

Digital Transformation of Ukraine's Tax System in Line with European Union Implementation Standards

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Abstract: The current stage of development of the tax system of Ukraine is characterized by large-scale processes of digital transformation, which have become an integral component of fiscal modernization and integration into the European economic space. The digitalization of tax administration is seen as a key factor in increasing the transparency, efficiency and fairness of taxation, as well as a tool for ensuring fiscal stability in the face of global challenges. In the context of the implementation of the EU-Ukraine Association Agreement and the provisions of the Directive on Administrative Cooperation in the field of Taxation (DAC6–DAC8), the Common Reporting Standard (CRS), and the Standard Audit File for Tax (SAF-T), the digital reform of the tax sector is becoming systemic, covering both technological and institutional and legal aspects. Based on the official statistics of the Organization for Economic Cooperation and Development, the European Commission, the World Bank, the IMF, and the Ministry of Finance of Ukraine, the author assesses the level of digital maturity of the fiscal system. The integral index of digital integration of tax services is calculated, which for Ukraine is 0.63, which is lower than the average level in the European Union of 0.82, but indicates a gradual convergence of administration standards and improvement of the quality of electronic services. A comparative analysis of the implementation of European standards has shown that Ukraine has made significant progress in creating basic electronic tools, but needs to deepen data integration, introduce artificial intelligence for risk analysis, and strengthen cybersecurity of tax information. It is substantiated that successful digitalization of the tax system requires a holistic data policy, a combination of technological, organizational and regulatory changes. The transition to an intelligent tax ecosystem will increase the efficiency of administration, reduce the level of the shadow economy and strengthen the fiscal security of Ukraine.

Keywords: digitalization, electronic administration, fiscal security, implementation, tax data

Introduction

The current stage of development of the tax system of Ukraine is characterized by large-scale transformation processes caused by a combination of internal structural reforms and external imperatives related to the implementation of the course towards European integration. Deepening economic cooperation with the European Union (EU) requires gradual harmonization of fiscal policy, adaptation of national legislation to the EU's set of legal norms, principles, policies and practices, and introduction of unified tax administration standards.

In this context, the digitalization of the tax system is considered not only as a technical modernization of tax procedures, but as a strategic direction of state policy aimed at increasing the transparency, efficiency, and accountability of fiscal control bodies. It is digital technologies that today form a new architecture of relations between the state, business, and citizens, where the speed of information exchange, data reliability, and minimization of the human factor in tax administration play a key role.

Modern EU tax policy is based on the principles of transparency, efficiency, electronic interaction and fair taxation. These principles are implemented through tools of digital administration, automated exchange of information between tax authorities, application of Big Data analytics and blockchain technologies in control processes. The harmonization of the Ukrainian tax system with the European model involves the integration of such tools in accordance with EU directives and technical standards (in particular, DAC7, DAC8, SAF-T, CRS) regulating digital accounting and real-time transfer of tax data.

In the context of the implementation of the EU-Ukraine Association Agreement [1] and the Action Plan for the implementation of the National Revenue Strategy of Ukraine for 2023-2030, the digital transformation of the fiscal sphere is becoming systemic. It is two-vector in nature: on the one hand, – is an increase in the level of tax revenues, an expansion of the tax base and a decrease in the shadow sector; on the other hand, – is the creation of a convenient, predictable and partnership environment for taxpayers. The development of an integrated digital infrastructure allows not only to optimize administration, but also to strengthen the fiscal security of the state through improving the quality of control and monitoring of financial flows.

In this context, it is important to create a single tax digital space that would meet the requirements of European institutions, facilitate the automatic exchange of information between national and international tax administrations, and ensure compatibility of Ukrainian databases with European systems such as e-Tax, VIES, Eurofisc, etc.

Thus, a comprehensive study of the peculiarities of introducing digital tools into the tax system of Ukraine, taking into account the implementation requirements of the EU institutions, identifying the main trends in the development of digital fiscal infrastructure and analyzing their impact on the efficiency of tax administration in the context of European integration processes is an urgent scientific task.

Literature review

The issue of digital transformation of tax systems in the twenty-first century is a subject of active study by both foreign and domestic researchers. The focus is on the digitalization of tax administration, automation of information exchange, introduction of electronic services and integration of national fiscal systems into the EU digital space. Modern research shows that digitalization is not only a technological process, but also a conceptual change in the management paradigm that affects the structure of the fiscal system, the effectiveness of tax control and the level of trust between the state and taxpayers [2-4].

The scientific literature has developed several approaches to interpreting the essence of the digitalization of tax systems. The institutional approach, presented in Williams [5], Ding et al. [6], defines digitalization as part of the process of modernizing public administration aimed at increasing transparency, reducing corruption risks and harmonizing with EU norms.

The technological approach [7, 8] focuses on technical aspects – the introduction of e-Invoicing, SAF-T, blockchain solutions and Big Data analytics, which provide prompt access to tax data and increase the accuracy of control.

The functional approach, characteristic of Miao [9] and Sturgeon [10], emphasizes the relationship between digital innovation and tax administration efficiency, especially in the context of reducing the shadow economy and strengthening fiscal security.

Significant attention in the foreign literature is paid to the analysis of the EU regulatory framework that defines the standards for the digital exchange of tax information. In particular, the Directives on Administrative Cooperation (DAC6 – DAC8) provide for the creation of unified procedures for data exchange between the tax administrations of EU member states and platforms that provide services to users within the digital economy. The DAC7 Directive expands the obligations of digital platforms to provide data on sellers and transactions, which is an important step in the fight against tax evasion [11, 12].

Some researchers – Bojanc et al. [13], Hesami et al. [14] – consider the impact of e-Invoicing systems in the EU countries on reducing tax gaps and increasing supply chain transparency. According to their conclusions, the

introduction of e-invoicing in Portugal, Italy, and Spain reduced VAT revenue losses by 15–20% in the first two years after the systems were launched.

Analytical models of the Organization for Economic Cooperation and Development (OECD), in particular the Tax Administration 3.0 concept, play an important role in modern research. It envisages the creation of an integrated digital ecosystem in which tax administrations have access to taxpayers' financial transactions in real time. This approach allows to abandon the traditional model of post-facto control in favor of preventive analysis and forecasting of tax risks based on machine learning [15].

In the scientific works of domestic authors, such as Mialkovska et al. [16, 17], Honcharuk et al. [18], Kohut et al. [19], Bondarenko et al. [20, 21] the issues of digitalization of tax administration are considered in the context of reforming the State Tax Service of Ukraine and its adaptation to the requirements of the European tax area. Ukrainian studies are mainly focused on the practical aspects of the introduction of electronic services ("Electronic Taxpayer's Account", systems of the software registrar of payment transactions, integration with "Diia") and analysis of technical and legal barriers. The authors emphasize that full integration into the EU's digital tax space requires a transition to structured data formats (SAF-T), harmonization of classifiers, and the creation of common information exchange protocols.

Considerable attention in professional sources is also paid to digital security challenges. Researchers [22-24] emphasize that the expansion of electronic systems creates risks of unauthorized access, data manipulation, and cyberattacks. In this context, the EU is developing a concept of "digital fiscal security" that combines requirements for cybersecurity, verification of digital identities of taxpayers, and management of access rights in tax systems.

At the same time, most researchers note the insufficient theoretical development of the problem of integrating digital tools into the tax administration of countries with transformational economies. Despite numerous successful practices in the EU, the issues of gradual implementation of DAC7-DAC8 standards, compatibility of national platforms, adaptation of the regulatory framework and training require further study [8, 25, 26].

Summarizing the results of previous studies, it can be concluded that scholars are united in their understanding of digitalization as a key factor in improving the efficiency of tax administration, transparency and fiscal stability. However, the issues of the scale of automation, the stages of integration with European standards, and digital security remain controversial. This determines the need for further research aimed at adapting the best European practices to Ukrainian realities, taking into account the institutional capacity of the state and the level of digital readiness of taxpayers.

Methods

The information base of the study is based on official data from international and national institutions that ensure the reliability and comparability of indicators of digital transformation of tax systems. Open statistical resources of the European Commission, OECD, World Bank, IMF and the State Tax Service of Ukraine were used. Additional information was obtained from the documents of the Ministry of Finance, the Ministry of Digital Transformation and analytical reports of international consulting companies (PwC, Deloitte, IMF, OECD 2018–2024).

All statistical materials are obtained from reliable sources, which allowed us to conduct a comparative analysis of the level of digitalization of the tax systems of Ukraine and the EU countries for 2018–2024. The selected period covers the key stages of digital transformation of fiscal authorities from electronic reporting to automatic exchange of tax data in accordance with Directives DAC6 – DAC8, as well as the impact of the COVID-19 pandemic as a factor of accelerated digitalization.

The methodological basis of the study is based on the systemic, comparative, structural-functional, and institutional-analytical approaches:

- the systemic approach allowed us to consider the digitalization of the tax system as a multi-level structure with institutional, technological and legal components;
- the comparative approach helped to identify common trends and differences in digital taxation in Ukraine and the EU;
- the structural-functional approach was used to assess the effectiveness of digitalization tools– e-cabinet of the taxpayer, e-Invoicing, SAF-T, blockchain and Big Data analytics;

- an institutional and analytical approach was used to assess the compliance of national reforms with the requirements of the DAC7, DAC8 directives and OECD standards (AEOI, BEPS 2.0).
- To quantify the level of digital maturity of tax authorities To quantify the digital maturity of tax authorities, statistical and index analysis was used with the following indicators
- the share of electronic declarations in the total reporting;
- level of automation of audits;
- number of digital services for taxpayers;
- integration with international platforms (CRS, DAC7);
- DESI and OECD DGI indices.

The graph analytical method was used to visualize the dynamics. The SWOT analysis helped to identify the strengths, risks and prospects for the development of digital tax administration. To ensure the comparability of indicators, the data was normalized, which made it possible to compare Ukraine's indicators with the EU average. The forecast of the dynamics of digital integration for 2025–2026 is based on trend analysis and targets of the National Revenue Strategy [27]. Thus, the research methodology combines quantitative analysis of digital indicators and qualitative assessment of institutional reforms, which ensures the comprehensiveness and scientific validity of the results.

Results

Over the past decade, the EU has been consistently developing a comprehensive regulatory and institutional framework for digital interaction in the field of taxation. The main goal of this process is to create a single digital space for the exchange of tax information between member states, which ensures transparency of financial flows, effective control over income taxation and counteraction to tax evasion.

The basic document defining the architecture of tax cooperation within the EU is Council Directive 2011/16/EU on administrative cooperation in the field of taxation (as amended by DAC6-DAC8). According to it, Member States are obliged to ensure the automatic exchange of information on financial accounts, digital platforms, crypto assets and transactions. Of particular importance is Directive DAC7, which obliges operators of digital platforms (e.g., Airbnb, Amazon, Uber) to report user income to tax authorities, which increases the level of tax transparency in the digital economy.

A key role in the formation of technical standards is played by the OECD Tax Administration 3.0 Framework initiative, which sets global guidelines for the transition to integrated tax ecosystems. It involves the use of Big Data technologies, Machine Learning, API interaction between tax services and financial institutions, which ensures the transition from “reactive” to “preventive” control.

At the same time, the program document “Digital Europe” (2021–2027) and the European Data Strategy (2020) create a financial and organizational basis for the digitalization of the public sector, including tax administrations. They are aimed at the development of data exchange infrastructure, cyber protection, cloud services and compatibility of state registers. The totality of these initiatives forms a multi-level system of digital transformation of taxation in the EU, structurally presented in the Table 1.

The introduction of the “e-Tax” and “e-Invoicing” systems has become the foundation for digital tax administration in most EU countries. These platforms allow automatic accounting of operations, minimize the number of technical errors, provide instant verification of the reliability of reporting and reduce the administrative burden on business. For example, in Portugal, Italy, and Poland, e-invoicing systems provide real-time data transfer to the central tax register, which allows tax authorities to automatically generate part of the taxpayer's tax returns.

The digitalization of taxation contributes to increasing transparency and trust in tax authorities, reducing shadow operations and increasing the level of voluntary compliance with tax obligations.

Table 1: Key regulatory and institutional elements of digital transformation of tax systems in the EU

Area/document	Year of adoption	Key content and objectives	Implementation tools
DAC6-DAC8	2011–2024	Administrative cooperation in the field of taxation, automatic exchange of information between tax authorities of EU countries	e-Reporting, CRS, SAF-T, DAC7 crypto-reporting
OECD Tax Administration 3.0 Framework	2020	Digital tax administration ecosystem, integration of Big Data and artificial intelligence	APIs, AI analytics, digital compliance
Digital Europe Program	2021–2027	Financing digital infrastructures and cybersecurity for public institutions	Cloud services, data exchange hubs
European Data Strategy	2020	Creation of a Single European Data Space	Interoperable registers, blockchain for public administration
e-Tax / e-Invoicing systems	2018–2024	Electronic reporting and accounting of transactions in real time	E-invoices, integrated tax gateways

Source: summarized by the author based on the materials of the European Commission [28], OECD [29], European Union [30]

According to OECD estimates [29], in countries that have implemented a full electronic reporting system, the tax gap has decreased by an average of 15–20% in the first three years after digital transformation.

For a comparative analysis of the degree of digital maturity of tax administrations, the integral indicator of the Digital Maturity Index D(TM) (1) is used:

$$D_{TM} = \frac{\omega_1 D_1 + \omega_2 D_2 + \omega_3 D_3 + \omega_4 D_4}{\sum_{i=1}^4 \omega_i}, \quad (1)$$

where D1 is the level of automation of tax administration; D2 is the degree of integration with international data exchange systems; D3 is the number and functionality of electronic services; D4 is the level of analytical data processing; ω_i is the weighting coefficients reflecting the importance of each component. According to the OECD [29], the average DTM score in the EU countries is 0.82 (on a scale from 0 to 1), while Ukraine in 2023 had a value of about 0.56 according to the OECD [29]. This indicates the presence of significant potential for the development of automated data exchange tools, Big Data analytics and integration of electronic services.

Thus, the regulatory and institutional model of digital taxation of the European Union is characterized by systematicity, interconnection of regulatory and technological components, as well as an orientation towards the creation of a “smart” tax ecosystem. This experience forms a conceptual basis for the modernization of the Ukrainian tax system within the framework of the European integration course. The modern tax system of Ukraine is at the stage of active digital transformation, which is a component of a broader strategy of reforming public administration and fiscal policy. Digitalization of the tax sector is considered as a key tool for increasing transparency, reducing corruption risks and ensuring effective administration of budget revenues.

Over the past five years, Ukraine has taken a number of important steps towards the digital renewal of tax administration. In particular, there is an Electronic Taxpayer’s Office, which provides remote exchange of documents with tax authorities, submission of reports, payment of taxes and receipt of information certificates online. An important achievement was the introduction of electronic tax invoices and a system for monitoring risk transactions with value added tax (VAT), which allows detecting fictitious transactions using risk analysis algorithms. In addition, an electronic audit (e-audit) based on the processing of large data sets (Big Data) and automated detection of inconsistencies in financial statements has been implemented. In addition, the accounting system of settlement transaction registrars has been deployed, which ensures the recording of cash transactions in real time and the transfer of data to tax authorities.

Despite significant progress, the digital transformation of the tax system of Ukraine has a fragmentary character. Existing electronic services function mostly autonomously, without a single integrated data architecture. The exchange of information between fiscal, customs, banking and financial institutions remains limited, which reduces the efficiency of analytical processes and risk monitoring.

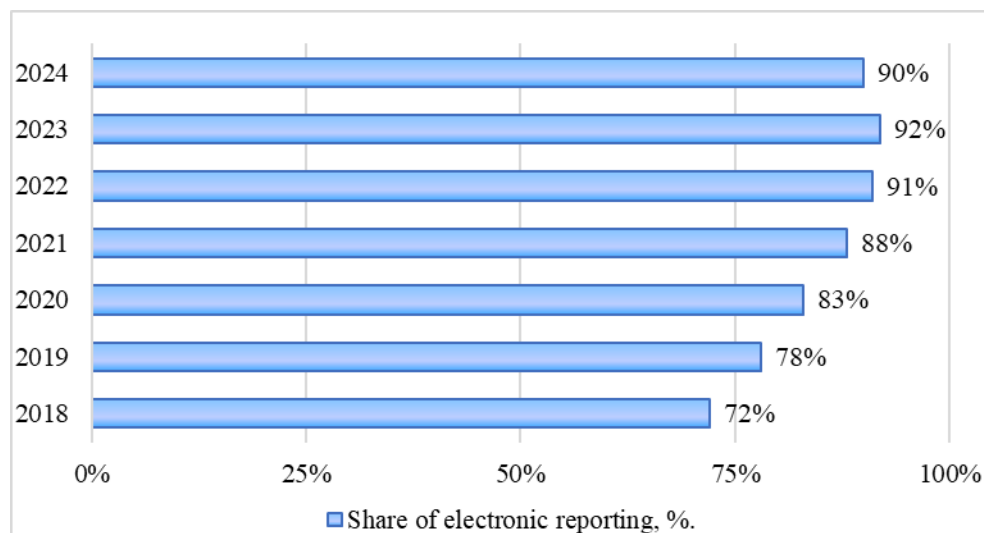
According to the Ministry of Finance of Ukraine [27], more than 90% of tax reports are submitted electronically, but only about 35% of audits are conducted based on automated analytics. This indicates an imbalance between the level of digitalization of reporting processes and the actual use of digital data to control and forecast tax revenues. The main elements of the digital infrastructure of the Ukrainian tax system are presented in Table 2, Figure 1.

Table 2. Main elements of the digital infrastructure of the tax system of Ukraine

System/tool	Year of introduction	Main functions	Current level of integration
Electronic taxpayer account	2018	Submission of reports, exchange of documents, communication with tax authorities	High (85% of taxpayers are covered)
System of electronic tax invoices and VAT monitoring	2017	Identification of risky transactions, prevention of VAT evasion schemes	Medium (limited integration with financial institutions)
Electronic audit	2021	Big data analysis, detection of anomalies in reporting	Low (limited coverage of audits)
Cash registers/precash registers system	2020	Real-time recording of payment transactions	Medium (partial integration with banking systems)
Information system for risk analysis (ITC Risk Engine)	2023	Algorithmic assessment of tax risks	Under testing

Source: compiled by the author according to the Ministry of Finance [27], State Tax Service of Ukraine [31], Eurasia Foundation [32]

Figure 1: Dynamics of the share of electronic tax reporting in Ukraine (2018 – 2024), %



Source: according to the State Tax Service of Ukraine [31]

The process of digitalization of the tax system shows a positive trend in the dynamics. In particular, the share of electronic reporting increased from 72% in 2018 to over 90% in 2024. This demonstrates the growing confidence of businesses in digital services and the effectiveness of the tax administration simplification policy.

At the same time, significant challenges remain on the way to a full-fledged digital tax ecosystem. These include the fragmentation of information databases, the lack of a single state data repository, limited compatibility with European systems (in particular, the EU Tax Observatory, VIES, DAC7 crypto-reporting platforms), and insufficient legislative harmonization with EU requirements.

To assess the level of digitalization of the tax system, the integral indicator [33, 34] of the Index of Digital Integration of Tax Services (IDI), which is calculated by formula (2), can be used:

$$I_{DI} = \frac{\lambda_E \cdot E_{norm} + \lambda_A \cdot A_{norm} + \lambda_D \cdot D_{norm} + \lambda_S \cdot S_{norm} + \lambda_T \cdot T_{norm}}{\lambda_E + \lambda_A + \lambda_D + \lambda_S + \lambda_T}, \quad (2)$$

where E_{norm} is the level of electronic reporting (share of electronic tax returns); A_{norm} is the degree of automation of audits and data processing; D_{norm} is the level of database integration and interaction between fiscal systems; T_{norm} is an indicator of the use of big data analytics technologies (Big Data, AI, blockchain) in the process of tax administration; $\lambda_E, \lambda_A, \lambda_D, \lambda_S, \lambda_T$ are weighting coefficients that determine the priority of each direction (for example, $\lambda_E = 0.25, \lambda_A = 0.20, \lambda_D = 0.20, \lambda_S = 0.20, \lambda_T = 0.15$); S_{norm} is an integral indicator of cybersecurity [35], which is calculated by formula (3):

$$S_{norm} = \frac{C_{norm} + R_{norm} + P_{norm}}{3}, \quad (3)$$

where C_{norm} – data privacy protection; A_{norm} – system fault tolerance; D_{norm} – access policy and audit of digital transactions. In this case, the normalized indicators $E_{norm}, A_{norm}, D_{norm}, T_{norm}, S_{norm}, C_{norm}, R_{norm}, P_{norm}$ are calculated by formula (4):

$$X_{norm} = \min \left(1, \max \left(0, \frac{X - X_{min}}{X_{max} - X_{min}} \right) \right), \quad (4)$$

According to preliminary calculations, the value of IDI for Ukraine is 0.63 (on a scale from 0 to 1), which corresponds to the average level of digital maturity, but is significantly lower than in the EU countries, where this indicator ranges from 0.80 to 0.90.

Thus, despite significant progress, the digitalization of Ukraine's tax system requires a systematic approach – integration of existing solutions into a single analytical platform, harmonization of legislation with European directives (DAC7, DAC8) and expanding the use of data analytics technologies for risk-based control.

Within the framework of the Digital Europe strategy and Directives DAC6 – DAC8, the European Union defines a single tax data architecture that provides for the integration of national systems into a common digital space. This process includes data exchange standards, harmonization of electronic reporting and creation of common formats for cross-border audits.

Important tools include: the global CRS standard, a mechanism for the automatic exchange of financial information between tax authorities; the SAF-T electronic reporting standard; the DAC7 digital platform reporting directive; and integration into the Eurofisc network, which coordinates the fight against VAT fraud.

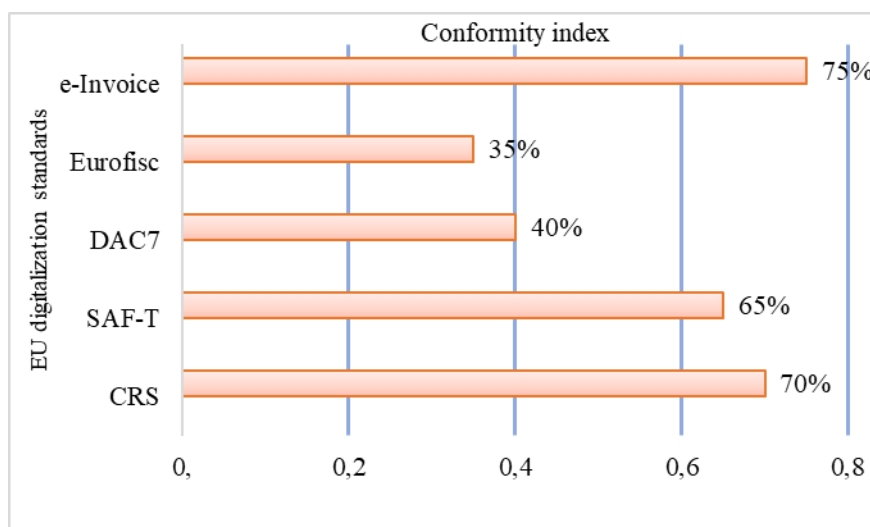
For the candidate countries, including Ukraine, this means the obligation to create a single information environment where tax data is compatible with EU systems. This integration requires harmonization of electronic document formats (XML, SAF-T), harmonization of taxpayer identification numbers (TINs), and cybersecurity of data exchange. Table 3, Figure 2 show the main standards of digitalization of EU tax processes and the status of implementation in Ukraine

Table 3. Assessment of the compliance of Ukraine's digital tax infrastructure with EU standards

Standard / directive	Objective	Status of implementation in Ukraine	Conformity assessment (0–1)
CRS	Automatic exchange of tax information	Partial implementation through banks	0.70
SAF-T	Electronic reporting and audit	Pilot implementation	0.65
DAC7	Data exchange of digital platforms	At the stage of legislative adaptation	0.40
Eurofisc	Common VAT monitoring system	There is no integration	0.35
e-Invoice / e-Reporting	Electronic invoice issuance	Partially implemented	0.75

Source: compiled by the author based on data from the European Commission [28], OECD [29], Ministry of Finance of Ukraine [27] and the World Bank [36].

Notes: Units of measurement – Compliance index: 0–1 scale.

Figure 2. Level of digital compatibility of the Ukrainian tax system with EU standards

Source: based on [37-39]

As can be seen from the graph in Figure 2, Ukraine has achieved the highest level of compliance in the e-Invoice (0.75) and CRS (0.70) standards, which indicates the availability of effective electronic services and progress in the field of automatic data exchange. At the same time, Eurofisc (0.35) and DAC7 (0.40) remain the least implemented areas, lacking not only technical but also legal compatibility with EU tax institutions.

This visual tool clearly demonstrates the priorities for further harmonization: the development of cross-border information exchange, connection to European audit networks, and improvement of analytical algorithms for fiscal control.

The current development of technologies opens up wide opportunities for Ukraine to move to an intelligent model of tax administration based on big data processing, automated reporting and interaction of state institutions in the digital environment.

The most important digital tools that are potentially effective in the context of integration into the European tax area include blockchain solutions, artificial intelligence, data mining technologies, API connections, and the creation of a single digital register of taxpayers.

Blockchain technologies ensure the immutability and verification of tax transactions, making it impossible to modify them without authorization. They can be used in the VAT system to register tax invoices, control supply chains, and

confirm the authenticity of financial transactions. Artificial intelligence opens up prospects for automated risk assessment and forecasting of potential tax evasion cases based on taxpayers' behavioral patterns. Data mining allows identification of atypical operations and formation of risk profiles of enterprises.

API solutions serve as an interface for the exchange of information between fiscal authorities, banks, customs, the Pension Fund and the State Employment Service, which reduces the administrative burden on business and speeds up data verification.

The creation of a single digital register of taxpayers will ensure centralized information management, simplify identification and reduce the risks of duplication of records in databases.

The implementation of these technologies corresponds to the strategic priorities of the EU regarding digital governance and the exchange of tax information. Their comprehensive application is expected to reduce the share of the shadow economy by 5–7 percentage points over the next three years, strengthen fiscal discipline and increase business confidence in the tax system.

According to forecast estimates [40, 41], a single digital payer registry and blockchain systems have the greatest potential for transformative effect (0.95 and 0.90, respectively), as they create a basis for data reliability and transaction transparency. AI and data mining technologies provide in-depth analytics, but require significant investment in training models and personal data protection. API solutions, although having a lower integration impact (0.7), are critical for inter-agency coordination and technical compatibility with EU systems.

Thus, the digital transformation of the tax system of Ukraine should be implemented according to the principle of “from infrastructure – to intelligence”: first, the creation of a single database and exchange channels, and then the implementation of analytical and automated decision-making mechanisms.

Discussion

The results of the conducted research confirm that the digitalization of the tax system is not only a technical process of modernization of information resources, but a comprehensive institutional reform that involves the transformation of management models, approaches to data analytics and interaction between the state, business and citizens. In this context, the key challenge for Ukraine remains the harmonization of the national system of tax administration with the requirements of the European Union, primarily in terms of ensuring transparency, compatibility and security of tax data exchange.

A comparison with the experience of EU countries shows that the introduction of digital tools such as e-Invoicing, e-Audit, SAF-T, and integration with the DAC7 platform make it possible to significantly reduce administrative costs, minimize the human factor in inspections and increase tax discipline. For Ukraine, the partial implementation of such solutions – in particular, the system of electronic audit and real-time registration of payment transactions – is already showing a positive effect, but their effectiveness is limited by the lack of full integration with international tax databases.

The level of centralization of tax data remains a matter of debate. European practice is based on a model of decentralized information storage with a high level of format unification (XML/SAF-T standards), while in Ukraine, a centralized architecture still dominates, which complicates the exchange of data between the State Tax Service, customs authorities and financial institutions. On the one hand, centralization increases government control, but on the other hand, it reduces the flexibility of the system and complicates adaptation to the requirements of DAC7 and CRS.

The discussion on data security in the process of digitalization of tax services remains highly relevant. The use of Big Data and artificial intelligence technologies significantly strengthens analytical capabilities, but at the same time creates risks of unauthorized access to confidential information and increases the requirements for cybersecurity. Therefore, ensuring secure data exchange and protection of taxpayers' personal information should be a priority in the further modernization of the fiscal system. One of the promising solutions is the implementation of blockchain-based mechanisms for verifying transactions and ensuring transparency of data flows. The experience of countries such as Estonia, the Netherlands and Denmark shows that the combination of artificial intelligence technologies with decentralized databases creates an optimal balance between control automation and privacy protection.

An important component of digital transformation is the personnel and organizational aspect. The practice of EU countries demonstrates that the technical implementation of digital tools should be accompanied by a systematic increase in the digital competences of tax authorities, as well as the creation of specialized units for data analytics

and cyber security. In Ukraine, these processes are at an initial stage: according to the Ministry of Finance, only 40% of employees of the State Tax Service have been trained in the use of digital administration systems. This shows the urgent need to strengthen human resources as a key prerequisite for the effective implementation of European practices.

Thus, the results of the study confirm the need for a gradual transition from fragmented digitalization to comprehensive integration of tax processes. The optimal scenario is in which Ukraine will gradually bring its tax system closer to the DAC7 and SAF-T standards, while ensuring technological compatibility, legal harmonization and a high level of cyber protection. This will contribute not only to increasing fiscal transparency, but also to strengthening Ukraine's position in the process of European integration.

Conclusion

The results of the study showed the key trends and directions of digital modernization of the tax system of Ukraine, and also identified the main challenges on the way to its adaptation to European standards. The digitalization of tax administration is viewed not only as a technical process of automating data collection, but also as a systemic institutional reform that ensures transparency, efficiency and trust in tax mechanisms.

The author establishes that the legal framework of the European Union (in particular, Directives DAC7, SAF-T, CRS) defines common principles of tax information exchange, electronic reporting and audit. These documents form the guidelines for candidate countries, including Ukraine, in building a digital tax administration ecosystem.

It is shown that a number of digital tools have already been created in Ukraine, such as the taxpayer's electronic cabinet, systems of software registrars of payment transactions, electronic invoices and e-audit, but they function in a fragmented manner and do not ensure full integration with European data systems.

The author identifies the main barriers to digital transformation: the lack of a unified tax data architecture, limited compatibility with EU information platforms, an imperfect regulatory framework for implementation of artificial intelligence solutions, and an insufficient level of digital competencies of the State Tax Service employees.

It is substantiated that the introduction of modern digital technologies, such as blockchain, AI analytics, data mining, and API interaction between government agencies, creates prerequisites for reducing the level of the shadow economy (currently about 28–30 % of GDP according to the World Bank) and increasing the efficiency of fiscal control.

The author proposes a phased model for the digital integration of Ukraine's tax system into the European space, which includes: harmonization of legislation in accordance with the requirements of DAC7 and CRS; creation of a single digital register of taxpayers; integration of e-audit and e-reporting into common European platforms; and improvement of the digital competence of tax authorities' employees.

Thus, the digitalization of the tax system is a strategic factor in strengthening Ukraine's fiscal security and an important condition for its integration into the European Union. Effective implementation of digital tools will help to build trust between the state and business, reduce tax risks and create a stable, transparent and predictable public finance system.

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