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Risk Management Improvement under the Solvency II Framework

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Abstract. Risk management is one of the most important and critical insurance company's areas that should be improved under the Solvency II framework. The goal of the research is to investigate the improvement possibilities of risk management under the Solvency II regime. To conduct the research, the authors have used the following methods: theoretical analysis of scientific literature, analytical methods, comparative methods, and modelling. Under the Solvency II framework the authors have prepared the model scheme of operational risk management, the main aim of which is to demonstrate, improve and implement operational decision-making strategy in insurance processes.

Keywords: risk function, operational risk management, Solvency II directive, Basel II framework, solvency.

I. INTRODUCTION

Insurance is one of the most important areas in every country's economics; therefore, it requires more sophisticated and sensitive risk analysis in order to ensure stability and solvency of insurance company's development and activity.

Solvency II framework that establishes new rules for insurance companies' solvency assessment in the European Union requires evaluating the current risk function with the purpose to improve it.

The fact is that the Solvency II regime sets a lot of challenges to every insurance and reinsurance company that asks for a new vision to the insurance companies' processes, systems, organizational structure, and capital.

The basis of a new regime is the risk function establishment and improvement according to the requirements of the Solvency II Directive in order to ensure solvency of insurance and reinsurance companies.

The main problem is that the requirements of the Solvency II Directive are still under development; therefore, it is hard to understand how to implement them in insurance and reinsurance companies' processes.

However, an effective risk management framework is crucial for the implementation of the Solvency II requirements and for the ability to prosper in a tough market environment.

In order to satisfy the requirements of the Solvency II Directive, it is necessary to divide the risk function into two parts: risk management and risk measurement. The authors of the paper will concentrate on risk management part.

The hypothesis of the article is that risk management models that include assessment, analysis, elimination and management of risk have a significant role in decision-making processes. The goal of the research is to investigate the improvement possibilities of risk management function under the Solvency II regime.

The object of the paper is risk management. Therefore, the subject is the improvement of risk management, according to the requirements of the Solvency II Directive.

To achieve the stated goal, the authors will use a theoretical analysis of the scientific literature, analytical methods, experts and priority charts methods, and comparative methods with the purpose to study the elements and functions of the risk management and the requirements of the Solvency II Directive.

The main problem to be resolved during the research will be to interconnect the risk model with decision-making process in an insurance company. The article consists of six main sections. The overview of the risk management under the Solvency II framework and the analysis of Baltic insurance market are presented in Section II. The authors investigate and analyse the risk management framework implementation in the banking sector under the Basel II regime in Section III. In Section IV, the overview of operational risk management, operational risk management model and its role in decisionmaking process are investigated. The influence of human social capital on operational risk management is presented in Section V. The research of possible impact is conducted by means of priority charts and by taking into account the experts' opinion. The final section summarizes the findings and conclusions of the study and assesses the improvement of risk management.

II. DESCRIPTION OF RISK MANAGEMENT FUNCTION UNDER THE SOLVENCY II FRAMEWORK

In order to understand the risk management function improvement necessity and its role in insurance or reinsurance company's processes, the Baltic insurance market should be analysed.

The main indicators of the Baltic insurance market situation are financial stability and solvency. Financial stability and solvency of the Baltic insurance market can be analysed by means of different ratios:

- loss ratio shows the relation between claims incurred and net earned premiums;
- expense ratio is the net operating expense proportion in earned premiums;
- combined ratio shows claims incurred and operating expense proportion in earned premiums.

Stability and solvency of the Baltic insurance market are presented in Fig. 1: the ratios are calculated on the total

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market basis that includes life and non-life insurance market figures.



Fig.1. Baltic insurance market analysis (created by the authors based on the Financial and Capital Market Commission of Latvia, Lithuanian and Estonian Financial Supervision Authorities)[1, 2, 3,4, 5, 6, 7, 8].

The Baltic insurance market analysis shows that in Lithuania and Latvia the combined ratio in the all periods is over 1 or 100%, but in Estonia the combined ratio is less than 1 point or 100%.

Also the loss ratio and expense ratio of the Estonian market are recognized to be at a normal level; however, results of Latvian and Lithuanian insurance markets should be managed and improved with the control function.

The fact is that only the Estonian insurance market works successfully, insurance companies' net earned premiums are larger than claims incurred and operating expenses; however, financial stability and solvency of the Latvian and Lithuanian insurance markets should be improved that can be performed through the requirements of the Solvency II framework.

The authors of the article investigate the Latvian insurance market in order to analyse its financial stability and solvency. The results of the analysis of solvency ratio of the Latvian insurance market are presented in Fig. 2.



Fig.2. Solvency analysis of the Latvian insurance market (created by the authors based on the data of the Financial and Capital Market Commission of Latvia) [2, 3, 4, 5, 6].

According to Fig. 2, the authors of the paper can conclude that solvency of the Latvian insurance market decreases every period; therefore, these trends influence financial stability of insurance market and country's national economy and prosperity. Moreover, solvency of the Latvian non-life insurance market is higher that of the life insurance market and it is related to the volume of technical reserves presented in Table 1 elaborated by the authors.

 TABLE 1

 Volume of Technical Reserves of the Latvian Insurance Market,

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LVL (THE FINANCIAL AND CAPITAL MARKET COMMISSION OF LATVIA) [2, 3, 4, 5, 6]

Insurance	Periods							
market	1Q,2011	2Q,2011	3Q,2011	4Q,2011	1Q,2012			
Non-Life	159 501	164 126	161 085	152 270	165 554			
Life	44 180	46 648	49454	52 030	53 148			

According to Table 1, the authors of the paper can conclude that the volume of technical reserves of non-life insurance market is greater than that of life insurance market. The volume of technical reserves in each insurance market increases in small volumes every quarter that shows the positive trend in the development of the Latvian insurance market.

The volume of reserves in non-life insurance market exceeds 150,000 th. EUR; therefore, it is necessary to investigate the level of reserves that shows the level of net technical reserves in net paid premium, and it is presented by



the authors in Fig. 3.

Fig.3. Level of reserves in non-insurance market (created by the authors based on the data of the Financial and Capital Market Commission of Latvia) [2, 3, 4, 5, 6].

The fact is that a level of reserves of non-insurance market decreases every quarter and negatively influences the insurance company's stability and adequacy of net technical reserves.

According to the performed analysis of the Baltic insurance markets, the authors can conclude that insurance companies should improve financial stability and solvency through risk management function improvement.

According to the requirements of the Solvency II framework, solvency and financial stability of insurance or reinsurance companies can be managed and improved through risk management function.

The Solvency II framework is based on the three pillars, where each pillar fulfils its own function: quantitative requirements, qualitative and supervision requirements,

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disclosure requirements that mean prudential reporting and public disclosure.

The main purpose of the new regime is to establish a common risk management system and risk measurement principles for every insurance and reinsurance company in the European Union.

The authors are concentrated on the supervision and qualitative requirements that are included in the System of Governance. The System of Governance under a new regime is presented in Fig. 4.



Fig. 4. System of Governance under the Solvency II regime (the authors' plotting is based on PricewaterhouseCoopers International Limited, EIOPA) [9, 10, 11].

According to the requirements of the Solvency II Directive, key functions under the System of Governance should be fit and proper. However, the requirements of the Second Pillar set a lot of challenges for every insurance and reinsurance company.

Risk management is the process of managing, planning, evaluation and controlling the processes of an insurance company with the aim to eliminate the possible risk of the insurance company and to improve its development, profit and financial results.

The structure of risk management function is presented in Fig. 5.



Fig.5. Risk management function (the authors' interpretation is based on Ernst&Young, PricewaterhouseCoopers International Limited, KPMG, Deloitte, EIOPA, J. Bokans publications) [12, 13, 14, 15, 16, 17, 18, 19, 20].

The point of view of the authors is that risk management function should cover all processes, reporting, strategies and procedures in order to identify, monitor, measure, manage and report the risks on a continuous basis.

Risk culture can be defined as the norms and traditions of behaviour of individuals and of groups within an organization

that determine the way in which they identify, understand, discuss and act on the risks the organization confronts and takes [19].

In fact, the authors recognize that the risk culture of every insurance or reinsurance company's risk culture is the heart of Own Risk and Solvency Assessment (ORSA).

The ORSA is based on the pre-existing concepts from an enterprise risk management framework, such as risk appetite and the need to link to a business strategy, and translates them into specific process that presents management with a picture of their own company's risk positions that can be used to steer the business.

The risk culture consists of components such as risk appetite, stress testing, risk identification, risk assessment, risk measurement, reporting, risk monitoring and connection with business strategy.

The risk appetite of an organization represents its overall philosophy to risk taking and the expectations of its stakeholders such as shareholders, policyholders and bondholders [19]. In fact, risk appetite defines the volume of total risk that organization accepts to hold. Risk appetite plays an important role in every insurance and reinsurance company and is expressed in qualitative units, using key metrics and forms based on risk management function.

Risk tolerance transfers a risk appetite value from qualitative metrics to quantitative terms, therefore, presents the amount of capital that an insurance or reinsurance company has decided to put at risk.

Risk limits present a more precise level of risk tolerance that is allowed to put in risk management.

However, according to the fifth Quantitative Impact Study that was performed with the aim to test and improve the requirements of the Solvency II Directive risk management separate modules can be performed in different ways:

- the standard formula;
- standard formula and partly internal;
- standard formula with undertaking-specific parameters;
- full internal model;
- simplification 'method'.

In fact, risk management should cover at least the Solvency capital requirement risks that are included in the Solvency II standard formula that is presented in Table 2.

TABLE 2

R	KISK UNDER SOLVENCY CAPITAL REQUIREMENTS [10, 21, 22, 23, 24]							
	Risk	Sub-risk	Risk of sub-risk					
Solvency Capital requirements	Operational risk							
	Adjustment for the risk absorbing effect of technical provisions and deferred taxes							
	Basic Solvency Capital Requirement	Market risk	Interest rate, equity, property, spread, currency, liquidity, concentration, risks					
		Life risk	Mortality, longevity, lapse, expenses, revision, CAT, disability, morbidity risks					
		Health risk	STL health, Non-STL health and CAT risk					
		Non-life risk	Premium reserve, lapse and CAT risks					
		Default						
		Intangible						

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The calculation approach of the Solvency Capital Requirement according to the standard formula is divided into the separate modules: operational risk, market risk, life underwriting risk, non-life underwriting risk, credit risk, market risk and health underwriting risk.

III. RISK MANAGEMENT ASSESSMENT BASED ON THE BASEL II FRAMEWORK

One option of better identification of risk management key areas is to analyse the Basel II results in the banking sector.

Therefore, the authors have investigated and analysed significance of the risk management function areas after the Basel II framework implementation in the banking sector.

The analysis of banking sector can be performed because of a reason that the Solvency II requirements are based on the Basel II framework rules; the main difference is only the sector unique features. The authors have investigated the similarities between the Basel II and Solvency II in order to ensure the way of the analysis of risk management key areas through results of the Basel II survey.

The main similarities between the Basel II framework and Solvency II regime are the following:

- three-pillar approach;
- renewal of relatively outdated regulations;
- ambitions in terms of improvement;
- development of employees' new skills;
- more risk-sensitive regulatory capital requirements;
- more sophisticated risk analysis;
- establishment and improvement of risk management;
- the change in business control, risk management, financial analysis approaches.

The authors have found out that the main features of risk management that develop and improve banks under the Basel II framework are risk appetite and risk tolerance.

The authors of the publication have investigated the risk appetite and most critical risks in the banking sector within the Basel II framework. Fig. 6 presents the survey of Ernst&Young company that was held in 2012 among 75 banks in 38 countries about the most critical risks of the banking sector.



Fig. 6.The most critical risks in the banking sector [25].

The authors can conclude that the most critical risks in the banking sector are liquidity, credit and market risks and operational risk.

The operational risk is identified as most critical by 36% of respondents. The authors of the paper have investigated

operational risk management under the Solvency II framework in Section IV.

Also the authors of the paper present the quantitative metrics for setting and monitoring the risk appetite in order to set the target risk profile that is presented in Fig. 7.



Fig.7. Survey of quantitative metrics for setting and monitoring the risk appetite [25].

According to Fig. 7, the authors can conclude that the banks in most cases use quantitative metrics for setting and monitoring the risk appetite such as capital buffers, limits, capital ratios, concentration limits, possible loss estimation, Tier 1 ratio, stress testing results, VaR.

The fact is that it is critically important to agree on the metrics that will be used to set and monitor the risk appetite.

To set the risk appetite, several key qualitative issues should be considered. The authors present the survey among banks about key qualitative issues in setting the risk appetite in Fig. 8.



Fig. 8. Survey on key qualitative issues in setting the risk appetite [25].

According to Fig. 8, the authors of the publication can conclude that key qualitative issues in setting the risk appetite are linked with business planning and are drilled down into the organization.

IV. OPERATIONAL RISK MANAGEMENT

Operational risk is a change in value caused by the fact that actual losses, incurred for inadequate or failed internal process, people and systems, or from external events (including legal risk), differ from the expected losses.

The fact is that operational risk management is the process of identification, analysis, assessment, organizing, planning, leading, controlling, elimination and evasion of operational risk events in order to minimize occurring probability and reduce possible losses or near miss.

According to the requirements of the Solvency II Directive, the model of operational risk management can be performed in many ways so that the authors present the model scheme of internal operational risk management.

In order to manage an operational risk, it is useful to understand the capital requirement of operational risk according to the standard formula that is presented in Formula 1 [10]:

 $SCR_{op} = \min\{0.3 * BSCR; Op\} + 0.25 * Exp_{ul}$ (1), where

BSCR – the requirements of the Basic Solvency Capital; Op – max(*oppremium*; *opprovision*).

Before measuring an operational risk, it is necessary to manage operational risks; therefore, the authors have investigated the standard formula of operational risk measurement.

In order to measure an operational risk, the following components should be taken into account: annual expenses that incurred during the previous 12 months in respect of the investment risk by policyholders from life insurance, earned premiums, insurance obligations and basic solvency capital requirements.

Therefore, the authors can conclude that operational risk management includes many points that should be assessed, controlled and led.

In order to better understand the nature and basis of operational risk model, the authors have performed an analysis. Its results are presented in Fig. 9.



Fig.9. Establishment of risk strategy (created by the authors based on Ernst &Young, PricewaterhouseCoopers International Limited, KPMG, Deloitte, EIOPA publications) [10, 16, 26, 27, 28].

In fact, in the operational risk model the connection between risk appetite, limits, tolerance statements and risk strategy should be analysed. The operational risk model created by the authors is presented in Fig. 10.





According to Fig. 10, the authors can conclude that the model of operational risk management is complicated and involves many parameters.

The authors can conclude that it is important to define the risk appetite, risk limits and risk tolerance in a correct way as their wrong estimation can lead to an incorrect risk strategy. Therefore, a wrong risk strategy will negatively influence business processes of insurance or reinsurance companies and can aggravate financial stability and development.

V.CASE STUDY: HUMAN CAPITAL IMPACT ON OPERATIONAL RISK MANAGEMENT

The successful integration of operational risk management in an organizational structure depends not only on an accurate model and correct data but also on the ability to demonstrate the connection between the decision-making process and data produced taking into account capital, estimated risk appetite, risk tolerance and risk limits, risk framework. 2013/24_

Therefore, the insurance or reinsurance company should show how effectively risk culture is integrated in all processes.

The fact is that one of the most critical key factors for operational risk management integration in the processes of insurance or reinsurance companies is human social capital.

The term 'social capital' refers to the benefits that can be obtained from social relationships, similar to financial capital, physical capital (e.g., a dwelling) and individual capital (e.g., education). [37]

The fact is that social human capital requires attention to be devoted to the relationships, which shape the realization of every employee's potential. Therefore, human social capital is a key to the company's activity success and development.

Therefore, the authors of the paper have conducted the research of human social capital impact on operational risk management using expert analysis and priority charts methods.

Within the framework of research, the authors have identified the criteria of social human capital that have the greatest impact on operational risk management according to the requirements of the Solvency II regime.

The authors have created a case study of Baltic lifeinsurance company based on the assessment of social human capital influence on operational risk management. The five experts from risk management, business control, financial and actuarial units have evaluated using a five-degree scale the following criteria of human social capital:

- Board and executive role modelling (K1);
- new and strengthened skills and knowledge (K2);
- increased transparency in the decision-making process (K3);
- collaboration in the decision-making process (K4);
- establishing risk management at the heart of the company's culture (K5);
- ensuring clarity of ambition (K6);
- building greater leadership alignment (K7);
- establishing and proactively managing key stakeholders (K8);
- possessing the right team (K9);
- engaging human resources (K10).



The authors' conducted research is presented in Fig. 11.

Fig. 11. The experts' evaluation of human social capital criteria.

The authors of the article have analysed the experts' evaluation and considered the model of evaluation and identification of factors, which prove the importance ratio of

human social capital criteria in order to identify the most important ones.

The model of evaluation and identification of factors compares the pairs of criteria and identifies the criteria that are the most important according to the experts' evaluation, and it is presented in Table 3.

 TABLE 3

 REQUIREMENTS OF HUMAN SOCIAL CAPITAL OF THE SOLVENCY II

Evaluation criterion (No.)											
	K1	K2	K3	K4	K5	K6	K7	K8	К9	K10	Rati
K1	-	2	1	1	1	1	1	1	1	1	0.18
K2	2	-	2	2	2	2	2	2	2	2	0.20
K3	1	2	-	4	3	3	3	3	9	3	0.11
K4	1	2	4	-	4	4	4	4	9	4	0.13
K5	1	2	3	4	-	5	7	5	5	9	0.07
K6	1	2	3	4	5	-	7	6	9	10	0.02
K7	1	2	3	4	7	7	-	7	9	7	0.09
K8	1	2	3	4	5	6	7	-	9	10	0
K9	1	2	9	9	9	9	9	9	-	9	0.16
K10	1	2	3	4	5	10	7	10	9	-	0.04

According to the results of the model of evaluation and identification of factors, the authors of the publication have identified and described the five main criteria of human social capital with the most significant impact on operational risk management:

- According to the experts' evaluation, the importance ratio of the criterion of new and strengthened skills and knowledge accounts for 0.20 because of the challenges of the Solvency II framework and sometimes due to incomprehensible requirements regarding operational risk management that requires a lot of knowledge, new developed skills to support all changes in processes, models, policies, organizational structure and procedures.
- The criterion of Board and executive role modelling is evaluated with an importance ratio of 0.18 that demonstrates a significant place of the Board under the Solvency II framework that requires considering results of the internal model during strategic decision-making process.
- The criterion of the right team of human social capital has an importance ratio of 0.16 because due to the Solvency II regime implementation all insurance and reinsurance companies need to have internal capacity to manage an operational risk. The companies need to find the best solution between permanent and temporary resources; therefore, they need to find the appropriate role for every employee to enable more precise and effective implementation of new processes.
- The experts evaluated the criterion of collaboration in decision-making process with an importance ratio of 0.13. In fact, implementation of the Solvency II framework involves almost all insurance or reinsurance company's processes and units; therefore, they are connected and depended on each other. Because of this reason, it is critical to have the decision-making process harmonized.

• According to experts' evaluation, the criterion of increased transparency in decision-making process has an importance ratio of 0.11. The fact is that one of the main requirements of the Solvency II framework is transparency of decision-making processes of insurance and reinsurance companies that affects financial stability, solvency and activity.

Human social capital has an important influence on operational risk management; therefore, good qualification of insurance or reinsurance company's employees, ability to work in a team and independence are one of the most important requirements of the Solvency II regime.

VI. CONCLUSION

The Solvency II framework should establish economic riskbased principles that should ensure solvency of every insurance and reinsurance company across the European Union countries. Risk management plays an important role in the requirements of the Solvency II framework implementation and establishment since it is related to all insurance or reinsurance company's processes, reporting, strategies and procedures.

The requirements of the Solvency II Directive are based on the Basel II that is the second of the Basel Accords, where recommendations on banking laws and regulations have been issued by the Basel Committee on Banking Supervision. The main aim of Basel II is to establish solvency of the banking sector through risk management. In order to better understand the nature and complexity of the Solvency II requirements, the authors of the article have investigated results of the Basel II regime with the aim to find the most critical risk of the banking sector and the key principles of setting the risk appetite. The most important result was that key qualitative issues in setting the risk appetite are linked with business planning and are drilled down into the organization. So the authors of the paper have proved the risk management importance in all insurance and reinsurance company's processes according to the new regime.

The authors have also investigated the method of risk management improvement by the model scheme of operational risk. In fact, the suggested approach helps to set a correct risk strategy in order to improve risk management process of identification, analysis, evaluation, planning, leading and controlling of operational risk events in order to minimize occurring probability and reduce possible losses or near miss.

In order to improve risk management function of insurance and reinsurance companies, the authors of the paper have also investigated the importance of human social capital in operational risk management. The main conclusion is that improvement of human social capital is critical for every insurance and reinsurance company; therefore, the Board should describe, control and manage the appropriate qualification of employees and also their roles in all processes.

The suggested approaches of risk management improvement will enable every insurance and reinsurance company to control trends within its development towards the solvency, development with the purpose of fulfilment of the Solvency II framework requirements. In the future, the authors of the article will continue the present research on risk management improvement of insurance and reinsurance companies.

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Darja Kaļiņina, Irina Voronova. Riska vadības pilnveidošana saskaņā ar Maksātspēja II direktīvas prasībām

Maksātspēja II direktīvas prasības attiecas uz visām apdrošināšanas un pārapdrošināšanas sabiedrībām, kas darbojas Eiropas Savienības teritorijā. Jaunās kārtības pamatā ir ekonomiski pamatotas prasības, kuras ir vērstas uz riska vadības funkcijas pilnveidošanu maksātspējas jomā. Publikācijas mērķis ir izpētīt riska vadības pilnveidošanas iespējas saskaņā ar Maksātspēja II direktīvas prasībām. Publikācijas hipotēze ir tāda, ka riska pārvaldības modelim, kas ietver riska novērtējumu, analīzi un vadību, ir būtiska loma lēmumu pieņemšanas procesā. Publikācijas objekts ir riska vadība, savukārt publikācijas priekšmets ir riska vadības pilnveidošana. Lai sasniegtu pētījuma mērķi, publikācijas autori izmanto zinātniskās literatūras teorētisko analīzi, analītiskās metodes, ekspertu un prioritātes metodes, lai izanalizētu riska vadības elementus saskaņā ar Maksātspēja II direktīvas prasībām. Pamatproblēma, kuru pēta publikācijas autori, ir saite starp riska metodes, lai izanalizētu riska vadības elementus saskaņā ar Maksātspēja II direktīvas prasībām. Pamatproblēma, kuru pēta publikācijas autori, ir saite starp riska metodes, lai izanalizētu riska vadības elementus saskaņā ar Maksātspēja II direktīvas prasībām. Pamatproblēma, kuru pēta publikācijas autori, ir saite starp riska metodes, lai izanalizētu riska vadības parvaldības modeli, kas atbilst jaunās kārtības prasībām, un kura galvenais mērķis ir īstenot, pilnveido operacionālo lēmumu pieņemšanu, kas savukārt integrēs riska stratēģiju apdrošināšanas sabiedrībā. Publikācijas autori ir izsecinājuši, ka riska stratēģijai un cilvēkresursu kapitālam ir ļoti liela ietekme uz riska vadību, tādējādi, pilnveidojot tos, ir iespējams uzlabot riska vadības funkciju.

Дарья Калинина, Ирина Воронова. Совершенствование управление рисками в соответствии с требованиями режима Платежеспособность II Требования директивы Платежеспособность II относятся ко всем страховым и перестраховочным компаниям, работающим на территории Европейского сообщества. В основе нового порядка лежат экономически обоснованные требования, направленные на совершенствование функции управления риском в области платежеспособности. Целью работы является исследование возможностей совершенствования управления рисков, в контексте требований директивы Платежеспособности II. Гипотезой публикации являются то, что модель управления рисков, которая включает управление, оценку и анализ рисков, играет важную роль процессе принятия решений. Объектом публикации является управление риском, а предметом в свою очередь – совершенствование процессе управления риском. Для достижения цели исследования, авторы публикации использовали теоретический анализ и обобщение научной литературы, аналитический метод, методы приоритетов и экспертный. Использование данных методов позволило авторам проанализировать элементы управления рисков в соответствии с требованиями директивы Платежеспособности II. Основная проблема, которую исследуют авторы, связана с исследованием связи между моделями рисков и процессом принятия решений в страховых компаниях. Авторы разработали, согласно требованиям нового режима, модель управления операционного риска, главная задача которой принятие и улучшение оперционных решений, который помогут интегрировать стратегию рисков в страхокую компанию. Авторы публикация констатировали, что большое влияние на управления риском.