

# Evaluation of the effectiveness of the internal control system of the institution using key performance indicators

Anatolii Syrotenko <sup>A</sup>; Ivan Tkach <sup>B</sup>; Anatolii Loishyn <sup>C</sup>; Mykola Tkach <sup>D</sup>

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## Abstract

The conducted research may be of interest to specialists of internal audit, internal control, and managers of all levels, who organize the functioning of internal control in subordinate structural units. The article practically substantiates the use of the matrix of key performance indicators (KPI) in assessing the effectiveness of the internal control system of the Ministry of Defense of Ukraine. The research conducted in the article is the result of the practical implementation of the developed comprehensive methodology for assessing the effectiveness of the internal control system of the Ministry of Defense of Ukraine. To achieve this goal, the study conducted its decomposition and separately: evaluated the selected indicators of the effectiveness of the internal control system through appropriate testing and analysis of financial (accounting) statements; a matrix of key performance indicators is formed; the generalized indicator of efficiency of functioning of system of internal control is defined; the corresponding assessment of efficiency of system of internal control according to the chosen criterion is carried out. The results of the study made it possible to determine a numerical value that can objectively indicate the effectiveness of the internal control system of the institution. The results of the evaluation of indicators can be further systematized in the appropriate database for the formation of statistical information and taken into account in the risk-oriented planning of internal audit activities. The results of the study in the article can be used in part and applied thematically when checking other indicators in the internal control system. The article formulates the prospect of further research in the subject area to improve the accuracy of assessing the effectiveness of the ICS, as well as in finding alternative methods for its evaluation.

**Keywords:** internal control, internal audit, evaluation, efficiency.

## Introduction

As of today, the system of public internal financial control of Ukraine (hereinafter – the PIFC system) is being reformed in accordance with the European model, including the Concept of public internal financial control “Orange book” [1].

The implementation of this reform is also provided by a number of domestic regulations [2–8].

The modern PIFC system is a set of three interconnected elements:

- internal control (management accountability – financial management and control);
- functionally independent internal audit;
- central harmonization unit.

National standards on internal audit [9] stipulate that the audit service evaluates the

<sup>A</sup> The National Defence University of Ukraine named after Ivan Cherniakhovskiy, Ukraine, Head of the National Defence University of Ukraine named after Ivan Cherniakhovskiy, Doctor of Sciences, e-mail: a.syrotenko1960@gmail.com, ORCID: 0000-0002-0266-5706

<sup>B</sup> The National Defence University of Ukraine named after Ivan Cherniakhovskiy, Ukraine, Head of the Center, Doctor of Economics, Professor, e-mail: tkachivan9@gmail.com, ORCID: 0000-0001-5547-6303

<sup>C</sup> The National Defence University of Ukraine named after Ivan Cherniakhovskiy, Ukraine, PhD student, e-mail: aloishyn@gmail.com, ORCID: 0000-0003-2769-9336

<sup>D</sup> The National Defence University of Ukraine named after Ivan Cherniakhovskiy, Ukraine, Head of the department, PhD, e-mail: nyck1985@ukr.net, ORCID: 0000-0002-8832-1268

activities of the institution in relation to the effectiveness of the internal control system, in the context of the performance audit.

Also, in accordance with the Resolution of the Cabinet of Ministers of Ukraine dated 28.09.2011 № 1001 "Procedure for establishing structural units of internal audit and conducting such audits in ministries, other central executive bodies, their territorial bodies and budgetary institutions belonging to the management of ministries and other central executive bodies" [10] the audit unit in accordance with its tasks evaluates the effectiveness of the internal control system.

To perform the above tasks, a comprehensive methodology for assessing the effectiveness of the internal control system (hereinafter – ICS) was developed [11].

## Material and methods

The following methods of theoretical and empirical research were used in the research, namely: comparison, analysis, synthesis, induction, deduction, system approach.

To ensure the achievement of the purpose of the article, it is proposed to decompose the purpose of scientific research and partially:

In view of the above, there is an urgent need for the practical implementation of the proposed approach to assessing the effectiveness of the ICS.

The study is the result of solving a scientific problem to determine a scientifically sound approach to assessing the effectiveness of the ICS, which is the practical implementation of the approaches set out in a comprehensive methodology. The results of the analysis of recent research and publications in the subject area are systematized and generalized in the sources [11-23].

**Setting objective.** The purpose of the article is the practical application of the matrix of key performance indicators (KPI) in assessing the effectiveness of the ICS of the Ministry of Defense of Ukraine (hereinafter – MOD).

1. Evaluate selected indicators by testing and analyzing financial (accounting) statements;
2. Fill in the matrix of key performance indicators;
3. To determine the generalized indicator of efficiency of functioning of ICS and to give the corresponding estimation of ICS according to the chosen criterion.

## Results and discussion

The analysis of approaches to the evaluation of the effectiveness of the ICS shows that as of today there is an urgent need to determine a scientifically sound approach to the evaluation of the effectiveness of ICS [12–20].

The substantiation of application of a matrix of key indicators of efficiency in an estimation of efficiency of ICS of establishment provides practical carrying out of estimation in establishment MOD according to the developed complex technique.

To calculate the generalized indicator of the efficiency of the ICS, it is proposed to perform this scientific task using generalized analytical data and a conditional institution (hereinafter – the Institution), which carries out its activities taking into account the characteristics of the MOD.

The direct participants in the process of functioning of the ICS in the Institution are:

- head of the institution;
- internal control manager;
- assistant manager of internal control;
- chairman of the working group on risk assessment;
- members of the working group on risk assessment;
- heads of structural subdivisions (within the limits of responsibility).

In accordance with the content of a comprehensive methodology for assessing the effectiveness of the ICS in the Institution, it is necessary to conduct research within the selected indicators.

Based on the results of the development of the scientific and methodological apparatus for assessing the effectiveness of the ICS [21-23], a number of indicators were identified, which

together can indicate the level of efficiency of this system.

Thus, for further application of the matrix of key performance indicators (KPI) the need to determine 6 main (key) indicators has been proved.

The research conducted in the above sources formulated a number of key indicators:

level of competence of those who carry out control measures;

quality of risk identification;

quality of risk assessment;

the state of implementation of control measures;

quality of financial accounting;

indicator of losses and shortages.

To evaluate each key indicator, a certain method of its implementation was substantiated.

All indicators, except for the indicator of losses and shortages, are of high quality. The study substantiates the application of test procedures to quality indicators. The indicator of losses and shortages is quantitative, so the source of its definition is the accounting (financial) statements and audit materials.

It should be added that in the future the application of a comprehensive methodology, it is proposed to use it directly during the audit event.

That is, the amount of losses and shortages due to violations in the functioning of the ICS is determined directly during the control measure.

In this study, the practical implementation of a comprehensive methodology takes place without the audit service audit, so it is proposed to determine the amount of losses and shortages based on the results of the last audit, or conditionally.

In any case, the change in the numerical value of the indicator will not be reflected in the process of practical implementation of the complex methodology, and the result obtained as a result will be conditional.

Consider each of the stages:

**1. Level of competence level of competence of those who participate in control measures.** An appropriate test task was developed to determine the numerical value of the indicator. The variant of

the test task was previously practically tested during the Higher academic courses on internal control and internal audit held in the period from 16 to 20 December 2019 at the National Defence University of Ukraine named after Ivan Cherniakhovskyi.

The practical implementation of the provisions of the integrated methodology involves determining the effectiveness of the ICS of one of the institutions in the MOD system, in our case, the conditional situation, so to determine this indicator is proposed to involve part of the ICS, namely:

internal control manager;

head of the risk assessment team;

heads of structural units responsible for the implementation of key processes in the institution.

In the Institution, in accordance with the tasks assigned to it, the key conditional processes are selected: process № 1 (educational process) and process № 2 (conducting scientific and technical work (activities)).

Thus, four officials are entrusted with the testing and determination of the level of awareness on the organization and functioning of the ICS, who are entrusted with the performance of these responsibilities, namely:

manager of internal control - first deputy head of the Institution (official № 1);

responsible for the process № 1 (official № 2);

responsible for the process № 2 (official № 3);

head of one of the key divisions of the Institution (official № 4).

The designated officials were asked to solve a test task, which includes 20 questions with answer options related to the organization and implementation of internal control. The obtained test results are as follows, table 1.

Thus, the average numerical indicator of the level of competence of those participating in the control measures is 77.5% and in accordance with the proposed evaluation criterion corresponds to a sufficient level.

*Quality of risk identification.* To determine the quality of risk identification, the Institution developed a questionnaire, which consists of a

number of statements (questions) on the identification, their quality and degree of development of organizational documents for risk processing.

**Table 1 – The results of the competence of those who carry out control measures**

| №               | Member       | Number of correct answers | %    |
|-----------------|--------------|---------------------------|------|
| 1.              | Official № 1 | 16                        | 80   |
| 2.              | Official № 2 | 16                        | 80   |
| 3.              | Official № 3 | 15                        | 75   |
| 4.              | Official № 4 | 15                        | 75   |
| Average result: |              |                           | 77,5 |

The number of points received on the questionnaire is based on 1 point for confirmation of the statement (or there is a regulation of this issue) with the appropriate determination of the level of maturity of the element, which is estimated in the range from 1 to 4 points. The general results of the questionnaire are defined in the table (Table 2).

**Table 2 – The results of the questionnaire to determine the quality of risk identification**

| Question | The received point | Question | The received point | Question | The received point |
|----------|--------------------|----------|--------------------|----------|--------------------|
| 1.       | 4                  | 11.      | 4                  | 21.      | 4                  |
| 2.       | 3                  | 12.      | 4                  | 22.      | 3                  |
| 3.       | 4                  | 13.      | 3                  | 23.      | 3                  |
| 4.       | 4                  | 14.      | 4                  |          |                    |
| 5.       | 3                  | 15.      | 3                  |          |                    |
| 6.       | 4                  | 16.      | 4                  |          |                    |
| 7.       | 3                  | 17.      | 4                  |          |                    |
| 8.       | 4                  | 18.      | 4                  |          |                    |
| 9.       | 4                  | 19.      | 4                  |          |                    |
| 10.      | 3                  | 20.      | 4                  |          |                    |

A total of 84 points was obtained, which corresponds to 73% of the maximum possible amount of points.

*Quality of risk assessment.* To determine the quality of risk assessment in the process of internal control at the university, the issues covered in the previously developed questionnaire were investigated. The general results of the questionnaire are defined in the table 3.

**Table 3 – The results of the questionnaire to determine the quality of risk assessment**

| Question | The received point | Question | The received point |
|----------|--------------------|----------|--------------------|
| 1.       | 4                  | 10.      | 4                  |
| 2.       | 4                  | 11.      | 4                  |
| 3.       | 4                  | 12.      | 4                  |
| 4.       | 4                  | 13.      | 4                  |
| 5.       | 0                  | 14.      | 4                  |
| 6.       | 3                  | 15.      | 0                  |
| 7.       | 3                  | 16.      | 0                  |
| 8.       | 4                  | 17.      | 4                  |
| 9.       | 4                  | 18.      | 5                  |

A total of 59 points was obtained, which corresponds to 65% of the maximum possible amount of points.

*Quality of implementation of control measures.* To determine the value of the indicator of the quality of implementation of control measures in the process of internal control at the university,

the issues covered in the previously developed questionnaire were investigated. The general results of the questionnaire are defined in the table 4.

**Table 4 – The results of the questionnaire to determine the quality of implementation of control measures**

| Question | The received point | Question | The received point | Question | The received point | Question | The received point |
|----------|--------------------|----------|--------------------|----------|--------------------|----------|--------------------|
| 1.       | 4                  | 16.      | 3                  | 31.      | 3                  | 46.      | 4                  |
| 2.       | 5                  | 17.      | 5                  | 32.      | 3                  | 47.      | 0                  |
| 3.       | 4                  | 18.      | 5                  | 33.      | 5                  | 48.      | 5                  |
| 4.       | 5                  | 19.      | 5                  | 34.      | 4                  | 49.      | 4                  |
| 5.       | 3                  | 20.      | 5                  | 35.      | 3                  | 50.      | 4                  |
| 6.       | 3                  | 21.      | 5                  | 36.      | 5                  | 51.      | 4                  |
| 7.       | 2                  | 22.      | 5                  | 37.      | 4                  | 52.      | 4                  |
| 8.       | 4                  | 23.      | 5                  | 38.      | 4                  | 53.      | 5                  |
| 9.       | 2                  | 24.      | 5                  | 39.      | 4                  | 54.      | 5                  |
| 10.      | 2                  | 25.      | 5                  | 40.      | 4                  |          |                    |
| 11.      | 4                  | 26.      | 5                  | 41.      | 0                  |          |                    |
| 12.      | 4                  | 27.      | 3                  | 42.      | 0                  |          |                    |
| 13.      | 3                  | 28.      | 3                  | 43.      | 4                  |          |                    |
| 14.      | 4                  | 29.      | 4                  | 45.      | 4                  |          |                    |
| 15.      | 3                  | 30.      | 4                  | 45.      | 4                  |          |                    |

A total of 205 points were obtained, which corresponds to 76% of the maximum possible amount of points

*Quality of financial accounting.* In accordance with the National Regulation (Standard) of Accounting 1 “General requirements for financial reporting” (hereinafter – the Standard) approved by the order of the Ministry of Finance of Ukraine from 07.02.2013 № 73 [24] provides qualitative characteristics of financial statements and principles of its preparation. In the process of determining the quality of

financial (accounting) reporting, appropriate testing was conducted taking into account the requirements of the National Regulation (Standard) of Accounting. To perform this task, the latest financial (accounting) statements submitted to the state treasury service for 2019 were analyzed.

The general results of the questionnaire are defined in the table 5.

**Table 5 – The results of the questionnaire to determine the quality of financial statements**

| Question | The received point | Question | The received point |
|----------|--------------------|----------|--------------------|
| 1.       | 5                  | 8.       | 4                  |
| 2.       | 5                  | 9.       | 5                  |
| 3.       | 5                  | 10.      | 5                  |
| 4.       | 5                  | 11.      | 4                  |
| 5.       | 5                  | 12.      | 4                  |
| 6.       | 4                  | 13.      | 4                  |
| 7.       | 4                  | 14.      | 5                  |

A total of 64 points was obtained, which corresponds to 91% of the maximum possible amount of points

*Indicator of losses and shortages.* The indicator of losses and shortages (*LS*) in the audit process was defined as the average value of the ratio of losses and shortages in terms of each asset (*A*) reflected in the financial statements of the institution by the Eq. (1):

$$LS = \sum \frac{LS_n}{A_n} \quad (1)$$

At conditional application of a complex technique it is offered to define the specified indicator at the level of value of 0,1 that on the

average makes one tenth of absolute value of efficiency of ICS.

2. The work carried out to assess the numerical value of the indicators of the efficiency of the ICS allows you to calculate and compile a matrix of key performance indicators of the ICS.

We use the Eq. (2) to determine the KPIs from the selected indicators:

$$KPI_i = \frac{AL}{SL} * 100\% , \quad (2)$$

Where, AL – actual level,  
SL – satisfactory level.

Next, conducting the best individual impressions:

Quality of risk identification:

$$KPI = \frac{73}{63} * 100\% = 1,15 (115\%);$$

Quality of risk assessment:

$$KPI = \frac{65}{63} * 100\% = 1,03 (103\%);$$

Level of competence:

$$KPI = \frac{77}{63} * 100\% = 1,23 (123\%);$$

Status of implementation of control measures:

$$KPI = \frac{76}{63} * 100\% = 1,2 (120\%);$$

Quality of financial accounting:

$$KPI = \frac{91}{63} * 100\% = 1,44 (144\%);$$

The composite matrix has the following form (Table 6).

**Table 6 – Matrix of key indicators of ICS efficiency**

| No | Indicator                                    | The level of achievement of goals |              |        |        | KPI index | Weighting factor |
|----|--|-----------------------------------|--------------|--------|--------|-----------|------------------|
|    |  | initial                           | satisfactory | target | actual |           |                  |
| 1. | Quality of risk identification:              | 37                                | 63           | 100    | 73     | 1,15      | 0,1781           |
| 2. | Quality of risk assessment                   | 37                                | 63           | 100    | 65     | 1,03      | 0,1741           |
| 3. | Level of competence                          | 37                                | 63           | 100    | 77,5   | 1,23      | 0,1700           |
| 4. | Status of implementation of control measures | 37                                | 63           | 100    | 76     | 1,20      | 0,1700           |
| 5. | Quality of financial accounting              | 37                                | 63           | 100    | 91     | 1,44      | 0,1538           |

3. The generalized indicator (coefficient) of efficiency of ICS is calculated in percent by the Eq. (3):

$$GI = \sum(KPI_i * n) - (LS * n), \quad (3)$$

Where,  $KPI_i$  –KPI index;

$LS$  – The value of the indicator of losses and shortages;

$n$  – Weighting factor of the indicator.

Calculating the generalized indicator:

$$GI KPI = (1,15 \cdot 0,1781) + (1,03 \cdot 0,1741) + (1,23 \cdot 0,17) + (1,20 \cdot 0,17) + (1,44 \cdot 0,1538) - 0,1 = 0,76$$

Next, we evaluate the obtained value of the generalized evaluation indicator, using the scale of the utility function proposed by Harrington (Table 7).

**Table 7 – Scale of the utility function proposed by Harrington**

| Generalized indicator | The level of efficiency of ICS |
|-----------------------|--------------------------------|
| $D > 0,8$             | proper level                   |
| $0,63 < D < 0,8$      | sufficient level               |
| $0,37 < D < 0,63$     | insufficient level             |
| $0,2 < D < 0,37$      | unsatisfactory level           |
| $D < 0,2$             | no efficiency                  |

Thus, the obtained value of the generalized indicator is in the range of  $0.63 < D < 0.8$ , which

corresponds to the level of maturity of the risk management system – the repetitive level and

the level of efficiency of the JCC in the Institution is assessed as sufficient.

## Conclusions

The results obtained based on the results of the evaluation of the effectiveness of the ICS of the conditional Institution in the MOD system allow to conduct a relevant analysis.

Thus, the actual level of achievement of goals in the functioning of the ICS in terms of selected indicators has the results shown in the relevant table 8.

**Table 8 – The actual level of achievement of goals in the functioning of the ICS in terms of selected indicators**

| Indicator                                    | Actual level (%) | The level of efficiency of ICS |
|--|------------------|--------------------------------|
| Quality of risk identification:              | 91               | appropriate                    |
| Quality of risk assessment                   | 77,5             | sufficient                     |
| Level of competence                          | 76               | sufficient                     |
| Status of implementation of control measures | 73               | sufficient                     |
| Quality of financial accounting              | 65               | sufficient                     |

The proposed approach to determining the value of quality indicators through the use of test procedures is universal due to the possibility of varying the number of questions and the approach to their evaluation.

The results of the study, along with determining the effectiveness of a particular indicator in assessing the effectiveness of the ICS provide an opportunity to identify common weaknesses (gaps) in the system.

The application of the matrix of key performance indicators (KPI) in assessing the effectiveness of the JIU of the MOD institution on the basis of practical work has proven its effectiveness and feasibility in a comprehensive methodology.

The analysis of the obtained results proved the possibility to determine the numerical value, which may indicate the effectiveness of the ICS of the institution.

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Obtained in the process of practical application of a comprehensive methodology indicators of the effectiveness of the ICS can be systematized into an appropriate database for further generation of statistical information and taken into account during risk-oriented planning of internal audit activities in accordance with the order of the Internal Audit Department from 04.12.2017 № 42 “On approval of the Interim Guidelines on Risk-Oriented Planning”.

Also, a comprehensive methodology can be used in part and applied thematically when testing the functioning of some of its key indicators.

Prospects for further research are seen in improving the accuracy of assessing the effectiveness of the ICS, as well as in finding alternative methods for its evaluation.

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