

# Automated Control System of Insurance Agent Motivation

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**Abstract**—The paper deals with the automated control system (ACS) of insurance agent motivation that provides information support for the mechanism of the financial incentives provision to the agent subject to his/her operational results. An algorithm of insurance agent motivation is described. In the course of the ACS development, the methodology of object-structural modeling of management accounting information systems was used. The proposed ACS provides support for decision-making concerning the regulation of the commission value to improve the efficiency of the agent activities and, as a consequence, to increase financial result of an insurance company.

**Keywords**—Automated Control System, Motivation, Insurance Agent, Operational result.

## I. INTRODUCTION

Amidst the economic crisis, insurance companies are looking for new methods and tools to reduce costs and increase their financial results [1].

It should be noted that in Russia, despite the increasingly widespread adoption of modern e-commerce technologies in the insurance industry, the share of payments received from the sale of insurance policies by intermediaries and, above all, insurance agents is still high in the total volume of insurance premiums.

This factor is particularly evident in regional insurance companies actively working in the retail market of voluntary non-life insurance. This is understandable, since the specificity of retail sales of insurance products is based on personal communication between a seller and a potential client, and the overall success of the deal depends on how this communication is built [2,3].

Agent's intermediary services are paid for in the form of a commission for each sold insurance policy as a percentage of a received premium.

In this regard, agents are strongly influenced by a human factor conditioned by their personal material interest [4].

In pursuit of a large commission, agents increase the share of such unprofitable types of insurance as motor insurance in their insurance portfolios, which leads to a decrease in the effi-

ciency of their activities and the financial result of the insurance company.

One of the ways to solve the described problem is the adoption of motivation control mechanisms for insurance agents based on the principles of financial incentives for their activities [5, 6].

In our paper, we propose to utilize a specialized automated control system (ACS) for information support of these mechanisms.

## II. SOLUTION APPROACH

It should be noted that the matters of automated control of insurance agent motivation have been examined insufficiently in specialized literature.

This can be explained by an individual approach in each insurance company to the solution of this problem including the choice of a key performance indicator for the assessment of insurance agent activities [7].

We propose to utilize an insurance agent's operating result as such indicator that is determined by comparing the agent's income and expenses for the reporting period (as a rule, based on quarter or half-year results) for unprofitable types of insurance [8].

A low operating result indicates agent's ineffective work and can be considered a reason for insurance company managers to take organizational measures in relation to this agent, including reduction in the commission rate or termination of contractual relationships [9].

Then, the task of optimizing the agent's operating result can be described as a linear programming problem in the form:

$$O_A = \sum_{t \in T} \left( B - \Delta R - L - \frac{C \cdot B}{100} \right)_t \rightarrow PO_A, \text{ where } C \in [C_{\min}, C_{\max}]$$

$O_A$  – the operating result of the particular agent;

$T$  – the reporting period;

$B$  – the total gross premium under the agent's insurance contracts;

$\Delta R$  – the change in the value of insurance reserves under the agent's insurance contracts;

$L$  - the total incurred losses under the agent's insurance contracts;

$PO_A$  – the value of the agent's operating result that guarantees profitability of the agent's insurance portfolio for a specific type of insurance;

$C$  – the agent's commission rate ( $0 < C < 100\%$ ).

$C_{min}, C_{max}$  – the change boundaries of the agent commission rate established by the insurance company for a specific type of insurance.

To generate agents' operating results, the accounting information of the insurance company accumulated for previous periods of insurance activities is used [10, 11].

Insurance agent motivation control is carried out with the use of an algorithm that consists of the following steps.

*Step 1.* Defining the  $PO_A$  value for a specific type of insurance.

*Step 2.* Carrying out a monitoring procedure for agent insurance portfolios and identifying an ineffective agent subject to the condition  $O_A < PO_A$ .

*Step 3.* Solving the linear programming problem (1) and determining the optimal value of the agent's commission rate  $C_O$  for a specific type of insurance.

*Step 4.* Drafting a plan of measures for the insurance company that is aimed at ensuring the required level of agent's profitability. For example, motivating the agent to build a well-balanced insurance portfolio and control the client base.

*Step 5.* Notifying the agent of new conditions for the commission calculation (compensation plan) and of proposed measures to improve his/her work efficiency in the insurance company.

*Step 6.* Approving of a new compensation plan with the agent.

The proposed ACS of insurance agent motivation is built on the basis of the described algorithm.

### III. AUTOMATED CONTROL SYSTEM

Fig. 1 shows a block diagram of the ACS of insurance agent motivation.

The data source for the analysis and decision-making is the data mart of agent insurance portfolios that receives accounting information from the insurance management accounting information system (MAIS).

The key module of the ACS is a decision support system implemented on the basis of the Excel Solver Add-in [12].

The Solver object cell contains the formula to calculate the average value  $O_A$  for the reporting quarter based on the expression (1). Optimization of the object cell value is achieved by selecting the values of the parameter  $C$  subject to the adopted constraints. The  $C_O$  is determined as the average value of the final values of  $C$  (see the example in Table 1).

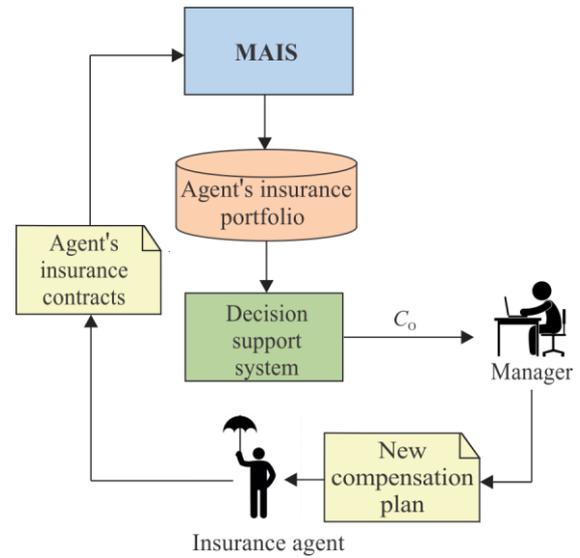


Fig. 1. A block diagram of the ACS of insurance agent motivation.

TABLE I. EXAMPLE OF THE SOLVER ANSWER REPORT ( $PO_A = 1000$ ;  $C_{ov}$  - ORIGINAL VALUES OF  $C$ ;  $C_{fv}$  - FINAL VALUES OF  $C$ ;  $C_{min} = 3.0$ ;  $C_{max} = 10.0$ )

Date	B	$\Delta R$	L	$C_{ov}, \%$	$C_{fv}, \%$	$C \cdot B / 100$	$O_A$
1 <sup>st</sup> month	100000	50000	50000	10.0	3.0	3000	-3000
2 <sup>nd</sup> month	130000	100000	15000	10.0	9.6	12500	2500
3 <sup>rd</sup> month	50000	35000	10000	10.0	3.0	1500	3500
					$C_O = 5.2$		<b>1000</b>

Fig. 2 presents an example of a change in the value of the agent's commission rate depending on the  $PO_A$  value.

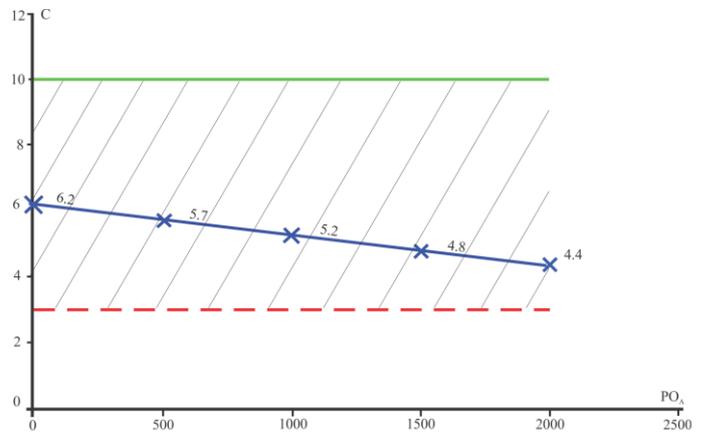


Fig. 2. A change in the value of the agent's commission rate depending on the  $PO_A$  value.

The shaded area on the chart is the area of acceptable values of  $C_O$ , under which it is possible to reconcile the interests of the insurance company and the agent.

### IV. CONCLUSION

In our paper, we proposed the ACS that provides information support for the financial stimulation mechanism for the agent depending on his/her operational result.

The ACS has been implemented on the basis of a complex solution for insurance activities automation “Kontinent: Insurance 8” [13]. In the course of the ACS development, the design patterns of object-structural modeling methodology for management accounting information systems was used [14].

This allowed to simplify the adaptation of the ACS to the specifics of conducting insurance activities by a particular insurance company and its easy integration with the enterprise information system.

Adoption of the presented ACS in operational insurance activities will provide decision support for the agent commission regulation aimed at the enhancement of their efficiency and, as a consequence, at the increase in financial results of the insurance company.

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