

Monitoring Parameters Analysis and Modeling for the State's Economic Security

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Abstract—Due to the high level of corruption, insufficient financial control and monitoring of financial transactions, the financial system of Ukraine has become a very attractive target for illegal financial activities and illegal financial flows. This determines the relevance of research compliance risks of financial transactions, the peculiarities of their organization in the field of monitoring the parameters of economic security of the state. The purpose of the study is to determine the methodological and organizational framework for monitoring financial transactions to develop practical recommendations for improving the organization of financial investigations of doubtful financial transactions. The scientific novelty of the study is to model the parameters of monitoring dubious financial transactions. The practical significance of the work is in determining areas for improving the analysis of the parameters of monitoring dubious financial transactions

Keywords—economic security, monitoring parameters, financial transactions, methods of analysis, doubtful financial transactions.

I. INTRODUCTION

With the growing complexity and dynamism of the globalization of economies and financial markets in the systems of economic security of states, the importance of monitoring the processes of shadowing and corruption is growing. Money laundering through various models and tools is one such process. The actualization of research on scientific and practical problems in identifying and preventing the risks of money laundering is due to the exacerbation of economic and global crises, the growth of fraud and terrorism in all countries in recent years. Due to the underdeveloped financial system, high levels of corruption, poor financial control and monitoring of financial transactions, Ukraine's financial system has become a very attractive target for illegal financial activities and illegal financial flows. Thus, the monitoring of money laundering technologies, which is a threat to financial security, is part of the system of analysis of the parameters of economic security of the state. Financial transactions of legalization of illegal income have a distorted essence, without changing their form, characteristics and properties of typical financial transactions. That is, at some point, ordinary financial transactions may have a hidden purpose, although their characteristics do not change, and therefore the existing mechanisms of counteraction do not detect them. Other problems in identifying doubtful financial transactions include

the following factors: the branching of financial institutions and the number of financial transactions; mobility of transfers and ease of use of financial services [1,2].

Financial transactions have problems identifying and proving their doubt in the following circumstances: if the financial transaction is confusing or unusual; is a set of related financial transactions that do not have an obvious economic meaning or obvious legal purpose; in case of revealing the facts of repeated financial transactions, the nature of financial transactions gives reason to believe that the purpose of their implementation is to avoid the procedures of mandatory financial monitoring or identification of the client [3-6]

Thus, the detection and analysis of doubtful financial transactions is a multifaceted problem. In addition, the dynamics of economic and financial processes, legislative changes lead to changes in models and tools of money laundering obtained illegally. These circumstances at the theoretical level require the development of new methodological support for the detection and analysis of dubious money laundering operations at the macro and micro levels of government. At the practical level, the uncertainty of identification and analysis of doubtful transactions necessitates the clarification of regulatory procedures for financial monitoring and the development of methodological support for their practical application.

The objectives of the study are: to determine the importance of financial monitoring for the economic security of the state; streamlining the tasks of monitoring the parameters of the economic security financial component; description of financial monitoring methodology; development of methodological bases for monitoring dubious financial transactions.

II. MATERIALS AND METHODS

2.1. FINANCIAL MONITORING AS A TOOL FOR ENSURING ECONOMIC SECURITY

At present, ensuring the economic security of the state and economic entities is becoming the primary and most important characteristic of the quality and state of the economy. The most important component of economic security is financial. Its provision provides for the functioning of the system of financial monitoring of operations in the financial sphere.

The financial security strategy must clearly define the objects, forces, means and methods of ensuring the security of all economic entities in the field of financial relations on money laundering, money laundering and terrorist financing [3,6]. The reasons for the concept of "monitoring" are: increasing instability of the external environment, which requires a rapid response of the management system, increasing its level of adaptability and flexibility; the need to shift the emphasis from controlling past events to anticipating and developing scenarios for responding to future changes; the need to track information about the state of financial resources in real time in terms of information overload.

The financial monitoring system in Ukraine covers virtually all financial service providers and provides for close cooperation between various ministries and agencies. Coordination of financial monitoring entities and their methodological support is entrusted to a specially authorized body - the State Financial Monitoring Service. According to the law, the system of financial monitoring is two-tier - primary financial and state financial monitoring [3]. The Ukrainian system of financial monitoring, in contrast to foreign counterparts, is endowed with much greater powers - it not only receives information, analyzes and publishes reports, but also conducts financial investigations. The functioning of a comprehensive system of economic security with elements of financial monitoring is carried out using the following principles:

- complexity (system) - the need to create a security system that would ensure the security of all facilities;
- timeliness - early detection of threats and prevention of their harmful effects; continuity - the constant action of the system;
- legality - the entire system of economic security and its functioning must be built in accordance with existing legal norms in the country;
- planning - security activities are organized on the basis of a comprehensive program and specific plans in certain areas of security;
- economic feasibility - the cost of measures to ensure economic security should not exceed the cost of economic results,
- confidentiality - a number of ways, means, methods of security must be concealed and known to a very narrow circle of specialists;
- competence - professionalism of all participants of the monitoring system [7,8,9]

Thus, the Ukrainian system of financial monitoring of economic security itself conducts financial investigations. Its activities are aimed at protecting public interests, as well as the preservation of significant amounts of confidential financial information [6].

In the current conditions of cyclical crises, the growth of the shadow economy and terrorism in the world, the functioning of the financial monitoring system should be considered as a tool of active management that allows a higher level of flexibility and adaptability of financial planning, forms a rapid response to internal and external changes. to ensure

economic security as subjects of primary monitoring and state monitoring [3,7].

2.2. ANALYSIS PARAMETERS MONITORING OF THE STATE'S ECONOMIC SECURITY

It is recommended to monitor the parameters of economic security of the state taking into account the data of financial monitoring of money laundering on the basis of creating a single information space by means of integration of information resources. Legalization (laundering) of proceeds from crime (CC) includes any actions related to a financial transaction or transaction with proceeds from crime, as well as actions aimed at concealing or masking the illegal origin of such proceeds, or possession of them, rights to such income, sources of their origin, location, movement, change of their form (transformation), as well as the acquisition, possession or use of income obtained by criminal means [2,9].

It should take into account the goals and objectives of monitoring (See Tabl.1).

TABLE I. GOALS AND OBJECTIVES OF MONITORING ECONOMIC SECURITY PARAMETERS

<i>Objectives</i>	<i>Tasks</i>
information interaction of all authorities to ensure economic security;	implementation of short-term forecasting of the development of the most important processes in the socio-economic and financial spheres;
control over the state of threats to the economic security of the state and regions;	operational monitoring of the state of the socio-economic and financial spheres
elaboration of proposals on a set of measures aimed at eliminating negative trends and phenomena, as well as on the participation of state authorities in providing assistance to the regions;	current analysis on the basis of spatial and temporal coordination of information flows on the state of monitoring objects, which are formed by various executive bodies and other organizations of all forms of ownership that participate in the monitoring;
prompt provision of public authorities of Ukraine and its subjects with information on the state of threats to economic security, their nature, possible consequences, as well as forecasts in this area;	timely identification of changes occurring in the socio-economic and financial spheres of the state, and the reasons that caused them;
assessment of the effectiveness of methods, organizational structures and management processes in relation to public authorities and management, self-government bodies, enterprises and organizations of all forms of ownership;	prevention of negative tendencies leading to the formation and development of centers of tension in the socio-economic and financial spheres, threatening the economic security of the state;

^a. Developed by authors with data from [5].

Monitoring data in quantitative and qualitative indicators allow to predict and modeling the impact of both negative and positive trends in the system of economic security protection. And this, in turn, will allow to build an algorithmization of the management system at all levels of implementation of the policy of protection of national interests of the country in the sphere of economy.

In order to achieve the goals of monitoring the parameters of economic security, appropriate organizational and methodological support is required, in particular regarding: collection and evaluation of information using thresholds and economic security criteria; obtaining information on the state of threats to the economic security of the state and regions; determination of levels of control over ensuring economic security: state, regional, territorial; operational analysis of monitoring data, use of mechanisms to prevent threats to economic security [5]

At the state level, monitoring is carried out in favor of sustainable development of Ukraine's economic system and is a system of continuous monitoring and analysis of the socio-economic and financial spheres, operational regulation of elimination of negative trends and phenomena in their development and use of potential. At the regional level, monitoring is a system of short-term forecasting of the dynamics of processes and phenomena, operational monitoring of the current state of the parameters of sustainable development and economic security. At the level of business entities, the monitoring of economic security of the state involves tracking dubious financial transactions and their participants in order to develop measures to prevent the risks of shadowing and money laundering. According to Ukrainian legislation, high risk is based on the results of the analysis of a set of defined criteria, which indicates a high probability of using the business entity to legalize (launder) proceeds from crime and / or terrorist financing [2].

2.3. METHODOLOGICAL BASES OF DEVELOPMENT FOR MONITORING PARAMETERS ANALYSIS

Detection of dubious financial transactions in terms of creating preventive measures for economic security of business entities and the state in general involves monitoring and analysis of data on internal and external financial transactions and their participants. A necessary condition for ensuring the economic security of the state is the security of business entities and the detection of signs of certain financial violations in their financial transactions. Such violations can be detected using the results of typological studies conducted by the State Financial Monitoring Service (SFMS) of Ukraine [1]. The main characteristics of typological schemes include: form of conduct - financial transactions; method of carrying out - moving, masking, transfer of financial assets; the result is the possession of financial assets obtained illegally. This takes into account the types of financial transactions, typical legal entities and individuals. As a result of observations on the number of dubious transactions in certain areas of business activity, a typological scheme of money laundering is modeled both within the national market and at the international level. In the analysis of financial transactions is the identification of persons involved in their implementation.

At the same time, financial transactions carried out by public figures and persons against whom international sanctions have been applied are determined, and the possibilities of using fictitious business structures are established [2]. As noted in the research [7] of the intergovernmental body that develops policies to combat money laundering and promotes its implementation at the

national and international levels, the most commonly used methods of legalization are shown in Table 2

TABLE II. THE MAIN OPERATIONS OF MONEY LAUNDERING

<i>Model stage</i>	<i>Type of operation</i>
Smurfing	Shredding of deposits, structuring of cash transactions without exceeding the limit established by law
Use of correspondent relations of banks	Exchange transactions Correspondent and transit accounts, Transfer of funds abroad
Contraband	Use of fictitious persons
Hidden placement	Use of sink companies Use of credit cards Use of cryptocurrencies
Legalization	Investing legally Illegal use of exceptions to the law

^a Developed by authors .

According to the SFMS, the participants in suspicious financial transactions in the materials submitted to law enforcement agencies were officials, state bodies or local governments and persons equated to them. The following were used as money laundering instruments: financial assistance (loans); cash; deposits; securities and others [9,10,14]. Economic analysis of financial transactions of money laundering is the transformation of investigated and verified information received by the subjects of primary financial monitoring in the form of financial monitoring through the interpretation and integration of all collected data.

The method of analysis of doubtful financial transactions can be divided into the following stages: verification of the received data on business entities or financial transactions, officials; development of a working hypothesis regarding their involvement in money laundering; collection, evaluation and verification of additional information about the surveyed business entities, officials and financial transactions; identification of preconditions for doubtful financial transactions; development of preliminary conclusions on the affiliation of financial transactions to typological schemes; combination of sources and assets of financial transactions in typological schemes of money laundering.

The dynamics of informing about financial transactions received by the SFMS for 2015-2019 indicate an increase in the number of materials on dubious financial transactions registered with the SFMS in 2.5 over the past 5 years.[10-12]. This may indicate both an increase in the volume of financial monitoring and an increase in the number of dubious financial transactions in the field of money laundering.

III.RESULTS AND DISCUSSION

3.1. MODELING OF ECONOMIC SECURITY MONITORING PARAMETERS

To organize an effective system for monitoring security parameters, it is advisable to use the model of "three lines of protection", which is shown on Fig. 1. The triple protection model is widely used in foreign practice [4,5,8]. The organization of an effective system for monitoring the security parameters of financial transactions provides for the following

procedures: customer risk assessment, which is used to collect all financial transactions and customer identification information to establish the appropriate level; measuring the risk of financial transactions used to identify accounts associated with transactions that lead to potential risks for analyzing the behavior and consequences of risks, which is used to identify suspicious schemes in transactions that lead to potential security risks; document management and reporting tools used to alert relevant employees about risks and generate reports on these risks.

Effective application of the model has the following advantages: flexibility in the application of the safety risk compliance procedures; effectiveness of assessment through the ability to realistically assess and reduce specific risks; proportionality of the application of preventive measures (resources should be directed to where the greatest risks are identified).

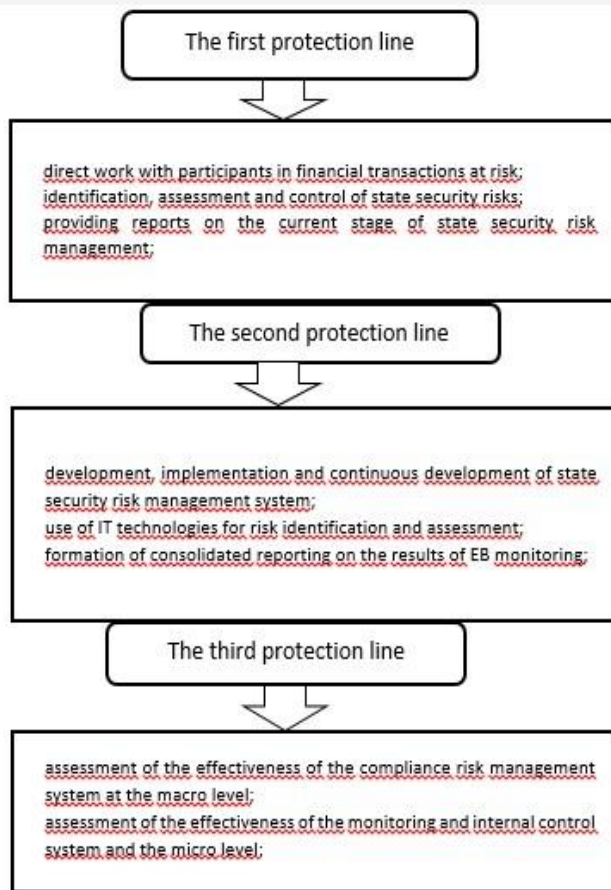


Fig. 1. Model of organization an effective system for monitoring the parameters of financial transactions economic security (created by authors)

3.2. MODELING OF THE ANALYSIS FOR FINANCIAL TRANSACTIONS AND THEIR SUBJECTS

The analysis method with the compliance risks of financial transactions for economic security are shown in Tabl. 3 [8]. Algorithms for identifying the risks of money laundering of business entities with non-transparent forms of ownership are presented in the work [6]. The methods of analysis of security

parameters of financial transactions include: monitoring the size of the financial transaction, transaction analysis based on comparison with regulatory indicators and signs of fictitiousness, assessment of risk factors, control of fictitious criteria of financial transactions, adaptation of financial transaction and client data.

TABLE III. PROCEDURES FOR FINANCIAL TRANSACTIONS RISK ANALYSIS

<i>Stages of analysis and evaluation</i>	<i>Procedures of analysis and evaluation</i>
Identification	Identification of threats and risks for individuals; Carrying out of classification of the revealed risks for individuals Forecast of the level of consequences
Analysis	Individual risk assessment (client risk, individual risk, service risk) Defining risk criteria and assessing their level
Reaction	Carrying out of the repeated analysis of individual risks (if necessary) The choice of method of individual risk assessment Development of individual risk management strategies
Control	Continuous monitoring of individual risks Adjustment of changes in risk management Reporting on the implemented risk management measures

^b. Developed by authors.

Monitoring the parameters of doubtful transactions involves procedures for the transition from monitoring the transaction to monitoring the activities and behavior of the client.[13,14]. Behavioral data: lack of data for proper verification, incomplete or dubious information, unclear explanations of the nature of activities, nervousness for no apparent reason or atypical behavior, unusual interest in the internal financial monitoring system, cancellation of a financial transaction after requesting supporting documents or clarification, insistence on the urgency of the financial transaction and nervousness, offering various forms of gratitude for the financial transaction, excessive justification of the financial transaction and lack of links with illegal activities, lack of knowledge about financial transactions at their own expense. The client's activity is characterized by the following data: inability to confirm the client's phone number and e-mail address, the presence of a large number of accounts or payment cards that do not meet business needs, the nature of the financial transaction indicates the presence of another clients that are unknown for bank, the presence of a representative who manages unrelated accounts.

Characteristics of external and internal factors of risk of legalization of dubious income involves their division into external (socio-economic, geographical) and internal (organizational, financial, informational, technological).

A high risk of financial transactions is established in relation to the following clients of individuals involved in dubious financial transactions: clients whose place of residence (stay, registration) is a state that does not comply with the recommendations of international organizations to combat money laundering or terrorist financing or the financing of the proliferation of weapons of mass destruction; clients included in the special list of persons; foreign public figures, members of their families and persons associated with

such politically significant persons, as well as clients, the ultimate beneficial owners of which are these persons; customers in respect of whom or their beneficial owners special economic sanctions have been applied; clients whose place of residence (stay, registration) is the state, referred by the Cabinet of Ministers of Ukraine to the list of offshore zones [3,6,10,15]

Analysis of data on dubious transactions, fictitious legal entities, beneficial owners and officials is the basis of information security of business relations of business entities. Often the monitoring of business relations involves procedures for the transition from monitoring the operation to monitoring the activities and behavior of the client, involves the use of certain methods of control [4]. These methods include: monitoring the size of the financial transaction, analysis of the transaction based on comparisons with regulatory indicators, risk assessment of financial security, adaptation of data on the financial transaction and the client.

IV. CONCLUSION AND FUTURE WORK

Modeling the analysis and assessment of economic security of financial transactions involves the use of developed methodological frameworks. The use of methods of analysis of financial transactions contains three analytical research complexes: analysis of potential risks and threats to the economic security of financial transactions; analysis of the results of monitoring the parameters of participants in financial transactions; analysis of criteria for identifying doubtful financial transactions and their participants. Modeling of parameters of financial transactions involves the use of the following data: compliance with legal requirements in the field of economic security of financial transactions, taking into account the criteria of typological research and the use of standard criteria for customer identification and fictitious transactions. For improving the methodological basis of monitoring and analysis of the parameters of economic security of financial transactions, it is recommended: the use of the model of "three lines of protection", which is widely used in foreign practice; such additional procedures for identifying signs of doubtful financial transactions: transfer of funds abroad; financial transactions with cash; financial transactions of politically significant persons, members of their families or related persons; financial transactions involving ties with Iran or North Korea. simplification of the procedure for conducting low-risk financial transactions; clarification of the list of politically significant or public figures. Systematization and automation of additional identification criteria, namely "threshold" and "suspicious" financial transactions and the introduction of additional procedures to identify signs of doubtful financial transactions determines the subject of further research. The developed methods and procedures for detection

and analysis of dubious financial transactions are the basis for clarifying the typological schemes of money laundering. This determines the direction of further research on measuring the risks of business relations in the system of economic security at all levels of management and software design procedures for detecting and analyzing doubtful financial transactions.

REFERENCES

- [1] Typological studies of the State Financial Monitoring Service of Ukraine for 2016, 2015, 2014. Kyiv, 2017. 126 P. URL: http://www.sdfm.gov.ua/content/file/Site_docs/2017/20170221/Zmist%201.pdf (In Ukrainian)
- [2] Law of Ukraine On the prevention and counteraction to the legalization (laundering) of proceeds from crime, the financing of terrorism and the financing of the proliferation of weapons of mass 06.12.2019 № 361-IX. URL: <https://zakon.rada.gov.ua/laws/show/361-20>
- [3] Zavoli, I., & King, C. (2021). The challenges of implementing anti-money laundering regulation: An empirical analysis. *Modern Law Review*, 84(4), 740-771. doi:10.1111/1468-2230.12628
- [4] Al-Rashidi, K. S. (2021). 'Indirect method of proof' and the kuwaiti anti-money laundering law: A lesson from the UK. *Criminal Law Forum*, 32(3), 405-433. doi:10.1007/s10609-021-09415-3
- [5] Premti, A., Jafarnejad, M., & Balani, H. (2021). The impact of the fourth anti-money laundering directive on the valuation of EU banks. *Research in International Business and Finance*, 57 doi:10.1016/j.ribaf.2021.101397
- [6] Moiseienko, I., Dronyuk, I., & Revak, I. (2021). Money laundering risk identification algorithms. Paper presented at the *CEUR Workshop Proceedings*, 2824 120-129.
- [7] Gilmour N. Preventing money laundering: a test of situational crime prevention theory. *J. of Money Laundering Control*. 2016. Vol. 19(4). P. 376-396, DOI: 10.1108/JMLC-10-2015-0045.
- [8] I. Dronyuk, I. Moysyenko, J. Kuck and O. Gorina, "Theoretical and Applied Aspects of Bank Credit Risks Minimization," 2020 IEEE PICS&T 2020, <https://ieeexplore.ieee.org/document/9468056> pp. 481-484, doi: 10.1109/PICST51311.2020.9468056.
- [9] Report on the National Risk Assessment in the Sphere of Prevention and Counteraction to Legalization (Laundering) of Proceeds from Crime and Terrorist Financing. Kyiv, 2019. URL: <https://finmonitoring.in.ua/NRA2019.pdf> (In Ukrainian)
- [10] Report of State Financial Monitoring Service. URL: https://sdfm.gov.ua/assets/userfiles/books/zvit_2018_ukr.pdf
- [11] Law No 584 08.07.2016 Finacial Ministry of Ukraine, Risk criteria for legalization (laundering) of proceeds from crime, terrorist financing and financing the proliferation of weapons of mass destruction URL: <https://zakon.rada.gov.ua/laws/show/z1047-16> (In Ukrainian)
- [12] Guidelines for informing about the financial transactions identified by the State Audit Office and its interregional territorial bodies, which are subject to financial monitoring, URL: <http://www.sdfm.gov.ua>. (In Ukrainian)
- [13] Moiseienko I.P., Ryvak N.O. Monitoring parameters of the level of economic security of Ukraine. *Actual Problems of Economics*, №11(137).2012. p. 95-103.
- [14] Law Of Ukraine, Strategy for the development of a system to prevent and combat money laundering, terrorist financing and the financing of the proliferation of weapons of mass destruction until 2020 URL: <http://zakon3.rada.gov.ua/laws/show/1407-2015> (In Ukrainian)