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S. Yevseiev[1], K. Çetinkaya[2]

Serhii.Yevseiev@hneu.net, kcetinkaya@karabuk.edu.tr

[1]*Simon Kuznets Kharkiv National University of Economics, Kharkiv*
[2]*Karabük University, Karabük*

DEVELOPING A MODEL OF EFFICIENCY OF INVESTMENT IN THE SECURITY OF BANKING INFORMATION IN ABS

Analysis methods of assessments of the effectiveness of investments in Information Security (IS) showed that the formation of an objective assessment of the efficiency of investment in the security banking information (Bin) in automated banking systems (ABS) very laborious process, and usually evaluation of security measures in banking sector organizations (OBS) reduced to finding categories: ROI, "Return on Investment", investment rate of return; TCO, "Total Cost of Ownership", total cost of ownership; PB, "Payback Period" payback.

To assess the costs of security BIn to use the OBS approach proposed in [1]. The specificity of the approach proposed is based on a mathematical model of synergetic threat assessment and improved model of the offender based on a synergistic approach improved classifier threats ABS [1] And reduced to the calculation of a security risk BIn in ABS in terms of simultaneous action on the system of information security threats, cyber-security and safety information. This approach allows us to evaluate the continuity of the functioning of business processes (processes information) and the ABS coefficient of internal rate of return on investment.

Presentation safety BIn as an information process, not a product, makes it possible to interpret the security of information assets as a multi risk management violations of safety OBS. As a result, risk management can achieve balance information risks for the activities of OBS, reducing the potential threat of hybrid components for security, IS, cyber security (CS), of information (SI) aimed at computing facilities that process information resources. The results of the balance of risk information assets BIn selection is an effective method of control that allows to pinpoint BIn security settings and get the best return on investment for the construction IS in ABS [1]. The formal description of the model estimates of investments in security BIn OBS, subject to necessary counter threats to hybrid BIn in ABS can imagine [1]:

$$W_{ABS}^{effinv} = \begin{Bmatrix} I_{O^{ABS}}, \Delta^{ABS}, \{DF^{ABS}\}, rang^{ABS}, \{SZ^{ABS}\}, d^{ABS}, D^{ABS} \\ ROI^{ABS}, NPV^{ABS}, ROSI^{ABS}, r^{ABS}, CV^{ABS}, OU^{ABS} \end{Bmatrix}$$ where $I_{O^{ABS}}$ – the value of information assets; Δ^{ABS} – a sign of cost-effectiveness; $\{DF^{ABS}\}$ – set of sources of threats to the safety components: IS, CS, SI BIn ABS [1]; $rang^{ABS}$ – Rank development process technical means of information protection (TMIP); $\{SZ^{ABS}\}$ – set TMIP [10]; d^{ABS} – present value of cash flow; ROI^{ABS} – rate of return on investment; NPV^{ABS} – the net present value; $ROSI^{ABS}$ – ROI TMIP; r^{ABS} – factor of profitability in the security BIn; CV^{ABS} – the degree of risk per unit of average income; D^{ABS} – income from the use TMIP; OU^{ABS} – estimate of income from the use TMIP. The importance of information assets BIn evaluate the expression:

$$I_{O^{ABS}} = \frac{E_{BIn}^{ABS}}{Y_{BIn}^{ABS}} \quad (1)$$

where E_{BIn}^{ABS} – the cost of information resources (IR BIn) BIn; Y_{BIn}^{ABS} – capital invested in the operation of the IP BIn. Signs of cost effectiveness Δ^{ABS} evaluate the expression:

$$\Delta^{ABS} = \frac{e}{b} \quad (2)$$

where e – expected economic effect; b – TMIP development costs.

If a commercial bank OBS weighs feasibility of a project, in the simplest case, it can calculate the provided net cost of NPV^{ABS} income and expenses that will project and compare them. In other words, the return on investment should exceed the costs and profitability OBS establish their own [1].

$$ROI^{ABS} = NPV_{inv}^{ABS} - NPV_{zt}^{ABS} \quad (3)$$

where NPV_{inv}^{ABS} – income from investments in TMIP ABS; NPV_{zt}^{ABS} – costs TMIP ABS; ROI^{ABS} – return on investment in TMIP ABS.

The same approach applies to assess the feasibility of investing in the security BIn in ABS. The main difference – investments in security BIn in ABS is not profitable, but only hypothetically prevent costs. Thus, TMIP OBS ABS should prevent costs more than the money spent on their development and implementation in TMIP ABS, which will talk about ROI TMIP $\left(ROSI^{ABS}\right)$:

$$ROSI^{ABS} = NPV_{zbtszi}^{ABS} - NPV_{zvtszi}^{ABS}, \quad (4)$$

where NPV_{zbtszi}^{ABS} – the cost of removal without compromising security embedded TMIP; NPV_{zvtszi}^{ABS} – the cost of removal of compromised security with embedded TMIP. This net present value NPV^{ABS} calculated by the expression:

$$NPV_{zbtszi}^{ABS} = \sum_{i=1}^{N} \frac{ALE_i}{(1+r)^i},\ NPV_{zvtszi}^{ABS} = C_{sz} + \sum_{i=1}^{N} \frac{ALE_i}{(1+r)^i} \quad (5).$$

For improving synergies in the security BIn ABS hybrid in terms of countering threats to security components: IS, CS, SI integration of threats should be considered: $DF^{ABS} = \{V^{NS}\} \cup \{V^{AS}\}$ (6)

When BIn risk calculation method applicable. Annual loss expectancy – ALE, is the expected loss in each period of evaluation:

$$ALE^{ABS} = \sum_{i=1}^{n} I\left(O_{DF}^{ABS}\right) F_i \quad (7)$$

where $\{O_{DF}^{ABS}\}$ – set of threats; $I\left(O_{DF}^{ABS}\right)$ – cost implications of the threat; ALE^{ABS} – the expected loss on sale; F_i – Frequency (feature) of threats.

Present value of cash flow d^{ABS} estimated by the expression: $d^{ABS} = D_r + ROI^{ABS}$ (8)

where D_r – discount rate; ROI^{ABS} – return on investment in TMIP ABS.

ROI factor security BIn r^{ABS} calculated by the expression:

$$r^{ABS} = \sum_{t=1}^{T} \frac{CF_t}{\left(1 + ROSI^{ABS}\right)^t}, \quad (9)$$

Assessment of degree of risk per unit of average income CV^{ABS} obtain using the expression:

$$CV^{ABS} = \frac{\sigma(E)}{\mu(E)} \quad (10)$$

where $\sigma(E)$ – standard deviation costs of the TMIP; $\mu(E)$ – expectation for realization TMIP.

Income D^{ABS} the use TMIP evaluate the expression: $D^{ABS} = Cost_1 P_D - Cost_2 (1 - P_D)$, (11)

The proposed model is based on an assessment of investment in the security BIn OBS hybridity based on threats BIn in ABS and discounting of future cash receipts and expenses. Thus, this model takes into account the change in the security BIn investment OBS over time. Changes in the investment process safety BIn OBS described as a finite automaton H^{ABS}, which describes the state of expression [1]:

$$H^{ABS} = \langle S_j^I, value, \Pi, S_0^I \rangle \quad (12)$$

Function Conversion investments Π from state *k* to state *j* is estimated by the expression:

$$\Pi = S_k^I \times value \to S_{k+1}^I \times value \to \ldots \to S_j^I \quad (13)$$

Assessment of potential losses U^{ABS} get information assets from the expression:

$$U^{ABS} = p_{rj} u_j \quad (14)$$

Calculation of the probability of at least one threat for each asset is performed by the expression:

$$p_{rj} = 1 - \prod_{i=1}^{m} (1 - pr_{ij}) \quad (15)$$

Thus, estimates of total expected loss OU^{ABS} consists of potential losses and is determined by the expression:

$$OU^{ABS} = \sum_{j=1}^{n} U^{ABS} \quad (16)$$

The estimations allow for the synergy and hybridity threats to safety components, IS, CS, SI BIn in ABS to provide qualitative and quantitative indicators of investment in the security BIn: ROI^{ABS} (rate of return on investment), NPV^{ABS} (тet present value), $ROSI^{ABS}$ (ROI TMIP. This approach allows fast and timely to assess the profitability of investing in the security BIn in ABS, which enhances the safety of ABS in general.

Proposed to use the total cost estimate of costs to eliminate the impact of threats and other causes disabling TMIP and total payments financing. Estimated total value of expenses M^{ABS} eliminate the consequences of threats and other causes disabling TMIP carried by the expression:

$$M^{ABS} = \sum_{i=1}^{m} C_i \quad (17)$$

Estimated total payments c_i funding sources formed by the formula: $c_i = \sum_{i=1}^{n} A_{i,j}$ (18)

where c_i – total payments *j*-th source of funding; $A_{i,j}$ – payment of the *j*-th source of funding; *i, j = 1 ... n*; n – number of funding sources.

The proposed model of efficiency investments in the security BIn OBS allows for efficiency investments by minimizing the cost of security BIn in ABS OBS in terms of countering threats to security components: IS, CS, SI, their integration of hybridization and synergy.

Minimize security expenses BIn in ABS OBS conducted the optimization process that reflects the following expression:

$$\min\left(E_1^{ABS}b_1 + E_2^{ABS}b_2 + ... + E_j^{ABS}b_n\right) \quad (19)$$

Summarizing the parameters used in the framework of the proposed model, we define the integral criterion of efficiency of investment in the security BIn OBS using the expression: $W_{ABS}^{effinv} = \sum_{i=1}^{N} w_i M^{ABS}$ (20)

Thus, the model of efficiency investments in the security BIn in ABS can be in different states S^{ABS}, which can be described as the following sets:

$$S^{ABS} = \left\{S_1^{ABS}, S_2^{ABS}, ..., S_m^{ABS}\right\} \quad (21)$$

where S^{ABS} – the set of possible states of the model; S_1^{ABS} – the initial state of the model; S_m^{ABS} – the final state of the model.

Thus, the method of evaluating the effectiveness of investments in the banking information security in automated banking systems which is based on a composite index investing to optimize the cost of funds for the construction of a system of information security in terms of hybrid threats of information security cyber-security and safety information.

References

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