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Статистичні проблеми та імперативи у воєнний час: критичний аналіз

Стаття висвітлює сучасні перспективи статистики як науки та її роль різних галузях людської діяльності. В основі статті лежить аналіз поточних тенденцій у розвитку статистики, а також її значущість в епоху цифрової революції та інформаційного віку. Перспективи статистики як науки неймовірно багатообіцяючі та різноманітні, охоплюючи різні сфери та галузі. Завдяки широкому аналізу поточних тенденцій і досягнень ця стаття проливає світло на розвиток статистики та її потенційний вплив на формування майбутнього.

В результаті дослідження визначено основні перспективи розвитку статистики як науки та сфери практичної діяльності, сформульовано ключові аспекти, що підкреслюють її значення. Доведено, що статистика - динамічна дисципліна, що розвивається, та має величезний потенціал для інновацій, відкриттів і впливу на суспільство. Проведено критичний аналіз статистичних проблем та невідкладних завдань, що виникають у воєнний час. Розглядається роль статистики у тих військових діях, і навіть застосування статистичних методів до ухвалення стратегічних і тактичних рішень. Обґрунтовано, що під час війни статистика зіштовхується з численними проблемами, які можуть ускладнити збір, аналіз і інтерпретацію даних.

Під час конфлікту роль статистики стає першорядною в інформуванні про прийняття рішень, розподіл ресурсів та оцінку впливу військових дій. Однак застосування статистичних методів під час війни створює унікальні виклики, починаючи від збору даних у ворожому середовищі й закінчуючи забезпеченням точності та надійності аналізу в умовах невизначеності та дезінформації. У цій статті розглядаються багатогранні проблеми, які виникають під час використання статистики під час воєнних сценаріїв, підкреслюючи наслідки для військової стратегії, гуманітарних зусиль і післявоєнної реконструкції. Вирішуючи ці виклики, статистики можуть внести значний внесок у підвищення ефективності та етичного проведення операцій у зонах конфлікту. Перспективи подальших досліджень вбачаємо в дослідженні непрямих методів та застосування альтернативних джерел збору даних, для повноцінної реалізації функцій статистики в умовах воєнного часу.

статистика, війна, збір даних, прийняття рішень, невизначеність, дезінформація

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The Influence of the Shadow Economy of Ukraine on Macroeconomic Indicators and Economic Security of the State

The article examines the influence of the domestic shadow economy on the main macroeconomic indicators of the state's development, and offers proposals for reducing the volume and level of the shadow economy of Ukraine. It systematizes scientific approaches to the essence and factors of economic shadowing and economic security. The study examines the experience of international organizations aimed at combating money laundering. It is revealed that the shadow economy of the country, in the conditions of globalization, is one of the significant exogenous factors influencing the economic security of the state. Most European countries, including Ukraine, use Gross Domestic Product (GDP) as an indicator of the volume of national production and the economic well-being of society. The article highlights the dynamics of GDP and the level of the shadow sector of the economy as a percentage of Ukraine's GDP over the entire period of the country's independence.

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Obtaining clear, reliable, and well-founded data on the volumes of the shadow economy allows developing well-reasoned measures to strengthen the economic security of the state. The implementation of measures aimed at strengthening the economic security of the state is primarily based on the development and implementation of effective legislative acts to counteract the shadowing of the economy. These measures should provide a reduction in the tax burden, the creation of more favorable conditions for legal work, the establishment of a system to counteract the legalization of criminally obtained income, the implementation of effective financial control, and the creation of liberal conditions in the legal economy.

To overcome the negative trends caused by a state of war, there is a need to develop an adequate mechanism to reduce the volumes and level of the domestic shadow economy. This mechanism should not only allow the country to quickly adapt to the modern changing environment but also contribute to the resolution of national security issues. Addressing this task necessitates the development of a set of practical recommendations for reducing absolute and relative levels of economic shadowing and, based on this, strengthening the country's economic security. In this regard, the authors have developed a multi-level model for reducing the volumes and level of the shadow economy by improving methodological approaches to the management of this process at the regional, national (state), intergovernmental, and global levels.

macroeconomic indicators, GDP, shadow economy, economic shadowing, economic security, multi-level model

Statement of the problem. One of the most urgent problems of the modern world economy is the problem of its shading. The fight against the shadow economy has become an urgent task for all countries of the world. Thus, the spread of the shadow economy was named by the World Economic Forum as a key global risk of the coming decade [14]. The shadow economy undermines the country's economic and social stability, which in turn poses a threat to national security. The fight against the shadow economy and corruption are important tasks for ensuring the stability and economic security of the state. In particular, these questions are an urgent problem of Ukrainian society that require thorough scientific research.

It is well known that the best indicators of the state of the economy of any country are its main macroeconomic numbers. Therefore, the question of the influence of the shadow economy on the main macroeconomic indicators of the state, in particular GDP, as well as the development of a multi-level model of reducing the volume and level of the shadow economy in the modern conditions of martial law, seems to be an important and urgent task.

Analysis of recent researches and publications. Researchers such as O.Z. Uholkova and M.M. Udymovych have assessed the state and features of the shadow economy in Ukraine, proposing strategic priorities in combating it [10]. Y.G. Vlasenko and T.O. Vlasenko considered types of shadow economy, characterized the current state of the shadow economy in Ukraine, and analyzed trends in the development of the shadow sector [4]. The state of economic security at the macroeconomic level was investigated by L.V. Levkovska and O.I. Dobryansky [7], who demonstrated that multiplicative methodologies are the most effective for practical application.

However, despite the presence of a significant number of constructive thoughts, proposals, conclusions, and generalizations, the identified problems do not yet have a definitive solution. Therefore, questions regarding the impact of the shadow economy on macroeconomic indicators and the economic security of the state in conditions of martial law require more detailed research.

Statement of the objective. In this regard, the aim of the article is to study the peculiarities of the impact of shadowing the economy of Ukraine on its key macroeconomic indicators and the economic security of the state in the current conditions of martial law. To achieve the set goal, the following tasks were identified and addressed:

- Analyzed domestic and international experience regarding the essence and factors of economic shadowing.
- Studied the experience of international organizations aimed at combating money laundering.
- Conducted an analysis of methodologies used in determining the volumes of the

shadow economy.

- Conducted an analysis of methodologies used in determining GDP volumes.
- Differentiated measures for de-shadowing the economy.
- Proposed a multi-level model for reducing the volumes and level of the shadow economy in the conditions of martial law.

The main material. The shadow economy encompasses illicit activities in the economic sphere classified into three types:

- Criminalized activities, subject to criminal responsibility according to current legislation.
- Non-criminalized activities but subject to legal responsibility under the norms of other branches of law.
- Non-criminalized activities that do not incur legal responsibility due to gaps in legislation [1, 12].

According to calculations by the Ministry of Economy of Ukraine, the volume of the domestic shadow economy from 2010 to 2021 fluctuated between 28% and 36% of the official GDP. This information is also reflected in the analytical note of the Department of Strategic Planning and Macroeconomic Forecasting, "General Trends of the Shadow Economy in 2021" [6, p. 2]. During this period, the lowest level of shadowing in the Ukrainian economy was observed in 2019 at 28% of GDP, while the highest level at 36% occurred in 2010 and 2014. However, these results may not fully reflect the situation in Ukrainian society. The actual level of the shadow sector of the economy in any country is always challenging to calculate for objective reasons. Thus, experts Leandro Medina and Friedrich Schneider believe that the shadow economy in Ukraine has a higher indicator than the one officially calculated by the government. In addition, they emphasize the territorial aspect of the location of the country under study. So, according to L. Medina and F. Schneider, the size of the shadow economy depends on the region [9; 15].

The level of the shadow economy of the countries of the world in 2019 is presented in the table 1, from which it can be seen that the United States of America had 4.8% and the Swiss Confederation had 5.5%, the lowest rates of shadowing of the economy to GDP. The highest level of the shadow economy in Bulgaria and Romania is 30.1% and 26.9%, respectively.

Therefore, the actual level of the shadow economy in Ukraine is approaching maximum permissible values, posing a threat to the economic and national security of the state. That is why, one of the priority directions of modern scientific research is to develop a well-founded long-term program for de-shadowing the Ukrainian economy. One of the means of solving this problem is a conceptual theoretical-methodological approach to determining the impact of the shadowing of the economy on the state, level and dynamics of macroeconomic indicators of the state and its economic security.

Most European countries, including Ukraine, use gross domestic product (GDP) as an indicator of the volume of national production and the economic well-being of society. So, given the scope of this article, let's focus on the researched effects of the shadow economy on GDP. Moreover, a number of other macroeconomic indicators are calculated on the basis of the GDP indicator.

The volume of GDP and the level of the shadow economy of Ukraine for 2010-2022 are given in the table 2, which also presents the amount of GDP per person.

Table 1 – The level of the shadow economy of the countries of the world in 2019

№	Country	% of the country's total GDP, %	№	Country	% of the country's total GDP, %
1	Republic of Austria	6,1	13	Republic of Lithuania	21,9
2	Australian Union	8,9	14	Grand Duchy of Luxembourg	7,4
3	Kingdom of Belgium	15,1	15	Kingdom of the Netherlands	7,0
4	Republic of Bulgaria	30,1	16	Federal Republic of Germany	8,5
5	Great Britain	9,6	17	Republic of Poland	20,7
6	Hellenic Republic	19,2	18	Romania	26,9
7	Kingdom of Denmark	8,9	19	United States of America	4,8
8	Republic of Estonia	22,1	20	Hungary	23,2
9	Italian Republic	18,7	21	Czech Republic	13,1
10	Kingdom of Spain	15,4	22	Swiss Confederation	5,5
11	Canada	9,4	23	Kingdom of Sweden	10,7
12	Republic of Latvia	19,8	24	State of Japan	8,2

Source: Compiled by the authors based on [12]

Table 2 – Gross domestic product and the level of the shadow economy of Ukraine for 2010-2022

№	Period	Gross domestic product		Gross domestic product per person		Level of the shadow economy, % of the country's total GDP, %
		unit of measurement	amount	unit of measurement	amount	
1	2010	trillion UAH	1,079	UAH	24798	36
2	2011	trillion UAH	1,300	UAH	29980	32
3	2012	trillion UAH	1,405	UAH	32480	30
4	2013	trillion UAH	1,465	UAH	33965	30
5	2014	trillion UAH	1,567	UAH	36904	36
6	2015	trillion UAH	1,989	UAH	46413	35
7	2016	trillion UAH	2,385	UAH	55899	33
8	2017	trillion UAH	2,984	UAH	70170	32
9	2018	trillion UAH	3,561	UAH	84228	29
10	2019	trillion UAH	3,978	UAH	94633	28
11	2020	trillion UAH	4,222	UAH	101138	30
12	2021	trillion UAH	5,451	UAH	131734	32
13	2022	trillion UAH	5,191	UAH	126152	-

Source: Compiled by the authors based on [6], [2], [3]

Table 2 shows that the GDP per person increases every year, but the lion's share of these revenues was taken out of the country, withdrawn from official circulation or concentrated in the hands of the population. Moreover, it is difficult not only to clearly

measure the volume of the shadow sector, but also the process of determining the mechanisms of concealment and laundering of the largest volumes of "dirty" funds is quite complex. This situation is due to the lack of direct methods for assessing the volume of the shadow economy, it is also due to the fact that the measurement of the shadow sector is a rather complex matter that covers a wide range of economic activities and which, at the same time, is constantly hidden by the participants.

The above mentioned shows that the problem of direct assessment of the level of shadowing of the economy is quite complex. In this regard, an adequate assessment of the volume of the shadow economy is carried out using the following indirect methods, which are the most acceptable for use in the conditions of the current national statistical base [8], namely:

- 1) financial:
 - a) calculation of the ratio of input-output prices in the relevant type of economic activity;
 - b) calculation of the impact of changes in the scale of production;
 - c) calculation of the impact of the technological factor;
 - d) calculation of the share of shadow economic activity;
- 2) monetary;
- 3) electric;
- 4) "expenditure of the population - retail trade".

However, it should be noted that the proposed methods give only an approximate estimate of the level of shadowing of the economy, therefore the integral coefficient acquires considerable importance, which significantly increases the reliability of the results and is calculated as the sum of the weighted relevant coefficients according to the above methods.

It should be noted that various methods of determining the volume of the shadow economy should be divided into two large blocks:

- the first includes the so-called direct assessment methods, which are also called micromethods, they include: analysis of records in tax books; the method of commodity flows and the method based on a survey (of experts or the public) regarding participation in shadow economic activity;

- the second block includes indirect or macro methods, among them: identifying discrepancies through comparison of registered income and expenses; various monetary methods; structural method; soft modeling method; method of balances; employment analysis method; method of technological coefficients; the method of analogies and the sociological method, etc.

Therefore, the calculations of the volume of the shadow economy are so diverse that different digital values of this economic phenomenon can be constantly observed in the mass media. Although the data on the shadow sector in the economy of Ukraine vary so much, the existence of even small-scale "shadow problems" is a huge burden for the economy of any country, especially when these volumes are too large for a young state that is developing its economy.

Therefore, obtaining clear, reliable and well-argued data on the volume of the shadow sector of the economy allows for the development of reasonable measures to strengthen the economic security of the state. The implementation of measures aimed at strengthening the economic security of the state is primarily based on the development and implementation of effective legal acts on countering the shadowing of the economy, which should ensure: a reduction in tax pressure; creation of more favorable conditions to work legally; creation of a system of combating the legalization of incomes obtained through criminal means; creation and implementation of effective financial control and creation of liberal conditions in the field

of legal economy.

The world community has always carried out large-scale measures aimed at countering the laundering of "dirty" money, since international shadow economic activity is a worldwide problem in the conditions of globalization, which has a negative impact not only on the world economy, but also on non-economic spheres of society (politics, morality, public consciousness, etc.).

In this regard, the most famous intergovernmental organization aimed at combating the laundering of illegal income, FATF - Financial Action Task Force - FATF, is of undoubted interest. We will remind that the FATF divides all national systems of combating money laundering into 4 conditional groups. In particular, Group I - countries whose national systems fully meet FATF requirements. The II group includes countries in which there are shortcomings in the legislative field. The III group includes countries that have strategic deficiencies in the national anti-money laundering system, and the IV group includes countries that are under a special regime of sanctions. Ukraine was on the "black list" of the FATF from 2002 to 2004 as a country that does not sufficiently fight money laundering. Ukraine was part of the first group until 2007. Then FATF transferred Ukraine to the second group (the so-called "grey list"), and in October 2011, Ukraine was excluded from the control list of this organization [11].

Another clear example of such a concentration of efforts in the field of combating the shadow economy is MONEYVAL - the Special Committee of Experts of the Council of Europe on the Mutual Evaluation of Anti-Money Laundering Measures and the Financing of Terrorism (Committee of Experts on the Evaluation of Anti-Money Laundering Measures and the Financing of Terrorism - MONEYVAL), which became an independent monitoring mechanism within the Council of Europe. MONEYVAL assesses the compliance of its member countries with all international standards in the legal, financial and law enforcement sectors by ensuring that its member countries have effective systems against money laundering and financing terrorists [13].

As another example of an international organization to combat shadow economic activity, the Egmont Group (an official international organization with 127 members connected to a single secure information exchange network) can be cited. The purpose of its activities is to hold meetings for Financial Intelligence Units (FIUs) from around the world, with the aim of improving cooperation in the field of combating money laundering and terrorist financing, as well as promoting the implementation of national programs in this area [5].

In addition, the government of Ukraine, in particular the State Financial Monitoring Service of Ukraine (State Financial Monitoring of Ukraine), actively cooperates with other competent bodies of foreign countries and international organizations that coordinate work to combat money laundering: UN; the IMF; World Bank Group; Interpol; The Eurasian Group for Combating the Legalization of Criminal Proceeds and the Financing of Terrorism (EAG); the Basel Committee; the Wolfsberg group; North Atlantic Treaty Organization, etc.

Based on the above, it becomes obvious that globalization simultaneously has both a positive and a negative impact on the process of de-shadowing of the economy. It is positive that in the conditions of globalization, the openness of national economies is significantly increasing, cooperation with international money transfer systems is strengthening, and cooperation between financial intelligence agencies of all countries is deepening. In view of this, the mechanism of money laundering cannot work effectively, and the laundering of illegal income becomes more and more difficult. However, on the other hand, this situation gives rise to the improvement of methods and ways of removing "dirty" money from the shadow sector of the economy by international criminal groups, in particular, the

heterogeneity of the socio-economic development of the countries of the world leads to the dominance of more powerful states or TNCs. This shows that globalization also strengthens the negative manifestations of the process of de-shadowing of both national economies and the world economy as a whole.

So, on the basis of a retrospective analysis of foreign and domestic experience and conducted own research, the following conclusions can be drawn:

- the shadow economy is a complex socio-economic phenomenon related to the state, level and dynamics of macroeconomic indicators that characterize the state and development of the country and, accordingly, its economic security;
- the methodology used to determine the volume of GDP and shadow economy needs to be improved;
- one of the priority directions of modern policies for the majority of countries worldwide, including Ukraine, is the de-shadowing of the economy;
- in the conditions of globalization, modern Ukraine is unable to effectively counteract competitive pressure, successfully defend its national interests on the world market;
- it requires a well-founded development of a long-term program for de-shadowing the economy of Ukraine, primarily aimed at creating favorable conditions for legal economic activities.

Based on the above, it is necessary to develop a multi-level model of reducing the shadowing of the economy by improving methodical approaches to the mechanism of managing this process at the regional, national (state), interstate and world (global) levels (Fig. 1).

The technology for forming such a model involves a series of sequential stages that shape four interconnected strategic contours for managing the process of de-shadowing the economy. It begins with the primary economic entities and gradually encompasses higher levels, ultimately reaching the global economy as a whole.

Thus, in the strategic contour for managing the process of de-shadowing the economy at the regional level, measures are envisaged to improve the legal activities of economic entities. These measures include ensuring transparency in the activities of economic entities, creating a competitive environment, preventing manifestations of corruption, eliminating schemes for minimizing tax obligations, enhancing investment attractiveness, legalizing shadow structures, and so on.

The next level provides for interaction in the strategic contour of management at the national (state) level, which is aimed at the existence of a reliable system of economic security of the country, state programs to reduce the shadowing of the country's economy, the country's free access to international markets, solving social problems, eliminating corrupt state structures, forming negative public opinion regarding various manifestations of the shadow economy, reduction in the circulation of cash during settlement transactions, the country's financial stability, the optimal level of inflation, improvement of the regulatory and legal framework, etc.

The strategic contour of managing the process of de-shadowing of the economy at the interstate level takes into account the implementation of Interstate programs to reduce the shadow economy, the use of exclusively cashless payment systems, the fight against the legalization of criminal income, the fight against protectionism and unfair competition, the improvement of methods for overcoming crisis phenomena, the promotion of the legal international transfer of capital and knowledge, support and revitalization of legal international trade, stabilization of inflationary processes, a program of measures to combat international corruption, involvement of non-governmental organizations in financial control, etc.

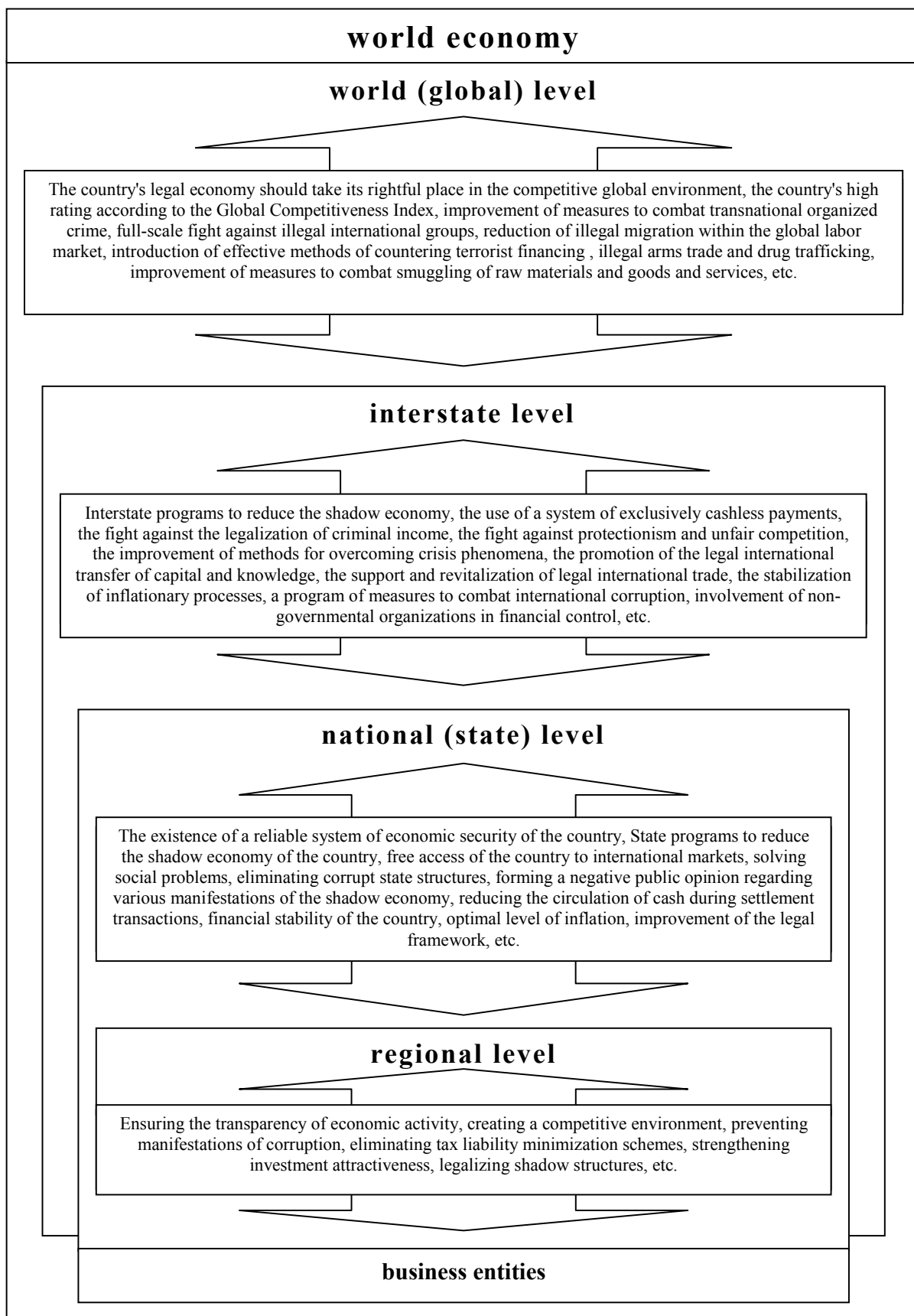


Figure 1 – A multi-level model of reducing the volume and level of the shadow economy

Source: Compiled by the authors

The following main measures are provided for in the strategic outline of managing the process of de-shadowing of the economy at the world (global) level: the legal economy of the country must occupy a worthy place in a competitive global environment, a high ranking of the country according to the Global Competitiveness Index, improvement of measures to overcome transnational organized crime, full-scale fight against illegal international groups, reduction of illegal migration within the global labor market, introduction of effective methods of countering terrorist financing, illegal arms trade and drug trafficking, improvement of measures to combat smuggling of raw materials and goods and services, etc.

Conclusions and prospects for further researches. Based on the conducted research, the following conclusions can be drawn:

1. The growth of the volume and level of the shadow economy, in the modern conditions of globalization transformations, in almost all countries of the world, is becoming more acute and relevant every year. This is due to the fact that the shadowing of the country's economy is one of the most important factors influencing the economic security of the state. Modern Ukraine is no exception, because there is an active increase in the volume and level of the domestic shadow economy, and this situation becomes especially dangerous under the conditions of martial law.

2. In the conditions of martial law, the monitoring of the country's shadow economy and the algorithm for reducing the shadow economy may undergo significant changes. There is an urgent need in developing a long-term program for the de-shadowing of Ukraine's economy, which is primarily aimed at creating favorable conditions for legal economic activity in the war and post-war periods.

Therefore, further research in this area should be focused on the development of an effective algorithm for determining the real volumes of the shadow sector of the economy in war and post-war conditions.

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Вплив тіньової економіки України на макроекономічні показники та економічну безпеку держави

У статті досліджено вплив вітчизняної тіньової економіки на основні макроекономічні показники розвитку держави та надаються пропозиції щодо зниження обсягів та рівня тіньової економіки України. Систематизовано наукові підходи щодо сутності та чинників тінізації економіки та економічної безпеки. Вивчено досвід роботи міжнародних організацій, спрямованих на боротьбу з відмиванням нелегальних коштів. Виявлено, що тіньова економіка країни в умовах глобалізації є одним із суттєвих екзогенних чинників впливу на економічну безпеку держави. Більшість європейських країн, включаючи Україну, використовують валовий внутрішній продукт (ВВП), як показник обсягу національного виробництва та економічного добробуту суспільства. У статті висвітлені динаміка ВВП та рівень тіньового сектору економіки до ВВП України за весь період незалежності держави.

Отримання чітких, достовірних та аргументованих даних щодо обсягів тіньового сектору економіки дозволяє розробляти обґрунтовані заходи щодо зміцнення економічної безпеки держави. Реалізація заходів, спрямованих на зміцнення економічної безпеки держави, базується в першу чергу на розробці та запровадженні дієвих нормативно-правових актів щодо протидії тінізації економіки, які повинні забезпечити: зниження податкового тиску; створення більш вигідних умов працювати легально; створення системи протидії легалізації доходів, одержаних злочинним шляхом; створення і запровадження ефективного фінансового контролю та створення ліберальних умов у сфері легальної економіки.

Для подолання негативних тенденцій, спричинених воєнним станом, необхідно розробити адекватний механізм зменшення обсягів та рівня вітчизняної тіньової економіки. Цей механізм має не лише дозволити країні швидко адаптуватися до сучасного мінливого середовища, а й сприяти вирішенню питань національної безпеки. Вирішення цього завдання зумовлює необхідність розробки комплексу практичних рекомендацій щодо зниження абсолютного та відносного рівнів тінізації економіки і, виходячи з цього, зміцнення економічної безпеки країни. У зв'язку з цим авторами розроблено багаторівневу модель зменшення обсягів та рівня тіньової економіки шляхом вдосконалення методичних підходів до управління цим процесом на регіональному, національному (державному), міжбюджетному та глобальному рівнях.

макроекономічні показники, ВВП, тіньова економіка, тінізація економіки, економічна безпека, різнорівнева модель

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