

Money Laundering Risk Identification Algorithms

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Abstract

It is shown that the risks of money laundering are a type of danger associated with political, social and economic activity. The methodological basis for identification of money laundering risks is given. The monitoring data of money laundering risks are analyzed. The algorithms for identification of money laundering risks in general case and partial case are developed on the basis of data on owners and structure of property of financial transactions subjects.

Keywords 1

Risks of illegal income legalization, financial monitoring, proper verification of customers, non-transparent ownership structure, beneficial owners

1. Introduction

The national system for preventing and combating money laundering needs to improve the methodological framework for identifying and analyzing risks at the level of business entities. In Ukraine, since 2016, national risk assessments have been carried out, which determine the typologies of risks of money laundering and terrorist financing and typical schemes of their occurrence [1]. The spread of these threats to economic security may result in the development of money laundering and the support of financial flows of international terrorism and crime [2]. An important aspect of the study of the legalization processes of illegally obtained income is the identification of money laundering risks [3,4]. The article [5] shows that contextual institutional restraints and cultural factors have significant impact on the possibility in the fight against terrorism an organised crime. The struggle for democracy there is all over the world [6,7].

The special state body, the State Financial Monitoring Service of Ukraine (SFMS), is taking enhanced measures to monitor the processes of money laundering, terrorist financing and the proliferation of weapons of mass destruction. Financial monitoring is a set of measures taken by the subjects of financial monitoring in the field of prevention and counteraction to legalization (laundering) of proceeds from crime, terrorist financing and financing of proliferation of weapons of mass destruction. Financial monitoring is a set of measures taken by the subjects of financial monitoring in the field of prevention and counteraction to legalization (laundering) of proceeds from crime, terrorist financing and financing of proliferation of weapons of mass destruction. The object of financial monitoring is actions with assets related to the relevant participants in financial transactions that conduct them; it is provided that there are risks of using such assets to legalize proceeds from crime, as well as any information about such actions or events, assets and their participants.

Legalization (laundering) of proceeds from crime 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 them, the rights to such income, the 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 [8].

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2. Materials and methodologies

2.1. Identification of money laundering risks

The main criteria used to form certain classes of different risks for businesses in the field of money laundering are as following:

1. The likelihood of risk of involvement in standard schemes of money laundering
2. The degree of uncertainty in the implementation of financial transactions
3. The consequences of dubious transactions
4. Potential for resilience / resistance to risks
5. Ability to recover from an emergency;
6. Scale and duration of consequences.

According to the updated methodology, the risk assessment scheme for money laundering legalization contains the following stages: preliminary stage, identification (identification) of risks, analysis, risk assessment and management [10,11].

A threat is interpreted as a person or group of persons whose activities may harm the country, society and the economy. In other words, terrorist organizations and their supporters, their money, their past, present and future activities in the field of money laundering.

Vulnerability is an area where a threat can be realized, or a factor that can help carry out that threat. These can be structural components of the financial system, mechanisms for movement and storage, services or goods in cash [8].

Consequences - the impact or harm of criminal activity on the financial system and / or institutions, the economy as a whole, the population, the business environment, national and international interests, the reputation and attractiveness of the country's financial sector to investors.

The likelihood of risks of money laundering is a function of the coexistence of the threat and vulnerability to it. That is, risky events occur when a threat exploits a vulnerability. R - national risk level of laundering and financial terrorism can be expressed as:

$$R = f(T, V) \times C, \quad (1)$$

where R - risk function, T - threat; V - vulnerability; C - the consequences of the risk of laundering and financial terrorism. Thus, the level of risk can be mitigated by reducing potential consequences, threats or vulnerabilities [11].

The tools of cybercrime in typological schemes of money laundering include: forgery of payment cards, access to remote banking systems, financial pyramids online, online casinos, denial of service, DDoS attacks to obtain personal information about customers.

2.2. Monitoring the risks of money laundering

The results of the SFMS activities and the size of financial transactions that may be associated with the legalization of funds and the commission of another crime, defined by the Criminal Code of Ukraine, are shown in Table 1.

Table 1

Results of SFMS activity during 2019

Direction of submission	Submitted materials	Generalized materials	Additional generalized materials	The amount of financial transactions (billion UAH)
Total	893	503	390	92,2
Investigation of the facts of money laundering received from acts of corruption	211	47	164	41,8

Source [9]

The number of financial statements with materials on the risks of money laundering is evidenced by Table 2.

Table 2

Number of financial statements on money laundering risks

Years	The total number of financial institutions of the SFU	Is registered with DSFM	Number of reports submitted to the DSFM
2016	1265	460	366
2017	1233	559	2285
2018	1299	699	3818

Source [9]

At the stage of functioning of business entities according to the information of the Ministry of Justice of Ukraine till August 16, 2018 information on ultimate beneficial owners was provided by 23.2% of the total number of registered legal entities (1,338,823 persons in total). According to the organizational and legal form, they are distributed as shown in table 3.

Table 3

Status of information about the ultimate beneficial owners in 2018

Legal Form	Number of registered joint ventures (thousand units)	Number of registered joint ventures (percent)	Number of JVs that provided information on CBD(thousand units)	Number of JVs that provided information on CBD (percent)
Limited Liability Company	633	47,3	192	61,7
Private enterprise	214	16	41	13,2
Farm	44	3,1	15	4,8
Total	1339	100	310	100

Source [12]

Any of the business entities from the given organizational and legal forms can be involved in standard schemes of money laundering.

Problems of risk identification in the field of financial monitoring arise due to the following features:

- the presence of a large number of risks of current and long-term decisions;
- difficulties in identifying risks because they are closely related to each other;
- the variety of risks identified in different activities of the bank;
- high dynamics of economic processes creates new types of risks;
- the presence of differentiation of levels of dynamism and intensity of the impact of risks by region and type of financial transactions.

3. Results and discussion

3.1. Methodical bases of algorithmization for money laundering processes

The method of realization of the system economic analysis principles in the conditions of counteraction to legalization (laundering) of the proceeds from crime is directed on research processes formalization, and also statement and the decision of a problem of its functioning. The algorithm is understood as a finite ordered set of precise rules that describe what actions and in what sequence have to be performed to achieve the main goal after a finite number of steps or to obtain a solution to the problem [3].

When analyzing the problem of money laundering, the general block diagram of the research algorithm can be presented as follows:

1. the essence of risk identification and ways of laundering illegal income;
2. the essence and levels of risk analysis of money laundering: national and micro level;
3. the nature and analysis of the risks of money laundering by financial intelligence entities;
4. indicators of legalization of illegal income, their dynamics, effectiveness of measures to counteract the legalization of illegally obtained funds.

The general scheme of the algorithm for studying the processes of legalization of proceeds from crime is shown in Fig.1.

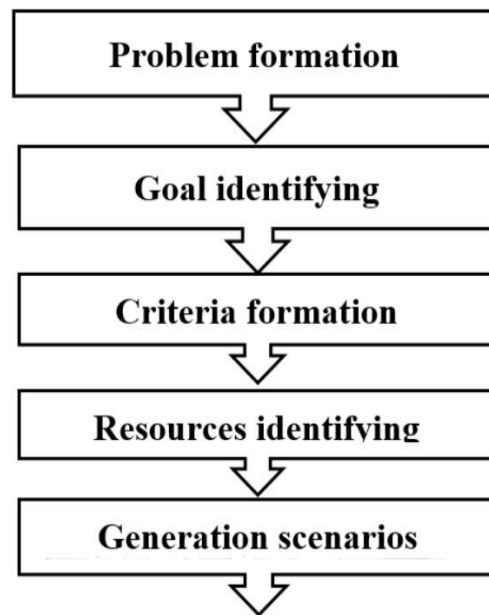


Figure 1: Algorithm for studying the processes of illegal income legalization

Thus, the algorithm of financial investigation and investigation to detect money laundering, means to establish, record, determine the fact and circumstances of the crime. These include the factors noted in table 4.

Table 4

Factors for detecting money laundering

Factors	Features of manifestation
circumstances of accumulation of criminal proceeds	time, place, manner and other circumstances of the crime
source of illegal origin of funds	relocation and use in the legal economy
place of hiding and storage	identification of countries involved in money laundering
identification and identification of persons	legal entities and individuals who are organizers, as well as other persons who participated or may be involved
nature and extent of damage	indicators of the number of financial transactions and their size

Source [13]

To harmonize Ukrainian legislation in the field of financial monitoring of money laundering with international standards, the concept of proper customer due diligence has been introduced. This check involves:

- identification and verification of clients;
- determination of the ultimate beneficial owner of the client;
- setting goals and nature of financial transactions or establishing business relationships;
- monitoring of financial transactions and business relations of the client;
- establishing compliance of client monitoring data with client databases available to the subject of primary financial monitoring [14];
- establishing data on the client's activities, sources of funds for financial transactions and the risks of such transactions [15];

- maintaining the relevance of these documents about the client [16].

3.2. Methods for identification money laundering risk subjects

To establish information on the final beneficial owners, Article 17 of the Law on State Registration of Legal Entities, Individual Entrepreneurs and Public Associations has been supplemented with new norms. These rules provide for the establishment of the following information about the ultimate beneficial owners: compliance of the ownership structure in form and content;

- for legal entities of non-residents installation of documents confirming registration
- for individuals, residents and non-residents
- notarized documents certifying the identity of the legal entity.

Data on the ultimate beneficial owners and ownership structure must be kept up to date, and changes must be notified to the state registrar within 30 days of their occurrence. The procedure for identification and verification of customers who may be involved in money laundering can be divided to two types: physically and remotely. Physical way provides for the physical presence of customers and the availability of copies of the original registration documents. The remote procedure also can be divided into two types: simplified verification models and full-fledged verification models. Identification and verification of participants in dubious transactions is possible in several variations. In addition to the physical presence and a copy of the original documents for non-banking institutions, as well as for banks, remote identification and customer verification is also available. Full-fledged verification models are: use of BankID NBU, qualified electronic signature (QES), video broadcasting session, as well as verification using the resource of state online services "DIYA (ACTION)". When using simplified models, customer verification involves the use of: data from credit bureaus and BankID NBU, the presence of QES, reading data from the chip of a biometric document. Intelligent DATA MINING [17] technologies used in the activities of banks [18] and algorithms for analyzing the intellectual potential of business entities to determine the risks of financial transactions conducted by them [10] can be used to verify clients of financial transactions [19].

Remote verification of participants in financial transactions is used in the following cases: for doubtful financial transactions that are subject to financial monitoring in accordance with the law; on low-risk financial transactions according to national and international typological studies; in financial transactions, which allows you to use the physical absence of the client (for example, when concluding insurance or credit agreements). Thus, remote verification allows you to use the physical absence of the client when concluding insurance or credit agreements [20-22]. The new requirements for the establishment of the ultimate beneficial owner, in addition to determining the ownership structure and registration documents, provide for the establishment of:

- persons who have a decisive influence on the activities of the enterprise, including through the chain of control or ownership;
- use of data from official documents, information from official and / or other sources;
- establishing measures to verify the accuracy of data on the ultimate beneficial owner ;
- notification to SFMS about discrepancies between the unified state register data and SFMS data about the ultimate beneficial owner.

The new provision on financial monitoring by banks provides for the use of a list of indicators of suspicion of financial transactions. These include those shown in table. 5.

Establishing the possibility of using fictitious business entities can be established by identifying the situations described in table 6.

Reconciliation of registration details is carried out in comparison with the following databases: with the Unified State Register of Enterprises and Organizations of Ukraine database, data of taxpayers in the State Fiscal Service of Ukraine; information on the absence of any activity for the specified reporting period or on availability of data on the movement of significant cash on current accounts. Many legal and financial intermediaries provide nominal owner services to conceal the ultimate beneficial owners and generate illicit income.

The system of financial investigations takes into account not only the risks in the field of financial monitoring, but also compliance risks in the field of business. Compliance - the risk of the business entity is the probability of losses / sanctions, additional losses or loss of planned income or loss of

reputation due to non-compliance with the law, regulations, market standards, fair competition rules, corporate ethics, conflicts of interest, and also internal bank documents of the bank.

Table 5
List of indicators of client activity and behavior

Classification feature	List of indicators
Client activity	Lack of data to properly verify, provide incomplete or questionable information Unclear explanations for the nature of the activity Nervousness for no apparent reason or atypical behavior Manifestation of unusual interest in the internal system of financial monitoring Cancellation of a financial transaction upon request for supporting documents or clarification Insistence on the urgency of financial aeration and nervousness Offering various forms of gratitude for conducting a financial transaction Lack of knowledge of financial transactions on their own account Excessive justification financial transaction and lack of links with illegal activities Unable to confirm the customer's phone address and email address Having 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 party to an unknown bank Absent or unpaid mandatory payments (taxes, utilities, etc.) The presence of a representative who manages unrelated accounts

Source: created by authors

Table 6
Identification of signs of fictitious business structures

Verification list	Fictitious signs
lifespan	relatively short life of the entity
Verification of founders	registration of the enterprise on fictitious persons (without a certain place of residence, mentally ill, students, foreigners, convicts, deceased persons, on the basis of purchased, stolen or lost documents); registration of a significant number of business entities with high performance per person (individual or legal entity)
Name verification	the name of the business entity coincides with the name of the state enterprise; presence of a tax address (existence of a mass registration address, indication of a non-existent address or address at which the enterprise cannot be located)
Checking the signs of statutory activity	absence of signs of statutory activity or carrying out of such activity in the minimum volume; availability of production facilities, warehouses, vehicles, other movable and immovable property; activities provided by the classifier of economic activities; number of employees, income, taxes and fees paid
Personnel inspection	lack of staff to carry out statutory activities; establishment of beneficial owners; the presence of high performance in the newly created structures; holding managerial positions (director / accountant) of the same person

Source [8]

3.3. Risks identification for concealment of beneficiary property

Concealment of beneficiary property is one of the key threats against money laundering. Identifying the risks of businesses with a non-transparent ownership structure involves identifying the risks of money laundering.

The ultimate beneficial owner is an individual who, regardless of formal ownership, has the ability to control and exercise decisive influence over the management and business activities of the business entity directly or through others. Such control is exercised by exercising the following rights:

- possession or use of assets (or a significant part of them);
- decisive influence on the formation of the management structure and voting results;
- making transactions on business conditions;
- giving mandatory instructions or functions of the governing body;
- influence through direct or indirect ownership of one legal entity independently or jointly with related parties (individuals and legal entities) share in the property of the joint venture in the amount of 25% or more of the authorized capital.

At the stage of registration and operation of business entities with a non-transparent form of ownership, there are such risks:

- fictitious entrepreneurship (according to Ukrainian legislation, fictitious entrepreneurship is the creation or acquisition of legal entities in order to cover up illegal activities or activities that are prohibited).
- using of intermediaries of legal and financial services, which in Ukraine include lawyers, law firms and associations, notaries, auditors, business entities that provide accounting and legal services, etc. All these intermediaries are required to perform financial monitoring responsibilities if they are involved in financial transactions for the formation of legal entities, management and provision of their activities, purchase and sale of corporate rights, raising funds for the formation, operation or management of business entities [16].

The general scheme of the algorithm for identifying risks of money laundering of business entities with non-transparent form of ownership is shown in Fig.2.

The concept of the ultimate beneficial owner of a legal entity has come into use in Ukraine together with the introduction into our legislation of provisions on financial monitoring. The algorithm for verifying a business entity with an opaque ownership structure consists of the following steps.

- Study of data on individuals
- Study of data on the legal entity and ownership structure
- Comparison of data on legal entities and individuals with data from the Internet and other sources of verification.
- Checking legal entities and individuals (owners and managers) for the following data: for the presence / absence of criminal cases of fraud; business reputation of individuals and legal entities, the presence of other legal entities in their property, relations with public figures, etc .; availability of trust agreements / declarations for persons registered in offshore jurisdictions.
- Analysis of information on the content of statutory activities and the financial condition of the business entity
- Monitoring the risks of the business entity
- The decision to establish the restoration or abandonment of business relations with business entities with a non-transparent ownership structure [8].

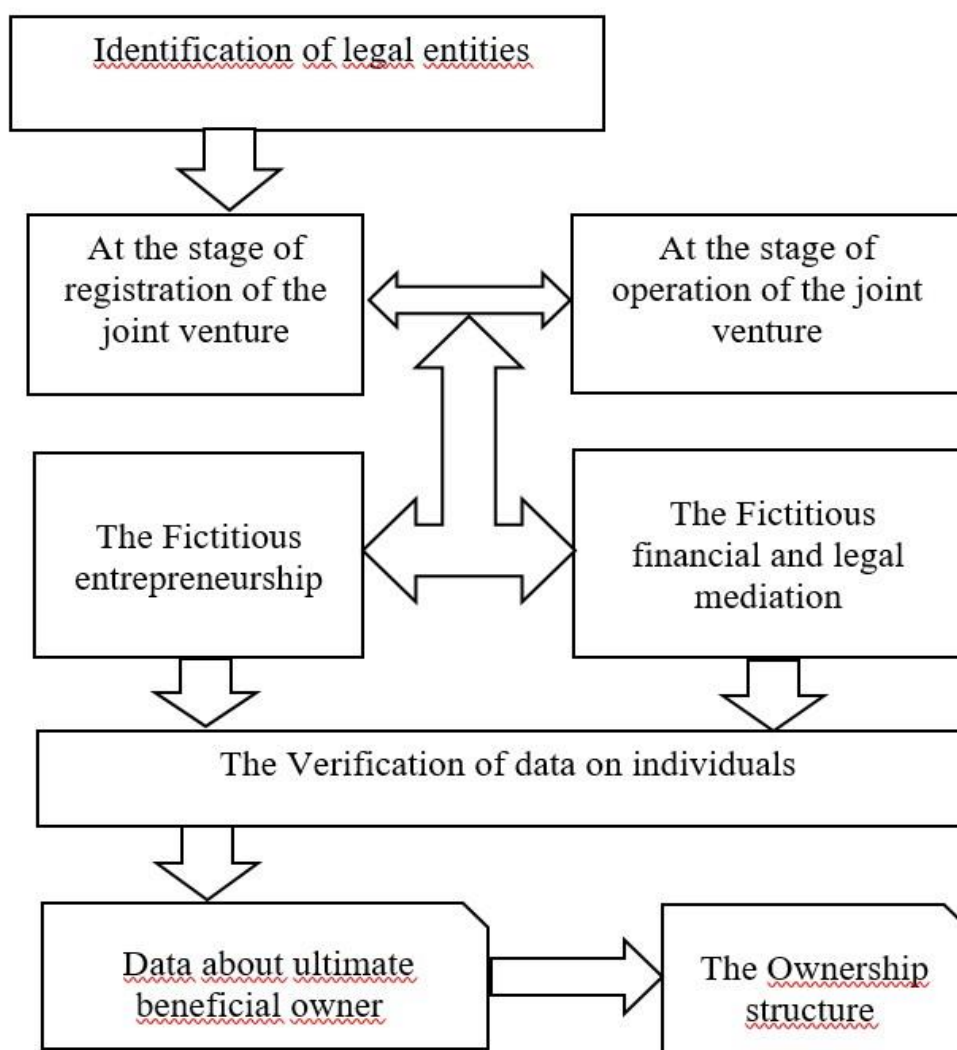


Figure 2: Algorithm for identifying risks of money laundering of business entities with non-transparent form of ownership

The main objectives in determining the ultimate beneficial owner are to prevent the illegal use of legal entities for the purpose of money laundering and terrorist financing, as well as to take measures to reduce such risks.

In order to establish the ultimate beneficial owner and ownership structure, the subjects of primary financial monitoring take the following mandatory measures: determine the ownership structure; analyze and identify persons who own a 25% or more share in the authorized capital of a legal entity (directly or through related parties); identify individuals who do not own a 25% stake in the share capital, but have a decisive influence on the activities of the legal entity [11].

One of the main responsibilities of banks, insurance companies, lawyers, accountants is the need to verify and identify the identity of the ultimate beneficial owner. If during the inspection it is established that the client is not the ultimate beneficial owner, the financial service providers must establish the identity of the ultimate beneficial owner. They must require the ownership structure of the legal entity and documents proving the identity of the ultimate beneficial owner.

If the founder of a legal entity is other legal entities or other legal entities, the inspection should be carried out until it becomes clear who is an individual who has a significant influence on the activities of such a company. In case of discrepancies between the official registers and the documents submitted by the client during the verification of information on the ultimate beneficial owner, it is necessary to inform the SFMS.

In case of non-submission of information on the ultimate beneficial owner, the Code of Administrative Offenses provides for the following fines.

- For concealment of information about the ultimate beneficial owner, late or incomplete submission of documents to the state registrar - from 17 thousand UAH to 51 thousand UAH, apply to the head of the legal entity or authorized person.
- For violation of the requirements for identifying the affiliation of the ultimate beneficial owner to politically significant persons, late submission of information on financial transactions - from 5,100 UAH to 34,000 UAH, apply to officials who carry out financial monitoring.

Thus, the new rules of financial monitoring, in accordance with the law [8], are intended to improve the procedure for determining the ultimate beneficial owners with the main goal to eliminate the risks of money laundering.

4. Conclusion and future work

Algorithmization of the processes of money laundering risks identification is great importance for the financial monitoring of these risks. The development of financial monitoring procedures involves: improving the methodological support of the processes of identification and verification of participants in money laundering processes, the introduction of additional stages of identification and verification of participants in dubious financial transactions.

The developed algorithms for identifying the risks of legalization of illegal income in the general case and in part based on the use of data on owners and ownership structure are an auxiliary methodological tool will allow moving to the digitalization of these processes. The effectiveness of algorithms for identifying the risks of money laundering can be increased through the using of software products to automate the processes of identification and verification of participants in financial transactions and digitalization of processes, which are reflected in typical models of money laundering. Subjects of primary financial monitoring are obliged to conduct financial investigations in the financial monitoring system, taking into account: assessment / revaluation of risks, including inherent in its activities; monitoring risks and documenting their results; keeping up-to-date information on risk assessment; creation of a risk profile of the subject of primary financial monitoring; documenting the risks of their clients in such a way as to identify the risks that constitute certain types of clients (development of risk profile of clients)

Algorithmization of the processes of identification of risks of money laundering is of great importance for the financial monitoring of these risks. The development of financial monitoring procedures involves: improving the methodological support of the processes of identification and verification of participants in money laundering processes, the introduction of additional stages of identification and verification of participants in dubious financial transactions.

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