Shadow economy dynamics: A comprehensive assessment of tax compliance strategies

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Abstract
The study aims to conduct an in-depth analysis of strategies to improve tax compliance in a dynamic shadow economy. The study addressed the problem of the shadow economy, which poses a serious threat to the economies of both developed and developing countries. In countries with high levels of shadow economy, budgets face deficits, forcing governments to raise taxes or borrow money, slowing economic growth. The anonymity of cryptocurrency transactions hinders tax liability tracking, thus creating additional challenges for tax authorities. The study employed data on the countries with the largest number of cryptocurrency holders and analysed their impact on financial stability. In countries with a high level of social cohesion, taxpayers tend to follow official rules, while in countries with low trust in government institutions, informal networks can facilitate tax evasion. The study cited successful tax legislation strategies from various countries, such as Estonia, Germany and Australia, and provided recommendations for optimising tax policy in Azerbaijan. These recommendations include increasing transparency, simplifying tax administration, fighting corruption, reducing the tax burden and encouraging legal economic activity.
Key words: financial regulation, transparency of transactions, informal networks, fiscal risks, digital currency.

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1. Introduction

The shadow economy significantly impedes global governance, undermining sustainable economic development and social welfare. Despite governmental and international interventions, its persistence results in substantial revenue losses and compromises fiscal sustainability. The shadow economy's prevalence stems primarily from excessive tax burdens and regulatory complexity, which incentivize evasion and foster parallel extralegal economic structures that threaten stability, equity, and sustainable growth. Extant tax non-compliance interventions encompass fiscal instruments, control mechanisms, and incentive frameworks. Theoretical tax legislation scholarship advocates for integrated approaches combining punitive measures with cooperative strategies to foster societal advancement. Shadow economy research emphasizes efficacy assessment of diverse taxation approaches, with successful implementations typically integrating fiscal incentives, administrative modernization, and educational initiatives. The implementation of technological innovations and process automation reduces administrative burden while enhancing accessibility (Niyazbekova et al., 2023). Concurrently, financial literacy promotion cultivates positive taxpaying attitudes among constituents.

Ginevicius et al. (2020) highlighted the importance of trust in the state and institutions in improving tax compliance. The authors noted that countries with a high level of trust in the government have a lower level of shadow economy. Petranov et al. (2022) addressed the scale and factors of the shadow economy in their research. Kelmanson et al. (2019), in turn, argue that reducing the tax burden and simplifying tax procedures can significantly reduce the size of the shadow economy, as businesses and individuals will be less likely to evade taxes. Taing and Chang (2020) addressed institutional and structural factors that influence tax behaviour.

Broughel and Thierer (2019) addressed the role of technological innovation in improving tax policy. Demirhan (2019) also argued that the introduction of information technology, such as electronic tax systems and blockchain, can significantly increase the transparency and efficiency of tax administration. Němec et al. (2021) studied the relationship between tax legislation and the level of corruption. Reducing the level of corruption in government agencies helps increase tax discipline. Erdoğdu and Akar (2022) noted that short-term tax amnesties can stimulate voluntary income declaration, but systemic changes in tax policy are needed for a long-term effect. Mammadli and Zeynalova (2021) investigated the role of tax education and awareness, arguing that programmes to improve financial literacy and raise awareness of tax obligations contribute to increased tax compliance. Lukáč and Simonidesová (2020), in turn, addressed the international aspects of tax policy, covering the issues of cross-border tax evasion.

Research demonstrates diverse strategies for addressing tax non-compliance and the shadow economy that align with sustainable economic principles. Evidence indicates the necessity of a comprehensive approach combining regulatory enforcement with incentives to enhance tax culture and institutional trust. Despite substantial scholarship, several areas remain underexplored: cryptocurrency's influence on tax evasion mechanisms, the role of informal social networks in shaping taxpayer behavior, and the interactive effects of combined policy interventions. While individual regulatory measures have received thorough examination, the synergistic impacts of integrated approaches warrant further investigation. The research endeavors to conduct a comprehensive evaluation of shadow economy dimensions for tax policy optimization, considering contemporary challenges and economic contexts. It specifically examines how digital currencies and psychological determinants influence tax compliance behavior and shadow economic activity. Furthermore, it investigates the efficacy of diverse fiscal and non-fiscal policy instruments, alongside international tax agreements, within the framework of existing tax legislation.

2. Materials and Methods

Statistical data on the share of the shadow economy in the gross domestic product (GDP) of various countries were obtained from World Economics (2024) reports. The information on tax evasion losses as a percentage of total tax revenues was taken from Statista (2020) statistical reports, which were used to assess the effectiveness of tax systems in different countries. Data on the percentage of the population that owns cryptocurrency was provided by Triple-A, and Chainalysis reports were used to study the use of cryptocurrencies in illegal activities (Triple-A, 2024). Official documents and reports of Azerbaijani and other governmental authorities on tax administration and control, such as data from the Ministry of Taxes of Azerbaijan and Common Reporting Standard (CRS) reports on international cooperation in the exchange of tax information, were also important sources of information. Additionally, documents and reports of international organisations such as the Organisation for Economic Co-operation and Development (OECD) were studied to determine global trends and best practices in tax administration.

The statistical analysis quantified shadow economy prevalence across nations and associated tax revenue losses. Cross-country comparisons revealed effective taxation strategies in Estonia, Germany, Australia, and the United Kingdom, where digital technologies enhance administrative efficiency and transparency. These practices informed recommendations for Azerbaijan's context.

The research evaluated Azerbaijan's shadow economy reduction initiatives, including fiscal reforms, administrative measures, technological implementations, and educational programs. The analysis encompassed tax rate adjustments, procedural simplifications, electronic filing systems, and enforcement mechanisms. The study addressed how informal social networks influence tax compliance behavior, recognizing sociocultural determinants of tax morale. International best practices were examined for their adaptability to Azerbaijan's circumstances. The investigation assessed existing tax literacy programs and awareness campaigns, evaluating their effectiveness and proposing enhancements.

3. Results

The shadow economy is one of the most significant and complex issues for economies around the world, including both developed and developing countries, and its sustainable management remains a challenge. It covers a wide range of illegal and informal economic activities, such as tax evasion, illegal employment, smuggling and corruption. One of the most obvious and significant problems of the shadow economy is its impact on public finances. When businesses and individual entrepreneurs evade taxes, the state loses a significant portion of revenue that could be used to finance public services and infrastructure projects (Dankevych et al., 2023). The low level of trust in state institutions also contributes to the spread of corruption, which exacerbates the problem. Workers in the shadow sector are often deprived of social guarantees such as pensions, health insurance and paid leave (Kudrenko & Hall, 2024). This creates significant risks to their well-being and increases social vulnerability. In addition, companies operating in the legal sector are forced to compete with shadow businesses, which have a competitive advantage due to tax evasion and lower labour costs, thereby challenging the sustainability of fair competition (Musayeva et al., 2024a; 2024b). High taxes and complex tax procedures increase incentives for evasion as economic agents seek to minimise their costs. At the same time, the lack of transparency and poor administration of the tax system contributes to the growth of the shadow economy. Figure 1 shows the level of the shadow economy in different countries.

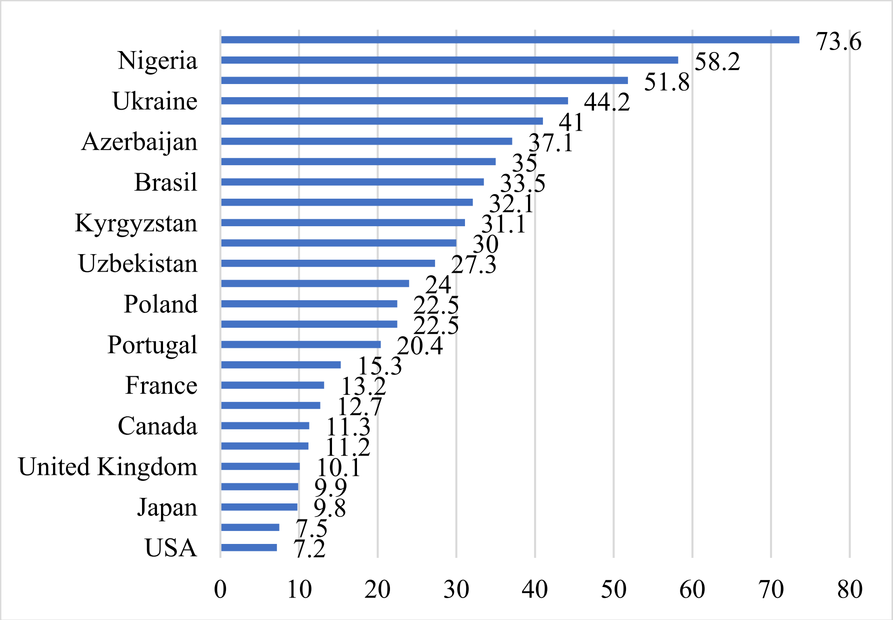

Figure 1 - Share of the shadow economy in different countries (% of GDP)
Source: based on the data from World Economics (2024).

Nations exhibiting minimal shadow economic activity (US: 7.2%, Switzerland: 7.5%, Japan: 9.8%) demonstrate robust socioeconomic stability and efficient taxation mechanisms. These environments foster legitimate economic participation, facilitating sustainable development. Moderate shadow economy countries (Portugal: 20.4%, Poland: 22.5%, Italy: 24%) maintain relative stability regarding tax revenue and regulatory oversight, generally supported by developed economic frameworks and established tax compliance cultures. Conversely, jurisdictions with substantial shadow economies (Azerbaijan: 37.1%, Moldova: 41%, Nigeria: 58.2%) confront significant governance challenges. Contributing factors may include administrative deficiencies, political volatility, economic opacity, and limited financial service accessibility for small and medium enterprises. Figure 2 shows the level of tax evasion by country.

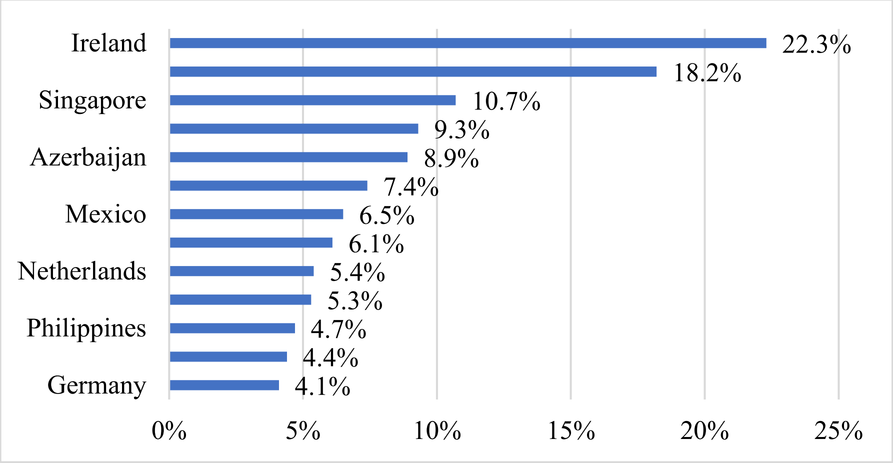

Figure 2 - Share of annual losses due to tax evasion in total tax revenues
Source: based on the data from Statista (2020).

The level of losses from tax evasion varies depending on the country and the effectiveness of its tax system, often impacting sustainable economic growth. Countries with low loss rates, such as Germany and Indonesia, demonstrate successful tax administration models that can be an example for other countries. Countries with high levels of losses, such as Ireland and Colombia, need significant reforms and improvements to their tax systems to reduce tax revenue losses.

Digital currencies, particularly cryptocurrencies, have emerged as a significant economic phenomenon globally (Kyrychok et al., 2020). These decentralized, often anonymous exchange media serve diverse purposes – both legitimate and illicit – with implications for sustainable development. Bitcoin, Ethereum, and other cryptocurrencies offer users considerable anonymity (Marmora, 2021). A primary concern regarding cryptocurrencies is their utilization in illicit transactions – facilitating payments for illegal goods/services, tax evasion, and money laundering. Despite regulatory efforts across numerous jurisdictions, criminal actors continue exploiting these technologies. Concurrently, cryptocurrencies maintain legitimate applications as investment vehicles and cost-effective mechanisms for international transfers. Figure 3 identifies nations with the highest cryptocurrency ownership rates, which face elevated financial sector stability risks.

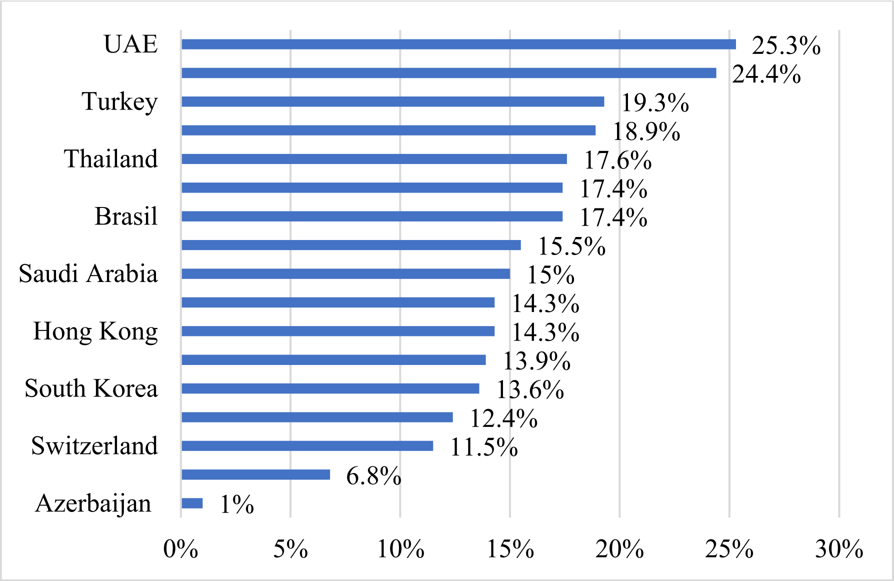

Figure 3 - Share of the population owning cryptocurrencies in 2023
Source: based on the data from Triple-A (2024).

Singapore (24.4%) and the UAE (25.3%) exhibit the highest cryptocurrency ownership rates globally. This prominence derives from digital innovation interests, inadequate banking infrastructure rendering cryptocurrencies advantageous, and governmental promotion of blockchain technologies. Cryptocurrency adoption varies significantly across nations based on economic, social, and regulatory environments. Higher adoption rates frequently occur in economically unstable regions or areas with limited conventional financial access, where cryptocurrencies serve as alternative financial mechanisms (Kyrychok et al., 2024). Conversely, stable economies with developed financial systems typically view cryptocurrencies as investment vehicles and technological innovations.

According to a Chainalysis report, in 2023, about 0.34% of all cryptocurrency transactions were related to illegal activities, equivalent to approximately $24.2 billion. For comparison, in 2022, about 0.42% of cryptocurrency transactions were related to fraud or illegal transactions, and in 2019 – 1.29%. Despite the efforts of many countries to regulate the cryptocurrency market with sustainable measures, criminal elements continue to find ways to use these technologies to their advantage. For instance, in recent years, the use of cryptocurrencies to hide tax revenues has increased significantly, especially among small and medium-sized businesses looking for ways to minimise tax payments. For example, in the United States, the IRS requires taxpayers to disclose information about income received from cryptocurrency transactions. The European Union is also taking steps to tighten control over cryptocurrency transactions by introducing new regulatory requirements for crypto exchanges and other market participants (Spytska, 2023).

Informal social networks and communities play a significant role in shaping the tax behaviour of economic agents and can influence sustainable practices and sustainability in compliance. These networks and communities include family, friends, colleagues, professional associations and other groups that can influence individual and collective tax decisions. If it is customary in a community to evade or minimise tax liabilities through informal practices, individual members of that community may be inclined to follow these norms. This social pressure can lead to a wider spread of the shadow economy and a decrease in tax compliance (Kerimkulov et al., 2015). In countries with a high level of social cohesion and trust, such as the Scandinavian countries, taxpayers are more inclined to follow official rules and regulations, which leads to a high level of tax discipline. At the same time, in countries with a low level of trust in state institutions, such as Greece or Italy, informal networks can actively facilitate tax evasion (Shahini, 2024). In Azerbaijan, which has historically had strong informal networks and family ties, the influence of such communities on tax behaviour can be significant. Family and kinship ties can facilitate tax avoidance practices, especially in small and medium-sized businesses where informal arrangements and transactions are often the norm (Rexhepi, 2023).

This study examines tax legislation strategies for reducing shadow economies, categorized into fiscal measures, administrative reforms, technological innovations, and educational campaigns, often implemented in combination for maximum effectiveness. Fiscal measures encompass tax policy adjustments that diminish evasion incentives, including tax burden reduction, system simplification, and targeted incentives. Lower tax rates for SMEs decrease shadow economy participation motivation (Rexhepi et al., 2024). Simplified procedures and single tax schemes enhance system accessibility. Sector-specific tax incentives promote legitimate economic activity. Administrative reforms focus on enhancing tax administration efficiency and sustainability through strengthened control mechanisms, increased penalties, and institutional restructuring. Improved audit systems, expanded authority, and technological monitoring significantly enhance administrative efficiency and sustainability (Ismayil-Zada, 2022). Stricter financial and criminal penalties for non-compliance improve tax adherence. Organizational restructuring and anti-corruption initiatives increase transparency and accountability. Technological innovations have become increasingly significant in tax administration (Petersone & Ketners, 2017). Electronic systems implementation, data analytics utilization, and procedural automation simplify taxpayer processes while increasing administrative transparency. Electronic filing platforms reduce errors and streamline processes. Advanced data analysis and machine learning facilitate more efficient identification of tax evasion patterns (Burmistrov et al., 2024).

Estonia has emerged as a digital tax administration pioneer, with electronic filing and payment systems dramatically simplifying procedures for all taxpayers. This Estonian model successfully minimizes bureaucracy and tax evasion opportunities, strengthening taxpayer trust and fiscal stability. Notably, over 95% of Estonian tax returns are filed electronically, demonstrating exceptional transparency and administrative efficiency. Germany prioritizes strengthened tax control through advanced data analysis technologies. Its taxation framework incorporates effective anti-fraud measures, including automated return verification and financial transaction monitoring systems. These mechanisms facilitate rapid identification of non-compliance, maintaining strict oversight of tax obligations, thereby reducing shadow economic activity and reinforcing public confidence. Germany's 2019 tax transparency legislation mandates automatic transfer of tax resident account information from financial institutions to authorities (Ermasova et al., 2019).

Australia focuses on tax legislation simplification and administrative barrier reduction. These approaches foster a conducive, sustainable business environment while strengthening the tax system's foundational integrity. Australia's Single Touch Payroll system (implemented 2018) requires real-time reporting of salary and tax data, increasing payroll transparency and reducing evasion opportunities. Additionally, Australia's annual Tax Time campaign utilizes multi-platform communications to promote timely tax compliance (Brown, 2020). The UK's Making Tax Digital (MTD) programme digitizes tax returns, offering taxpayers training resources and consultations on digital filing tools. Promoted through various media channels and partnerships, MTD has reduced tax return errors by 10% while increasing digital service adoption by 20% (Ketners, 2024).

Azerbaijan faces challenges from a substantial shadow economy that impedes national economic development by reducing tax revenues and enabling corruption. Many SMEs and entrepreneurs operate informally to avoid tax administration complexities and liabilities, resulting in unregistered economic activity that hampers effective tax policy implementation (Yarin et al., 2023). To address these issues, Azerbaijan has implemented several strategic measures. The electronic tax filing system introduced in 2019 has simplified submission processes and reduced tax evasion by 15% according to the State Tax Department. Automated verification systems enhance compliance monitoring while electronic invoicing enables real-time transaction tracking, improving financial reporting transparency and tax calculation accuracy. Azerbaijan strengthened international cooperation by joining the OECD's Common Reporting Standard in 2020, enabling more effective financial flow analysis to identify evasion. Complementing these technological solutions, Azerbaijan conducted over 50 educational seminars for entrepreneurs in 2021, resulting in a 30% increase in electronic service adoption and a 7% improvement in voluntary compliance according to the Ministry of Taxes.

Despite sustainability initiatives, Azerbaijan's high shadow economy necessitates tax system improvements and enhanced compliance monitoring. Azerbaijan's specific economic context requires tailored interventions focusing on transparency and administrative simplification to ensure accessibility across taxpayer segments. An integrated interagency data exchange system would enhance tax administration efficiency while reducing evasion opportunities. Combating corruption remains critical through strengthened accountability mechanisms, including stringent liability measures for tax officials and independent monitoring commissions. Public awareness campaigns highlighting corruption's negative effects and transparent taxation's benefits are essential for sustainability. Tax burden reduction and legal economic activity stimulation could be achieved through rate reforms optimizing small and medium enterprise obligations, potentially implementing progressive taxation and vulnerable taxpayer relief. Enhanced tax control effectiveness requires analytical tools for targeted, risk-based audits concentrating resources on problematic areas. Developing robust tax audit institutions, including independent audits for high-risk sectors, would strengthen compliance. Taxpayer education programs improving tax literacy and free consulting services for smaller businesses would further support compliance improvement efforts. International cooperation and information exchange are crucial components of effective tax administration. Through tax information exchange agreements with foreign jurisdictions, Azerbaijan can enhance its capacity to identify tax evasion and combat international avoidance schemes. Engagement with international bodies like the OECD provides valuable insights into tax administration best practices. Tax policy optimization and shadow economy reduction necessitate a multifaceted approach encompassing legislative reform, anti-corruption initiatives, enhanced transparency, and administrative simplification.

4. Discussion

Hoinaru et al. (2020) highlighted the correlation between the level of corruption and the size of the shadow economy. Scientists argue that high levels of corruption directly contribute to the growth of the shadow economy, creating favourable conditions for tax evasion and illegal economic activity. Baklouti and Boujelbene (2020) demonstrated that countries with low levels of corruption, such as the Scandinavian countries, have significantly lower levels of shadow economy. However, they focus on corruption as the main factor, while the current study also considers tax and administrative reforms as important aspects.

Ohnsorge and Yu (2022) studied the impact of cultural and historical factors on the level of the shadow economy. Studies show that in countries with a long history of informal economic practices, such as China and India, the shadow economy remains high despite modern reforms and measures to improve tax administration. Cultural habits and historical precedents play a significant role in shaping economic behaviour and influence the sustainable practices of a society (Jakubik et al., 2017). The current findings also recognise the importance of cultural factors, especially in the context of Azerbaijan.

High taxes and complex tax procedures increase incentives for evasion as economic agents seek to minimise their costs (Karimli et al., 2022). At the same time, the lack of transparency and poor administration of the tax system contributes to the growth of the shadow economy. Medina and Schneider (2019) also studied the impact of the tax burden on the level of the shadow economy. Huynh and Nguyen (2020), in turn, cited examples from Asian countries where the tax burden leads to a significant amount of illegal economic activity. The current research also highlights the importance of tax policy in shaping the shadow economy, especially in countries with high tax burdens and complex bureaucracies.

The empirical evidence indicates minimal shadow economic activity in the United States, Switzerland, and Japan, reflecting robust socioeconomic stability and tax system efficiency. These low metrics suggest economic actors predominantly operate within legal frameworks, fostering sustainable economic growth. Conversely, Afghanistan, Panama, and Nigeria exhibit substantial shadow economies, signaling governance challenges including tax compliance issues, corruption, and systemic opacity. Tax evasion losses vary significantly across jurisdictions; Germany and Indonesia demonstrate exemplary tax administration practices worthy of emulation, while Ireland and Colombia require substantial fiscal reforms to mitigate revenue leakage and enhance long-term sustainability.

Hanifah et al. (2024) addressed the impact of educational campaigns on the level of tax discipline. The results show that conducting information campaigns and educational programmes for taxpayers significantly improves the level of tax legislation and reduces the size of the shadow economy. The researchers cited examples of successful campaigns in Australia and the UK. The current study acknowledges the importance of educational campaigns to improve tax culture but does not place as much emphasis on this aspect. Cryptocurrencies have become a significant phenomenon in the global economy in recent years. Chen et al. (2021) addressed technological innovation as a way to reduce the shadow economy. Ma and Zhu (2022) also show that the introduction of electronic tax administration systems, such as electronic invoices and automated audit systems, significantly reduces the potential for tax fraud and increases the transparency of financial transactions. The current study also notes the importance of technological innovations, such as electronic tax systems and the use of big data, in improving tax administration and fostering sustainable practices.

In countries with a high level of social cohesion and trust, such as the Scandinavian countries, taxpayers are more likely to follow official rules and regulations, leading to a high level of tax compliance (Tynaliev et al., 2024). At the same time, in countries with a low level of trust in state institutions, such as Greece or Italy, informal networks can actively facilitate tax evasion, undermining long-term sustainability. Rossier and Ouedraogo (2024) also addressed the impact of social factors, such as the level of trust in state institutions and social cohesion, on the level of the shadow economy. Researchers determined that countries with a high level of social trust, such as Scandinavia, have a much lower level of shadow economy. The authors, similarly, to the current study, emphasised the importance of trust in state institutions and social trust in the formation of tax discipline. The coincidence lies in the recognition of the influence of social factors on the level of the shadow economy. Canh et al. (2020) studied the impact of globalisation and international cooperation on the level of the shadow economy. The research shows that countries actively participating in international tax information exchange initiatives, such as CRS and FATCA, have lower levels of shadow economy due to increased transparency and enhanced control over financial flows. The current study also emphasises the importance of international cooperation in the fight against the shadow economy.

Conclusions

The study conducted a comprehensive assessment of various aspects of the shadow economy that affect the economic development and sustainability of countries. The main problems of the shadow economy include a negative impact on public finances, a decrease in public trust in state institutions and increased social injustice and inequality. When a significant portion of economic agents evade taxes, honest taxpayers begin to perceive the tax system as unfair, which can lead to a further decline in tax compliance and the growth of the shadow economy.

The study examined examples of different countries with different levels of shadow economy. For instance, countries with a low shadow economy, such as the United States (7.2%), Switzerland (7.5%) and Japan (9.8%), demonstrate a high level of social and economic stability, as well as an efficient tax system. At the same time, countries with high levels of the shadow economy, such as Afghanistan (73.6%), Nigeria (58.2%) and Panama (51.8%), face serious problems in the areas of tax compliance, corruption and lack of transparency in their tax systems. Azerbaijan also has a high level of shadow economy (37.1%). The study also examined the impact of modern technologies, such as cryptocurrencies, on the shadow economy. Decentralised and anonymous means of exchange, such as Bitcoin and Ethereum, can be used for tax evasion and illegal transactions, making it difficult for tax authorities to trace such transactions.

The study data yields several key insights. Tax legislation should be streamlined, simplifying procedures and reducing burdens on SMEs. Building trust in state institutions requires enhanced accountability measures for civil servants to ensure sustainability. Technological innovations – electronic tax systems and big data analytics for financial transactions – can substantially improve tax administration transparency and efficiency. Effectively combating shadow economies demands a multifaceted approach incorporating tax, administrative, and technological measures alongside civil society engagement and international cooperation. One of the main limitations of this study is the focus on general trends in the shadow economy without delving into specific aspects of each country, which may limit the applicability of some recommendations in specific contexts. Further research should deepen the analysis of the influence of socio-cultural and institutional factors on the dynamics of the shadow economy in different regions of the world and develop more accurate models for forecasting and estimating the size of the shadow economy.

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