. Generalization, multivariate analysis, decomposition and formalization are used. Statistical analysis methods were used to identify key trends and conduct a rating analysis of insurance companies in Ukraine. The economic-mathematical dynamic model, in which the simulated development of the economic system is reflected through the trend of its main indicators, is a trend model [11, 12]. The first stage of forecasting is the analysis of the gross amount, premiums, calculation of basic and chain growth and growth rates. Preliminary analysis of the time series of economic indicators consists in identifying and eliminating anomalous values of the levels of the series, as well as determining the presence of a trend in the original time series. At the first

stage, Irwin method was used to identify anomalous levels of time series:

$$\lambda_t = \frac{|y_t - y_{t-1}|}{\sigma_y}, \quad t=2, 3, \dots , n, \tag{1}$$

where n – the number of levels in the time series;
y_t – time series point;
σ_y – standard deviation:

$$\sigma_y = \sqrt{\frac{\sum_{t=1}^{n}(y_t - \bar{y})^2}{n-1}}, \tag{2}$$

where $\bar{y}$ – the arithmetic mean of the time series:

$$\bar{y} = \frac{\sum_{t=1}^{n} y_t}{n}. \tag{3}$$

At the second stage, the presence of a trend is determined using the method of checking the difference in the average levels, carried out in four stages.

At the first stage, the initial time series y_1, y_2, y_3, y_n is divided into two equal parts according to the number of levels: in the first part there are n1 first levels of the initial series, in the second part there are n2 other levels ($n_1+n_2=n$).

The third stage consists in checking the equality (homogeneity) of the variances of both parts of the series using the Fisher F-test.

At the fourth stage, the hypothesis of the absence of a trend is tested using Student's t-test (t).

After determining the presence of a trend, the type of growth curve is determined. To select the type of polynomial growth curve, the most common method is the finite difference method (Tintner method).

At the first stage of this method, differences (increments U_t) of the k-th order inclusive are calculated:

$$u_t^{(1)} = y_t - y_{t-1},$$
$$u_t^{(2)} = u_t^{(1)} - u_{t-1}^{(1)},$$
$$\dots\dots\dots\dots\dots\dots\dots\dots$$
$$u_t^{(k)} = u_t^{(k-1)} - u_{t-1}^{(k-1)}. \tag{4}$$

For a polynomial of the first stage (direct):

$$y_t = a_0 + a_1 t. \tag{5}$$

The next step is to assess the adequacy of the model.

For adequate models, the task of estimating their accuracy is posed. The accuracy of the model is characterized by the deviation of the model from the real value of the modeled variable (economic indicator). For the indicator of the specified time series, the accuracy is defined as the difference between the value of the actual level of the time series and its estimate obtained by calculation using the model.

In this case, the following are used as statistical indicators of accuracy:
– the average relative approximation error:

$$\bar{E}_{rel} = \frac{1}{n} \cdot \sum_{t=1}^{n} \left| \frac{y_t - \hat{y}_t}{y_t} \right| \cdot 100 \%, \tag{6}$$

– coefficient of convergence:

$$\varphi^2 = \frac{\sum_{t=1}^{n}(y_t - \widehat{y}_t)^2}{\sum_{t=1}^{n}(y_t - \overline{y})^2}, \qquad (7)$$

where n – the number of levels in the series;

$\widehat{y}_t$ – estimation of the levels of the series by the model;

$\overline{y}$ – the arithmetic mean of the levels of the series.

– coefficient of determination:

$$R^2 = 1 - \varphi^2. \qquad (8)$$

The final stage is the forecasting of economic characteristics.

Forecasting economic indicators based on trend models, like most other methods of economic forecasting, is based on the idea of extrapolation.

An interval forecast based on trend models is carried out by calculating a confidence interval – such an interval in which, with a certain probability, the actual value of the predicted economic indicator can be expected.

The calculation of confidence intervals for forecasting using growth curves is based on the conclusions and formulas of the regression theory. In the case of a straight-line trend, a similar formula for pairwise regression can be used to calculate the confidence interval, so the forecast confidence interval (U_y) in this case will look like this:

$$u_y = y_{n+L} \pm t \cdot S_y \cdot \sqrt{1 + \frac{1}{n} + \frac{3 \cdot (n + 2L - 1)^2}{n \cdot (n^2 - 1)}}, \qquad (9)$$

where L –the warning period;

y_{n+L} – point forecast according to the model for $(n+L)$ – th point in time;

n – the number of observations in the time series;

$S_{\widehat{y}}$ – the standard error of the estimate of the predicted indicator, calculated according to the above formula for the number of model parameters equal to two; t is the tabular value of the Student's test for the significance level a and for the number of degrees of freedom equal to $n-2$; number of degrees of freedom 6−2=4. The visualization of the obtained results was carried out using a graphical method.

5. Results of the study of the conceptual foundations of the company's innovative development in the insurance services market

5. 1. Rating analysis of Ukrainian insurance companies

Insurance, in addition to its main protective function for the consumer - ensuring the financial protection of the insured against possible damage, property damage and losses – also performs its integral functions: accumulation and investment storage.

According to the rules of insurance, the recognition of insurance premium income begins from the moment the insurance contract comes into force, that is, from the moment the insurance cover is provided. The beginning of the contract is considered the moment of signing the application or passing a medical examination when the customer pays the premium for the first year.

The rating of insurance companies is formed on the basis of a multivariate analysis that takes into account the impact of insurance reserves, assets, premium levels by type of insurance, the level of indemnities and other parameters. It is also an assessment of the availability/openness of information about the company, including the company's website and consumer reviews. Thanks to the method used, the rating of the best insurance company is formed.

Table 1 shows the activity ratings of insurance companies in terms of insurance premiums and insurance payments in the Ukrainian market during 2019 [11].

Table 1

Rating of insurance companies by insurance premiums and insurance payments in Ukrainian market for 2019

Rating	Insurance premiums	Insurance payments
	Name of the insurance company	
1	ARX	UNIQA
2	UNIQA	ARX
3	IG «TAS»	IG «TAS»
4	ARSENAL Insurance	PZU Ukraine
5	PZU Ukraine	INGO Ukraine
6	INGO Ukraine	ARSENAL Insurance
7	VUSO	Universalna
8	ALFA Insurance	PROVIDNA
9	ASKO	Kniazha
10	Universalna	Oranta

The leading positions (Table 1) in terms of insurance premiums and insurance payments in the country's market are occupied by ARX and UNIQA. PrJSC IG TAS" took the third place. Achieving such positions is possible with the expansion of income generation and functioning in various types of activities. This indicates a stable position in the provision of insurance services, an increase in insurance volumes and stable development in market conditions.

The rating of insurance companies by types of insurance products for 2019 is given in Table 2 [11, 13] and for 2017–2018 is given in Tables 3, 4 [11].

Table 2

Rating of insurance companies by types of insurance products in 2019

Rating	MCLI	CASCO	Tourism	Green card	The medicine
	Insurance company				
1	IG «TAS»	ARX	PZU Ukraine	IG «TAS»	UNIQA
2	Oranta	ARSENAL Insurance	ERV	Persha	PROVIDNA
3	UPSK	UNIQA	Kniazha	INGO Ukraine	INGO Ukraine
4	IC «USI»	INGO Ukraine	IC «GURDIAN»	Kniazha	ARX
5	Kniazha	PZU Ukraine	VUSO	Oranta	ALFA Insurance
6	PZU Ukraine	Universalna	IG «TAS»	PZU Ukraine	NaftoGaz strakh
7	VUSO	IG «TAS»	Ukrfinstrakh	ASKO	Kraina
8	ALFA GARANT	Express insurance	PROVIDNA	UTICO	PZU Ukraine
9	ARX	VUSO	ARX	–	IG «TAS»
10	ARSENAL Insurance	VIDI Insurance	Universalna	–	Universalna

An analysis of insurance companies shows (Table 2) that the TAS insurance group occupies a leading position, as in 2018, in the rating for the MCLI insurance product, as in 2017 – the "green card". In terms of CASCO, it ranks ARX, in tourism – PZU Ukraine, in medicine – UNIQA. From the rating of the ten largest insurance companies in the country, it should be noted that in 2019 they provided high guarantees for the storage, accumulation and timely payment of funds for insured events.

PrJSC "Insurance Group "TAS" (Table 3) ranks first in the rating for MCLI insurance product, ARX for CASCO, PZU Ukraine for tourism, GLOBUS for green card, and UNIQA for medicine. In 2018, these insurance companies provided insurance coverage in society, were financially sound and stable in the market environment of insurance services.

As a result of the analysis of insurance companies that rank first in the rating by types of insurance products in 2017 (Table 3), it is possible to state that they are implementing a common development strategy to increase insurance products and increase the volume of insurance in the market.

Analysis of the rating of the insurance group "TAS" is shown in Fig. 1.
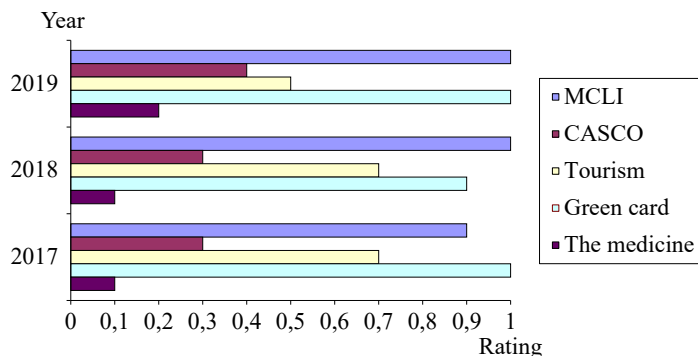

Fig. 1. Analysis of the rating of the insurance group "TAS"

PrJSC "Insurance Group" TAS "(Fig. 1) in terms of the insurance product MCLI and the" green card "occupies a leading position. According to the insurance product tourism in 2019, it lowered its position and took 6th place. But in CASCO and medicine, she improved her position. The lowest rating of the offered insurance products is occupied by medicine. But in recent years, PrJSC Insurance Group TAS has been a leader in all types of insurance services.

Thus, from the rating of the ten largest insurance companies that occupy the first places in the rating in the country's insurance market, we can conclude that they have earned a reputation as financially stable companies that flawlessly fulfill their obligations.

5. 2. Determination of the company's position in the insurance services market

The goal of PJSC "Insurance group "TAS" is to make life as easy as possible for its consumer and, communicating with him, act not as a seller, but as a financial consultant, adviser, trusting expert. In this context, the instant payout project has been introduced, under which reimbursement is paid within five days.

In 2019, IC "TAS" became the winner in the nomination "Leader of MCLI" in the rating according to the leading business publication "TOP-100". The nominees included leading representatives of the banking, insurance and other segments of the financial market.

Currently, the insurance company occupies a leading position in the insurance market of Ukraine in terms of insurance payments. The main efforts of the insurance

Table 3

Rating of insurance companies by types of insurance products in 2018

Rating	MCLI	CASCO	Tourism	Green card	The medicine
	Insurance company				
1	IG «TAS»	AXA Insurance	PZU Ukraine	GLOBUS	PROVIDNA
2	Oranta	UNIQA	ERV	IG «TAS»	UNIQA
3	UPSK	ARSENAL Insurance	VUSO	Persha	NaftoGaz strakh
4	IC «USI»	Ukraine insurance group	IG «TAS»	INGO Ukraine	AXA Insurance
5	Kniazha	INGO Ukraine	Ukrfinstrakh	PZU Ukraine	INGO Ukraine
6	PZU Ukraine	PZU Ukraine	Kniazha	Kniazha	ALFA Insurance
7	PROVIDNA	Universalna	Universalna	Oranta	Ukraine insurance group
8	UNIQA	IG «TAS»	AXA Insurance	UTICO	PZU Ukraine
9	VUSO	Express insurance	PROVIDNA	ASKO	Kraina
10	ARSENAL Insurance	VUSO	Persha	–	IG «TAS»

Table 4

Rating of insurance companies by types of insurance products in 2017

Rating	MCLI	CASCO	Tourism	Green card	The medicine
	Insurance company				
1	Oranta	AXA Insurance	VUSO	IG «TAS»	PROVIDNA
2	IG «TAS»	UNIQA	PZU Ukraine	Persha	NaftoGaz strakh
3	PROVIDNA	Ukraine insurance group	ERV	ІНГО Україна	UNIQA
4	UPSK	ARSENAL Insurance	IG «TAS»	GLOBUS	AXA Insurance
5	Kniazha	INGO Ukraine	Укрфінстрах	PZU Ukraine	PZU Ukraine
6	PZU Ukraine	PZU Ukraine	Кремень	UTICO	INGO Ukraine
7	UNIQA	Universalna	Kniazha	Kniazha	Kraina
8	AXA Insurance	IG «TAS»	PROVIDNA	Oranta	ALFA Insurance
9	DOMINANTA	Express insurance	Universalna	ASKO	Ukraine insurance group
10	VUSO	VUSO	AXA Insurance	–	IG «TAS»

group are focused on creating high-quality insurance products with competitive advantages that are interesting for the consumer.

Analysis of the market position of the insurance group is presented in Table 5 [11, 13].

All calculations that are given in the studies are made in the national currency of Ukraine. Let's accept in calculations the exchange rate set by the National Bank of Ukraine. The US dollar (USD) exchange rate is UAH 23.7. per dollar. The euro (EUR) exchange rate amounted to UAH 26.3 per euro.

The results of the analysis of the insurance group "TAS" allow to state an increase in its positions in the market in terms of insurance payments and insurance reserves (Table 5). Insurance premiums for "green card" payments have been in the first position for four years. Net premiums also solidified its third position, making the company one of the first in the country. Health insurance is increasing its position in the service market. There is a strengthening of the company's positions in all types of insurance premiums, except for tourism. Analysis of positions in the market environment includes several more types of insurance services. The main efforts of the insurance group are focused on creating high-quality insurance products with competitive advantages that are interesting for the consumer.

Insurance group "TAS" is constantly growing, developing effectively, regularly disseminates the results of its work, providing official reports on changes in the composition and volume of the insurance portfolio. In 2019, the company increased the number of insurance payments.

An analysis of the structure of insurance premiums (%) at the end of 2019 is shown in Fig. 2.

An analysis of the distribution of the share of the main insurance products in the portfolio for 2019 (Fig. 2) led to the following conclusions: policies for MCLI car owners occupy the largest share in the portfolio. They account for more than 33.30 % of total receipts, health insurance accounts for 7.04 %. The smallest part is occupied by property (2.2 %).

The strategic role and significance of profit requires the analysis and evaluation of all components that make up the financial results of an insurance company.

In modern conditions, the analysis of the financial results of the activi-

ties of insurance companies is considered to ensure stable, successful activities and further increase in profits and profitability.

Analysis of monetary characteristics – the profitability of insurance services is presented in Fig. 3 [11].

Table 5

Analysis of the position in the market of the insurance group "TAS", mln. USD

| Index	2015	2016	2017	2018	2019
1 Insurance premiums	607,4	763,2	1023,9	1387, 8	1815,1
market position	11	9	7	5	3
2 Net insurance premiums	541,2	666,6	912,1	1 247,7	1 649,6
market position	7	6	3	3	3
3 Insurance payments	212,4	262,2	371,3	545,5	727,0
market position	11	9	7	4	3
4 Insurance reserves	328,7	446,9	661,8	1078,7	1 380,6
market position	7	6	6	4	3
Incl. insurance premiums by type					
OSGPO	171,1	207,8	290,3	481,2	604,5
market position	3	3	2	1	1
Green map	222,9	251,2	245,1	273,0	367,4
market position	1	1	1	2	1
CASCO	78,8	114,1	168,7	255,0	354,3
market position	11	8	8	8	7
Property (second risks)	16,7	30,8	42,0	39,2	41,4
market position	18	16	11	14	14
The medicine	44,3	40,5	58,2	85,4	127,7
market position	14	13	11	10	9
Tourism	16,3	30,7	49,5	79,0	90,5
market position	9	6	4	4	6
Compliance other	57,3	88,1	170,1	175,0	229,3
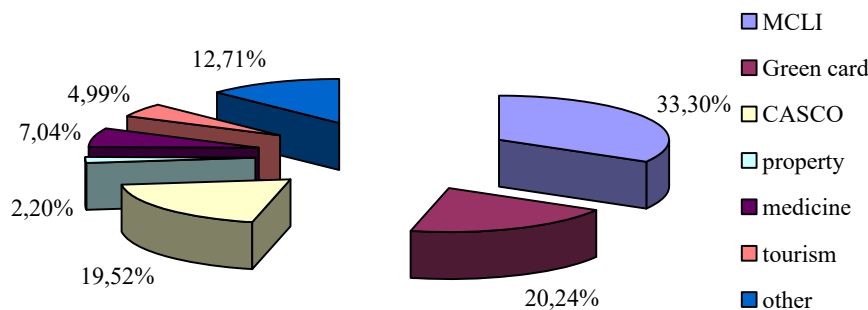
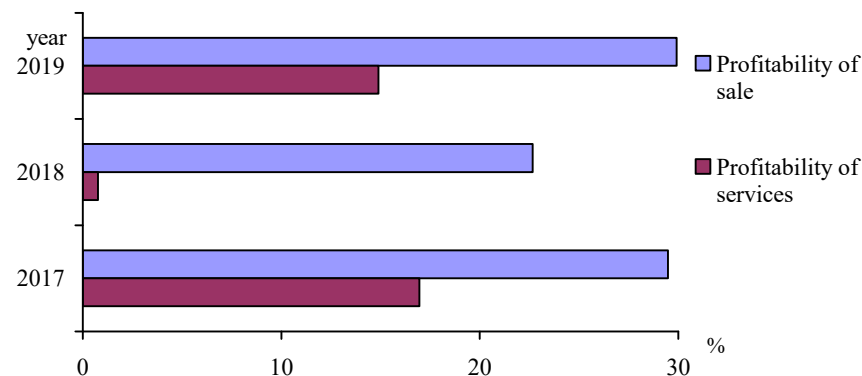Fig. 2. Analysis of the structure of insurance premiums for 2019

Fig. 3. Analysis of the profitability of insurance services

From the analysis of financial indicators, it can be concluded that gross profit in 2019 increased by 161.512 million UAH compared to 2018, and by 184.768 million UAH compared to 2017 or by 79.27 %. The growth rate was 163.00 %. The net financial result of profit compared to 2018 also increased by UAH 104.128 million UAH and compared to 2017 by 45.33 million UAH or by 72.01 %.

Profitability is the main relative indicator of monetary results of the insurance company. The profitability of the company's insurance services in 2019 increased by 7.25 % compared to 2018, but by 0.43 % compared to 2017 (Fig. 3). The dynamics of indicators allows us to conclude that it is of an increased nature. The company's return on sales in 2019 increased by 14.13 %, these positive changes in profitability indicators occurred as a result of an increase in profit, but decreased by 2.06 % compared to 2017. This was due to an increase in insurance payments for the period under review.

All these factors have a positive impact on the development of insurance and ensuring its continuous financing. Therefore, the insurance company must be financially viable and provide insurance compensation to the insured at a certain moment of the occurrence of the insured event and be perceived as a form of innovative development.

5. 3. Forecasting the gross amount using a trend model

Gross amounts, bonuses, calculation of basic and chain growth rates and growth are given in Table 6 [11, 12].

Fig. 4 shows the dynamics of the gross amount, premiums for the last three years in the semi-annual context of the TAS insurance group.
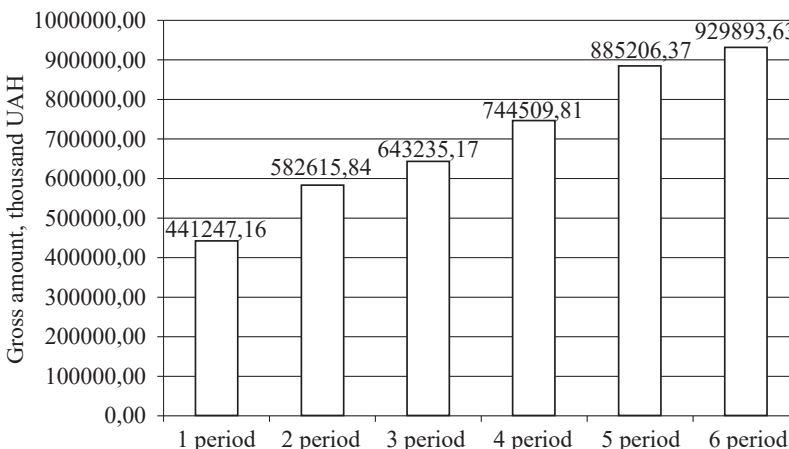
Table 6

Gross sums, premiums of PrJSC Insurance Group TAS

Yeaar	Gross amount, premiums, thousand UAH.	Growth rate, %	
		basic	chain
2017	1023863,00	100,00	100,00
2018	1387744,98	135,54	135,54
2019	1815100,00	177,28	130,80

The arithmetic mean of the time series and the standard deviation calculated using (2) and (3) are, respectively, $\bar{y}$=704451.330 thousand UAH and σ_y=85994.106 thousand UAH.

The results of calculations by (1) the Irwin criterion (λ_t) are given in Table 7.

Fig. 4. Dynamics of the gross amount, bonuses, thousand UAH

Table 7

Estimated values of the Irwin criterion

Criteria value (λ_2)	Criteria value (λ_3)	Criteria value (λ_4)	Criteria value (λ_5)	Criteria value (λ_6)
0,760	0,326	0,545	0,757	0,240

Tabular value of the Irwin criterion (confidence probability P=0.95):

n=3; Irwin criterion λ_t=2.3;

n=10; Irwin criterion λ_t=1.5.

Interpolation results:

2,3 − 1,5=0,8; 0,8/(10 − 3)=0,114; 1,5 − 0,114 · 4=1,144.

Since Irwin's criterion λ_i<1.144, then all levels of the series are not considered abnormal.

Results of calculations at the second stage:

$\bar{y}_1$=555699.390 thousand UAH; $\bar{y}_2$=853203.270 thousand UAH; σ_1^2=10743160506.392; F=1.148, n_1−2= =n_2−2=3−2=1, F_{table}=162 (P=0.95).

Since F_{exp}<F_{table}, the hypothesis of equality of variances is acceptable.

The results of calculations for the fourth stage:

t_{exp}=3.634>t_{table}=1.533, i. e. there is a trend, so the type of growth curve can be determined by the Tintner method.

To approximate economic processes, fourth-order finite differences are calculated (4). The calculation results are presented in Table 8.

The order k=1 is chosen – a polynomial of the first step (straight line).

After determining the shape of a straight line, its parameters are determined using the least squares method. The data for calculating the straight line (5) are given in Table 9.

Table 8

Calculation of 4th order differences

Number of levels	Time series point (y_t)	1st order growth ($u_t^{(1)}$)	2nd order growth ($u_t^{(2)}$)	3rd order growth ($u_t^{(3)}$)	4th order growth ($u_t^{(4)}$)
1	441247,16	–	–	–	–
2	582615,84	141368,68	–	–	–
3	643235,17	60619,33	−80749,35	–	–
4	744509,81	101274,64	40655,31	121404,66	–
5	885206,37	140696,56	39421,92	−1233,39	−122638,05
6	929893,63	44687,26	−96009,30	−135431,22	−134197,83

Table 9

Data for calculating the equation of a straight line

Number of levels	Duration of time (t)	Time series point (y_t)	Time series level (y_t) for time (t)	Duration of time (t^2)	Estimation of the levels of the series by the model ($\widehat{y}_t$)	Network model $\left(\left\|\dfrac{y_t - y_t}{y_t}\right\|\right)$
1	1	441247,16	441247,16	1	457860,00	0,0376
2	2	582615,84	1165231,68	4	556496,53	0,0448
3	3	643235,17	1929705,51	9	655133,06	0,0185
4	4	744509,81	2978039,24	16	753769,60	0,0124
5	5	885206,37	4426031,85	25	852406,13	0,0371
6	6	929893,63	5579361,78	36	951042,66	0,0227
Total	21	4226707,98	16519617,22	91	–	0,1732

Based on the data in Table 9 the system of normal equations has the form:

$$\begin{cases} 6a_0 + 21a_1 = 4226707.98, \\ 21a_0 + 91a_1 = 16519617.22, \end{cases}$$

where a_1=98636.53; a_0=359223.47.

Therefore, the trend equation will look like:

$$\widehat{y}_t = 359223.47 + 98636.53t.$$

The reduced indicators are determined by (6)–(8): $\overline{E}_{rel}$=2.89 %; φ_2=0.0157; R_2=0.9843. To calculate the upper and lower confidence intervals, (8) were used; the calculation results are given in Table 10.

Thus, the calculation of the parameters of the trend model indicates that next year the gross amount of the insurance company may amount to 2,197,994.91 thousand UAH, which is 21.09 % more than in 2019.

Table 10

Results of forecast confidence interval calculations

Time (t)	Step (L)	Point forecast ($\widehat{y}_{n+L}$)	Forecast confidence interval	
			Lower limit	Upper limit
7	1	1049679,19	1006528,32	1092830,06
8	2	1148315,72	1104669,32	1191962,12

5. 4. Formation of the mechanism of influence of the planned measures on the innovative development of the insurance company

It is proposed to ensure the innovative development of the insurance company through the further implementation of the "Full Business Protection" program.

As a result of the implementation of this program, we will consider the components of the company's innovative development strategy in the following areas (Fig. 5).
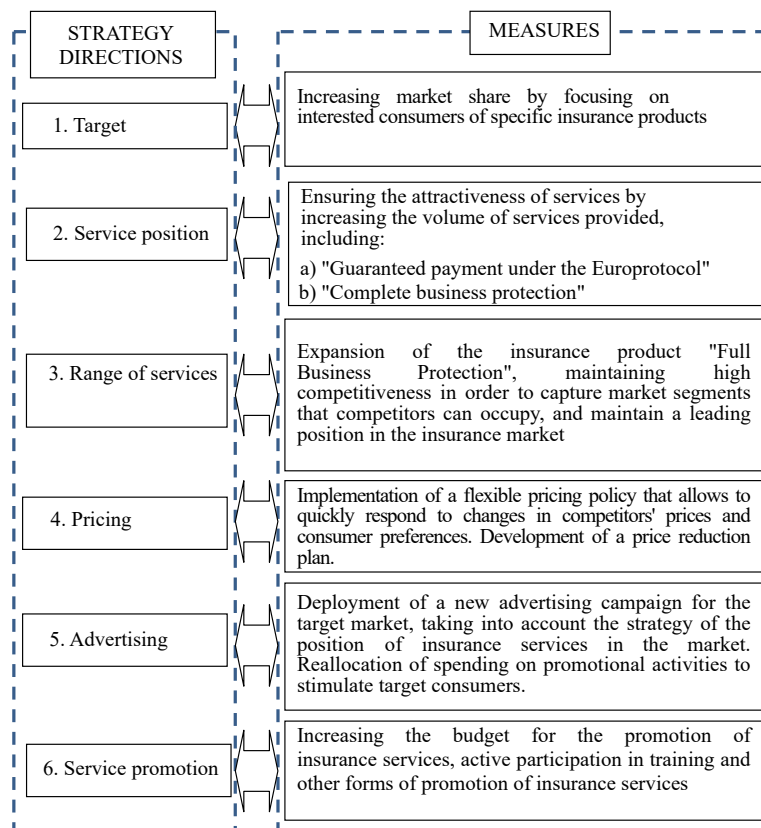

Fig. 5. Components of the innovation development strategy

"Full business protection" is a comprehensive property and liability insurance program for entrepreneurs – owners of small and medium-sized businesses: shops, retail chains, private clinics, cafes, restaurants, hotels, beauty salons, hairdressers, dry cleaners, etc. This is a reliable insurance protection of property and business facilities to ensure its continuous and stable operation [14].

PrJSC "Insurance group" TAS "when promoting the insurance product" Full business protection "may provide for the following evaluation criteria:

– compliance with the internal and external conditions of the company's activities (taking into account regional specifics);

– compliance with the general strategy of economic development;

– the optimal ratio, compliance with development goals, functional efficiency, the company's ability to flexibly adapt to market changes, information transparency.

According to the logic of strategic management and a systematic approach, a mechanism for the strategic innovative development of insurance companies in the provision of services has been developed and characterized, which includes 4 blocks (Fig. 6): planning, implementation, analysis and control.

This list can be expanded according to the conditions that form an effective strategy.

For each company, the content of innovation development management is unique and depends on the specific conditions of the organization's functioning, as well as the influence of external and internal factors.

6. Discussion of the results of the study of innovative development of insurance companies

A rating analysis of the activity of insurance companies was carried out (Table 1). These companies occupy a leading position in the market due to the following factors:

– secure placement of funds in national and freely convertible currency;

– reliable insurance protection of health and life;

– stable growth of insurance premiums and payments;

– timely response to changes in the needs of its and potential consumers;

– immediate payment of insurance compensation in case of an insured event;

– professional service.

From the rating of the ten largest insurance companies (Tables 2–4), it is possible to conclude that their reliability is ensured not only by significant authorized and reserve funds, but also by the existing mechanism for reinsurance of large risks. These companies occupy the first places in the rating in the insurance market of Ukraine. The companies work with leading international reinsurers of the world.

Based on the above ratings (Fig. 1), the Insurance Group TAS in recent years provides high guarantees for the preservation, accumulation and timely payment of funds.

The authors of [10] considered the development trends in the health insurance market, which are problematic in the Ukrainian market, and the competitive positions of the leading insurance companies in it. The calculated integral indicator makes it possible to conduct a comprehensive study of the market behavior of market participants.

The research results (Table 5) indicate that the company has been confidently holding a leading position for several years. Yes, insurance premiums rank third on the market in 2019. Insurance premiums for the analyzed period increased almost three times. Net insurance premiums in 2019 consolidated their positions in third place, which brought the company to one of the first places in Ukraine.

An analysis of the distribution of the shares of the main insurance products in the portfolio in 2019 (Fig. 2) proved that the policies of the MCLI car owner occupied the largest share in the portfolio. This indicates confidence in the design of the insurance product in the service market. The smallest part is occupied by property.
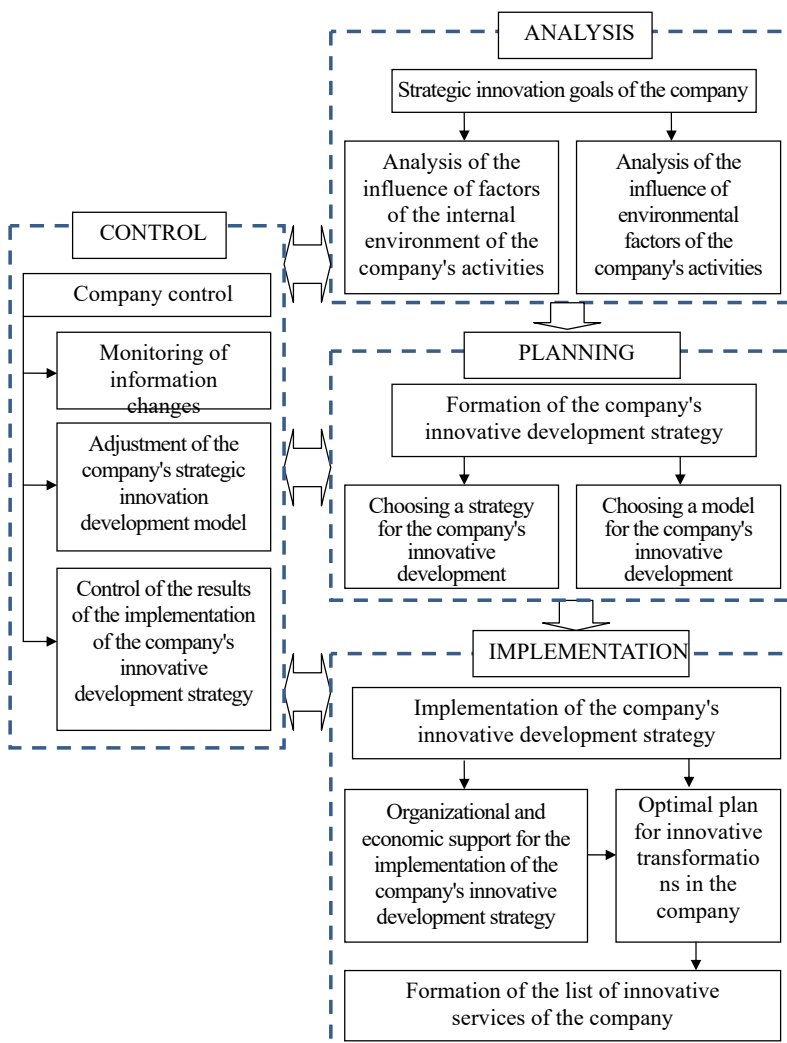

Fig. 6. The mechanism of strategic innovative development of insurance companies in the provision of services

Calculations of financial indicators (Fig. 3) of profit and profitability in market conditions show that the results have improved over the period under review. This gives confidence in the activities of the insurance company to ensure the insurance protection of society.

Table 4 shows the dynamics of the gross premium amount for three years in a semi-annual context (based on the results of the studies given in Table 6).

Forecasting the parameters of the trend model (Tables 7–10) indicates that next year the value of the gross amount may increase by 21.09 %.

The mechanism of innovative development of the company (Fig. 5, 6) allows to include in its structure elements related to the management and development of innovative strategies. They are inseparable from the overall strategic mission of the company, namely, forms, means, methods, tools, models that ensure the efficiency of all systems in interaction.

All these studies show that the innovative development of domestic insurance companies is not only the result of innovative changes in the management system, but also a necessary condition for their successful functioning. The innovative development of insurance companies is considered as a controlled transition to a better quality state, which is characterized by obtaining a leading position in the service market.

But the study has certain limitations. It is very difficult to evaluate the contribution of professional consultants and high-quality experts with rich experience and deep knowledge to the innovative development of insurance companies.

The disadvantages of this study include the lack of research into the conclusion of additional contracts for the transfer of insurance or financial risks. In an insurance contract, this risk is random and therefore unpredictable.

Therefore, it can be argued that the key to the successful development of the insurance group is the continuous improvement of the company's activities, focus on leading management methods and technologies.

In the future, it is advisable to study the innovative development of insurance companies in the following areas: resource efficiency, management of insurance and financial risks, development of appropriate strategies for the profitability of insurance products and ensuring sustainable competitive advantages.

7. Conclusions

1. A large number of insurance organizations of different levels and volumes of insurance portfolios operate in Ukraine. They have certain development prospects and their own client base. The leading positions in terms of insurance premiums and insurance payments in the Ukrainian market are occupied by ARX and UNIQA and PJSC "SG" TAS. They have built a reputation for financially sound companies that deliver on their commitments flawlessly. These companies occupy the first positions in the market due to:
– reliable placement of funds in national and freely convertible currency;

– reliable insurance protection of health and life;
– excess of the profitability coefficient over the inflation coefficient;
– stable growth of insurance premiums and payments;
– timely response to changing needs of its and potential consumers;
– immediate payment of insurance compensation in the event of an insured event;
– professional service.

2. One of the largest companies in the insurance market of Ukraine is PJSC Insurance Group TAS, as evidenced by the leading positions in the ratings. The reliability of the company is ensured not only by significant authorized and reserve funds, but also by the existing mechanism for reinsurance of large risks. The company works with the world's leading reinsurers. It implements a general development strategy to increase the volume of insurance and is steadily moving towards achieving its strategic goal - to be the number one company in the Ukrainian market. However, it should be noted that there are negative fluctuations in certain profitability indicators as a result of economic instability in the country.

3. The forecasting the value of the gross amount using a trend model is done. The calculation of the parameters of the trend model indicates that next year the gross amount of the insurance company may amount to 2,197,994.91 thousand UAH, which is 21.09 % more than in 2019.

4. The innovative development of insurance companies is not only the result of innovative changes in the management system, but also their successful functioning.

The innovative development of companies is seen as their controlled transition to a better quality state. It is characterized by the acquisition by the company management system of the properties of adaptability (the ability to more effectively respond to changes) and innovation (the ability to implement internal changes in companies). It is proposed to ensure the innovative development of the insurance company through the implementation of the "Full Business Protection" program. TAS Insurance Group will continue to explore new opportunities in new service areas. It provides a high return on capital and conducts business in accordance with modern world standards, market developments that meet the needs and requirements of consumers. The recommendations on the formation of a mechanism for the implementation of the proposed areas of innovative development of the company according to the selected projections are substantiated. According to the logic of strategic management and a systematic approach, a mechanism for the strategic innovative development of insurance companies in the provision of services has been developed and characterized, which includes 4 blocks: planning, implementation, analysis and control.

Thus, the development of Ukrainian insurance companies in the context of globalization and growing international competition is possible only through the development and implementation of innovations. The innovative development of insurance companies contributes to further commercialization and stable long-term success in the national and international markets.

References

1. Bednarczyk, T. H., Jańska, A. (2015). Product and Process Innovations in Property Insurance for Individuals. Annales Universitatis Mariae Curie-Skłodowska, Sectio H, Oeconomia, 49 (4), 45. doi: https://doi.org/10.17951/h.2015.49.4.45

2. Szymańska, A., Bednarczyk, T. H., Klapkiv, J. (2018). Rozwój dystrybucji ubezpieczeń majątkowych online w Polsce w latach 2005-2016. Ekonomika i Organizacja Przedsiębiorstwa, 5, 82–94. Available at: http://bazekon.icm.edu.pl/bazekon/element/bwmeta1.element.ekon-element-000171537387

3. Klapkiv, L., Klapkiv, J. (2017). Technological innovations in the insurance industry. University in Lublin, University of Łódź. Journal of Insurance, Financial Markets and Consumer Protection, 26 (4), 67–78. Available at: https://depot.ceon.pl/bitstream/handle/123456789/14333/RU26-5.pdf?sequence=1&isAllowed=y

4. Karapiperis, D., Brandenburg, A., Birnbaum, B., Brande, A., Castagna, S., Greenberg, A. et. al. (2015). Usage-Based Insurance and Vehicle Telematics: Insurance Market and Regulatory Implications. National Association of Insurance Commissioners.

5. Telematics Update. Insurance Telematics Report (2014). Available at: http://saiv.espaceweb.usherbrooke.ca/References/236_2014_InsuranceTelematicsReportExtract_19p.pdf

6. Global Insurance Telematics Subscriptions to Exceed 100 million by 2018, but Auto Insurance Faces Dramatic Changes (2013). Research, ABI. Available at: https://www.abiresearch.com/press/global-insurance-telematics-subscriptions-to-excee/

7. Eckert, J., Gatzert, N., Martin, M. (2016). Valuation and risk assessment of participating life insurance in the presence of credit risk. Insurance: Mathematics and Economics, 71, 382–393. doi: https://doi.org/10.1016/j.insmatheco.2016.10.006

8. Ballotta, L., Haberman, S., Wang, N. (2006). Guarantees in With-Profit and Unitized With-Profit Life Insurance Contracts: Fair Valuation Problem in Presence of the Default Option. Journal of Risk and Insurance, 73 (1), 97–121. doi: https://doi.org/10.1111/j.1539-6975.2006.00167.x

9. Zhuravka, O. S., Vasylchuk, A. Y. (2017). Analysis of the insurance market in Ukraine. Efektyvna ekonomika, 3. Available at: http://www.economy.nayka.com.ua/?op=1&z=5493

10. Kneysler, O., Kryvytska, O., Shupa, L., Huzela, I. (2019). Assessment of the competitive environment of the health insurance market. Problems and Perspectives in Management, 17 (2), 541–549. doi: https://doi.org/10.21511/ppm.17(2).2019.42

11. Reitynh strakhovykh kompaniy Ukrainy. Available at: https://forinsurer.com/ratings%20/nonlife/19/12/38

12. Metodychni vkazivky do vykorystannia ekonomiko-matematychnykh metodiv u dyplomniy roboti studentiv spetsialnosti 051 «Ekonomika» (2018). Sievierodonetsk, 184.

13. Litvinova, I. M., Makarenko, I. O., Protsenko, A. V. (2021). Pozytsiyi na rynku PrAT «Strakhova hrupa «TAS»» ta vybir napriamkiv innovatsiynoho rozvytku. The XV International Science Conference «Modern approaches to the introduction of science into practice». San Francisco, 79–81. Available at: https://eu-conf.com/events/modern-approaches-to-the-introduction-of-science-into-practice/

14. Usluha byznes strakhovanyia "povnyi biznes-zakhyst". Available at: https://sgtas.ua/ru/zashita-imushestva/povniy-biznes-zahyst/