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DIRECTIONS OF MODERNIZATION OF THE INFORMATION AND TECHNICAL SUPPORT OF THE TREASURY SYSTEM

Abstract. The advantages of remote access via the Internet to the information resources of the State treasury service of Ukraine with the aim of automating the process of executing budgets at all levels, which allows to optimize the costs of supporting the interaction process due to the rejection of the flow of incoming and outgoing paper documents, speed up information processing, reduce the time for treasury maintenance of budgets and reduce the number of errors in data. An analysis of the measures that contribute to the implementation of the software and technical complex "Treasury client - Treasury" was carried out, with the aim of providing wide opportunities for remote service of administrators and recipients of budget funds, preparation and execution of financial and payment documents by them via the Internet using reliable means of protection. An analysis of the dynamics of the number of managers and recipients of budget funds working in the remote service system "Treasury client - Treasury" is provided. Cloud technologies are considered as one of the main technological bases for the modern effective organization of electronic information interaction of state bodies, in particular, the construction of an electronic government system. The conditions for creating a stable transfer of electronic information interaction to the cloud are defined, which makes it possible to attract a wide range of users to it with relatively low material costs, while the lack of contact with an official increases the efficiency and transparency of the interaction of the state with citizens, reduces the likelihood of corruption, and Internet technologies ensure higher efficiency and efficiency of the corresponding document flow. The key problems associated with the use of a web browser to organize remote access to software for the purpose of further modernization of automated systems (AS) or software and technical complexes (STC) of the Treasury of Ukraine, which excludes the need to update existing or installed new software, are identified on the computers of remote users and ensures the availability of changes immediately after the launch in the Treasury of Ukraine of modernized versions of such AS and STC.

Keywords: treasury service, public governance, information resources, budget funds, cloud computing, remote service, web-access.

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НАПРЯМИ МОДЕРНІЗАЦІЇ ІНФОРМАЦІЙНО-ТЕХНІЧНОГО ЗАБЕЗПЕЧЕННЯ КАЗНАЧЕЙСЬКОЇ СЛУЖБИ

Анотація. Розглянуто переваги віддаленого доступу за допомогою мережі Інтернет до інформаційних ресурсів Державної казначейської служби України з метою автоматизації процесу виконання бюджетів усіх рівнів, що дозволяє оптимізувати витрати на підтримку процесу взаємодії завдяки відмові від потоку вхідних та вихідних паперових документів, прискорити обробку інформації, скоротити час на казначейське обслуговування бюджетів та зменшити кількість помилок у даних. Проведено аналіз заходів, які сприяють упровадженню програмно-технічного комплексу «Клієнт казначейства - казначейство», з метою надання широких можливостей дистанційного обслуговування розпорядників та одержувачів бюджетних коштів, підготовкою та проведенням ними фінансових та платіжних документів через мережу Інтернет з використанням надійних засобів захисту. Надано аналіз динаміки кількості розпорядників та одержувачів бюджетних коштів, які працюють в системі дистанційного обслуговування «Клієнт казначейства – Казначейство». Розглянуто хмарні технології як одну з основних технологічних баз для сучасної ефективної організації електронної інформаційної взаємодії державних органів, зокрема побудови системи електронного урядування. Означено умови для створення стабільного перенесення електронної інформаційної взаємодії у хмару, що дає змогу залучати до неї широке коло користувачів з відносно невеликими матеріальними витратами, при цьому відсутність контакту з чиновником підвищує ефективність і прозорість взаємодії держави з громадянами, знижує ймовірність корупції, а Інтернет-технології забезпечують вищу ефективність і оперативність відповідного документообігу. Означено ключові проблеми, які пов'язані з використанням веб-браузера для організації віддаленого доступу до програмного забезпечення з метою подальшої модернізації автоматизованих систем (АС) або програмно-технічних комплексів (ПТК) Казначейства України, що виключає необхідність оновлення існуючого або інстальованого нового програмного забезпечення на комп'ютерах віддалених користувачів та забезпечує доступність змін відразу ж після запуску в Казначействі України модернізованих версій таких АС та ПТК.

Ключові слова: казначейська служба, публічне врядування, інформаційні ресурси, бюджетні кошти, хмарні обчислення, дистанційне обслуговування, web-доступ.

Introduction. Public policy in Ukraine today is built on the principles of general accessibility, openness and transparency for every citizen and institutions of

civil society. The information infrastructure of today's public administration needs rational changes that can be implemented on the basis of new innovative approaches and technological updates with the help of information and technical support. The use of information and technical support for the improvement of public governance, improvement of relations between the state and citizens, organization of electronic forms of interaction between state authorities, local self-government bodies and civil society is one of the priority tasks of building an information society in Ukraine.

The introduction of information and technical support for the treasury system opened up a new opportunity to find more advanced methods of managing financial resources. The first step towards the application of innovative approaches to the system of functioning of the State treasury service of Ukraine was the implementation of the system of remote customer service (RCS), which made it possible to achieve a set of advantages [1, p. 96].

Globalization of the economy requires the improvement of the Treasury's customer service system, effective interaction and establishment of relationships at various levels in the management of public finances, which is a guarantee of increasing the transparent and effective distribution of budget funds [2-6]. The main prerequisites for the modernization and improvement of the quality level of service to managers and recipients of budget funds by the bodies of the treasury service are the introduction of a system of innovative technologies.

However, the excessive concentration of financial resources and their high turnover require total control over the management of budget funds and open opportunities for improving the mechanism of information and technical support for the management of financial resources in the treasury system and the use of temporarily free funds in order to further cover cash gaps. In order to increase the efficiency, analytical and reliability of information about the state and movement of budget funds, it is quite important to introduce automated processing of all information flows in the Treasury system.

Analysis of recent research and publications. The analysis of scientific publications on the management of financial resources showed that such scientists as S. O. Bulgakova, M. B. Gulanovska [7], M. A. Demyanchuk [8], O. P. Kyrylenko [9], A. I. Krysovaty [9], M. I. Ogdanskyi, N. I. Sushko [10], V. I. Stoyan [11] and others. The effectiveness of the operation of a single treasury account is considered in the papers of Yu. V. Pasichnyk, P. G. Petrashko, V. I. Stoyan [11], O. O. Chechulina, S. I. Yuriy [12] and others.

Treasury authorities are constantly improving the process of servicing state and local budgets in order to meet customer requests and the requirements of the international community. The implementation of the latest information technologies in the work of the Treasury of Ukraine allows to create high-quality forms of organization of the activities of the Treasury and structural units, to rationally optimize the interaction with state authorities and local self-government by providing access to state information resources. This study is devoted to the consideration of innovative directions and tools for the modernization of the information and technical support of the treasury system.

Setting objectives. The purpose of the research is the analysis the effectiveness of the use of the existing information and technical support of the treasury system while ensuring a high level of information reliability and to determine the introduction of innovative tools to reduce the costs of budget funds and update hardware and system-wide software as a result of reducing autonomous and decentralized data processing systems

The object of research is the process of development of information and technical support of the treasury system.

The subject of the research is the analysis of innovative tools and technologies for the modernization of financial resources management in the treasury system, as well as the practice of their application in order to improve the quality of service to managers and recipients of budget funds by the treasury service bodies.

Presenting main material research. Cloud computing occupies one of the leading places in the list of modern information technology priorities along with virtualization, business analytics and mobile solutions. Transferring a large amount of electronic information interaction to the cloud makes it possible to attract a wide range of users to it with relatively low material costs. At the same time, the lack of contact with the representative of the Treasury increases the efficiency and transparency of the state's interaction with state authorities and local self-government bodies, reduces the likelihood of corruption, and Internet technologies ensure higher efficiency and efficiency of the relevant document flow. Therefore, it can be argued that cloud technologies are one of the main technological bases for the modern effective organization of electronic information interaction of state bodies, in particular, the construction of an electronic governance system with the involvement of the treasury system. This determines the relevance of scientific research in this area.

Cloud computing is a technology of distributed data processing in which computer resources and capacities are provided to the user as an Internet service. Providing services to the user as an Internet service is key. However, this service should be understood not only as access to the service via the Internet, access can also be made via a regular local network using web technologies.

The basis for the creation and rapid development of cloud computing systems was provided by large Internet services, such as Google, Microsoft, etc., as well as technical progress, which essentially suggests that the emergence of cloud computing was only a matter of time. Let's focus on how the development of the above directions allowed cloud systems to become more accessible:

the development of multi-core processors led to: increased productivity, with the same equipment size; decrease in the cost of equipment as a result of operating costs; reducing the energy consumption of the cloud system, for most data centers this is really a problem when expanding data center capacities;

increase in capacity of information carriers, decrease in storage cost 1 MB of information allowed: unlimited (at least this is how most "clouds" position themselves) to increase the amount of stored information; reduce the cost of maintaining information stores by significantly increasing data volumes;

the development of multithreaded programming technology allows: efficient use of computing resources of multiprocessor systems; rationally distribute cloud computing power;

the development of virtualization technologies allows: to create software for creating a virtual infrastructure regardless of the amount of provided hardware resources; ease of scaling, building up systems; reduce the costs of cloud systems administration; guarantees the availability of virtual infrastructure via the Internet;

the increase in bandwidth has led to: an increase in the speed of working with cloud systems, in particular, the virtual graphic interface and work with virtual media; reducing the cost of Internet traffic for working with large volumes of information; the penetration of cloud computing into the masses.

The current state of development of telecommunications systems and information technologies, the presence of the necessary legal framework for the use of electronic digital signatures create all the prerequisites for the introduction of a full-fledged, legally significant electronic document flow in treasury bodies [13-16].

In order to simplify and optimize the interaction of managers and recipients of budget funds in the service process, the State treasury service of Ukraine decided to introduce an electronic form of customer service using reliable means of electronic digital signature and modern Internet technologies.

To achieve this goal, the State treasury service of Ukraine carried out a number of preparatory measures in the following areas:

1. Regulatory regulation of the electronic remote service process: improve the regulatory documentation base; improve organizational and legal actions regarding remote treasury service;

2. Modernization of the information and telecommunications system of the State treasury service of Ukraine: a secure Internet access node, a complex information protection system was built for the specified complex, and a certificate of compliance was obtained from the State Service of Special Communications and Information Protection of Ukraine; key certification centers of the State treasury service of Ukraine were created and accredited, a comprehensive information protection system was built and a certificate of compliance was obtained from the State Service of Special Communications and Information Protection of Ukraine, development of the information site of the State treasury service of Ukraine; the hardware platform of the State Treasury Service of Ukraine was modernized, a modern Tieg 3 Data Processing Center was created and certified; modernized the accounting automation system for the accounting of the budget execution of AS "Kazna"; the information resources of the Unified Register and the Unified Network of Administrators and Recipients of Budget Funds in AS "Kazna" have been integrated; the remote customer service system was integrated through the software and technical complex "Treasury client - Treasury" using the electronic digital signature of the key certification center of the State treasury service of Ukraine in AS "E-Kazna".

The implementation of AS "E-Kazna SB" has the following advantages compared to a decentralized system: a complete combination of planned and cash indicators, an increase in the speed of information processing, a single balance of

state budget expenditures and the possibility of making operational management decisions, the possibility of integration with external systems. As a result of the centralized service of administrators and recipients of budget funds of the state budget, the transition to an extraterritorial service system will be important [1, p. 103-104].

The development of the treasury system, its growing requirements and financial capabilities constantly give rise to both quantitative changes in the information environment (constant increase in the volume of processed information, quantitative increase in performed functions), and qualitative ones (expansion of the functionality of the tasks to be solved, updating of information technologies, changes in function parameters, etc.) [1, p. 104].

The implementation of modern information technologies in treasury services contributes to the creation of qualitatively new forms of organization of the activities of the State Treasury Service of Ukraine and their structural divisions, optimization of interaction with state authorities and local self-government by providing access to state information resources, the ability to receive electronic services using the Internet [15].

In order to increase the number of institutions that are serviced by the treasury bodies, it is necessary to implement the software and technical complex project "Treasury client - Treasury" and provides for a certain sequence of implementation:

the first stage – creation, experimental testing on test data with the involvement of clients of the Treasury of Ukraine, construction of a comprehensive information protection system and obtaining a certificate of the State Service of Special Communications and Information Protection of Ukraine;

the second stage – a pilot project in the mode of experimental and industrial operation with the introduction of circulation of electronic payment documents;

the third stage – connecting managers and recipients of budget funds for the exchange of electronic payment documents and customer account statements;

the fourth stage – expansion of the range of documents used in the maintenance of the budget institution's estimate (including supporting documents).

In order to understand the need and advantages of remote customer service through the software and technical complex "Treasury client - Treasury" (STC "Treasury client - Treasury"), the purpose of this toolkit is detailed.

STC "Treasury client - Treasury" is essentially designed to provide external clients of the State treasury service of Ukraine (administrators and recipients of budget funds) with remote access via the Internet to the information resources of the State treasury service of Ukraine in order to automate the process of budget execution at all levels. It will allow to optimize the costs of supporting this process due to the rejection of the flow of incoming and outgoing paper documents, speed up the processing of information, reduce the time spent on treasury maintenance of budgets and reduce the number of data errors.

Evidence of the effectiveness of the work carried out is the following data on the increase in the number of administrators and recipients of budget funds.

According to the official reporting of the State treasury service of Ukraine, the number of institutions and organizations included in the Unified register of managers

of budget funds and recipients of budget funds as of January 1, 2024 [17]. In particular, the number of administrators and recipients of state and local budget funds included in the network was 10,204, namely: State budget – 9,161 institutions (of which 9,161 are administrators of funds and 1,043 recipients); local budget – 54,232 institutions (of which 33,963 are managers of funds and 20,269 are recipients).

The number of accounts for crediting taxes and payment collections opened in the State Treasury of Ukraine in 2022 was 721,607, in 2023 – 683,613. A decrease of 37,994 (5.6%) was observed, which is a consequence of the increase in territories where active hostilities are taking place [17].

The number of managers/recipients of budget funds who work in the remote service system "Treasury client - Treasury" (RSS) is shown in Fig. 1.

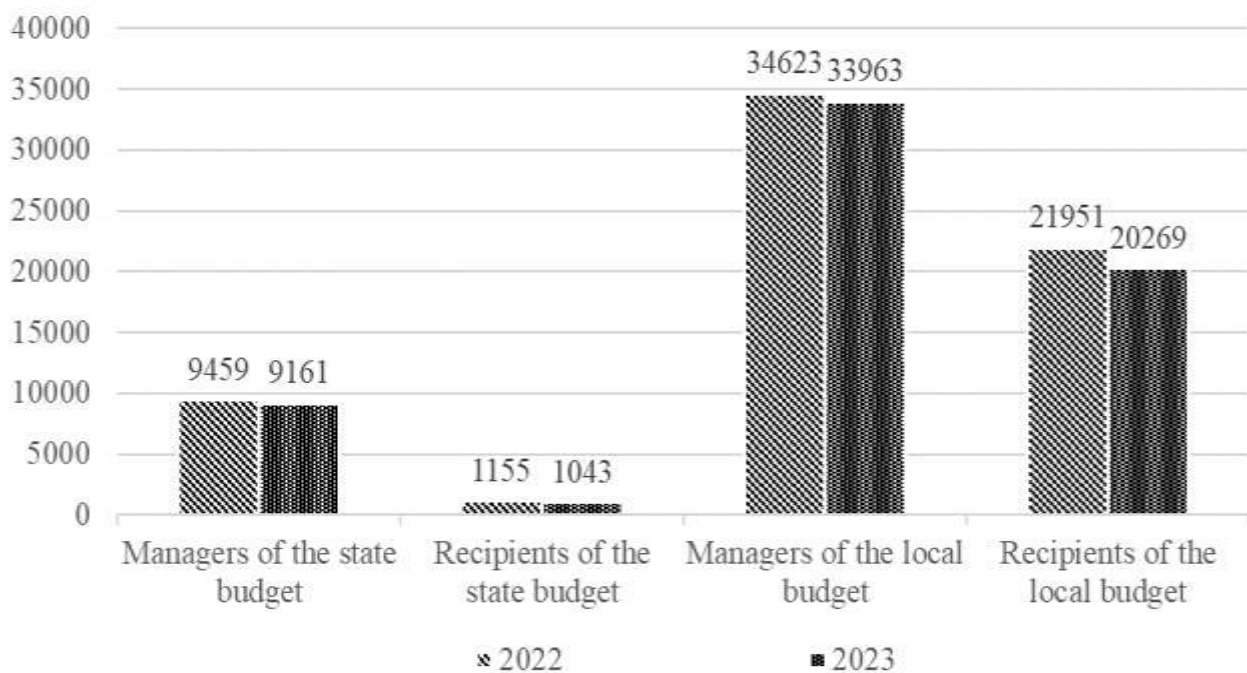


Figure 1. The number of managers/recipients of budget funds who work in the remote service system "Treasury client - Treasury" (RSS).

Source: compiled by [17].

Access of external clients to the resources of the information environment of the Treasury of Ukraine takes place through standard web-browsers, which are usually distributed freely, therefore their use will not increase the cost of either the information resources of the Treasury of Ukraine or software from the managers (recipients) of budget funds, which is why the number of managers/recipients of budget funds who work in the remote service system increases every year (Fig. 2).

Deploying the system of remote access of clients of the Treasury of Ukraine through the STC "Treasury client - Treasury" will speed up the passage of payments, improve the fault tolerance of the information environment of the Treasury of Ukraine, and simplify the service of managers of budget funds [18, 19].

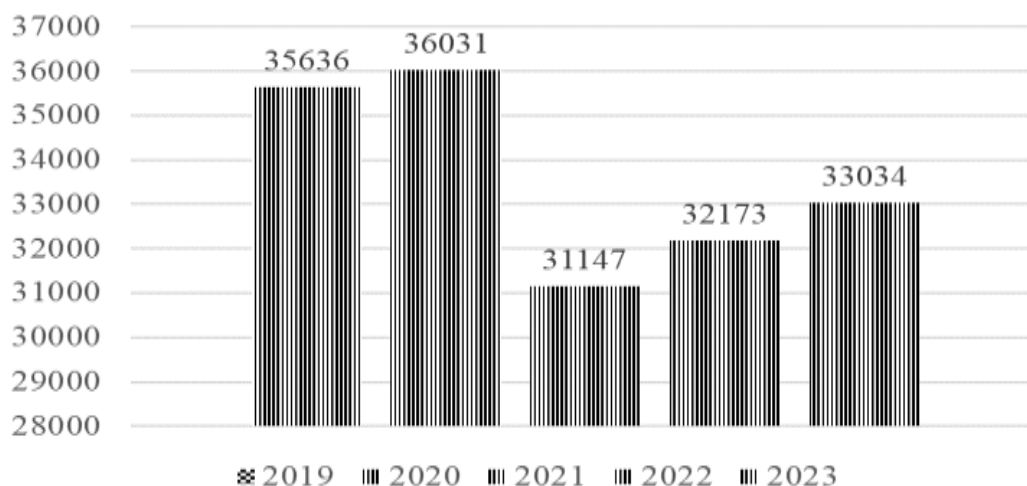


Figure 2. The number of managers/recipients of budget funds who work in the remote service system.

Source: compiled by [17].

At the same time, clients get the opportunity in real time to monitor the status of accounts opened in the territorial bodies of the State treasury service of Ukraine, the passage of payments, receipt of account statements, etc. Also, a significant economic effect is achieved due to significant time savings, reduction of costs for consumables.

The list of functions that managers and recipients of budget funds can access through standard web-browsers is shown in Fig. 3.

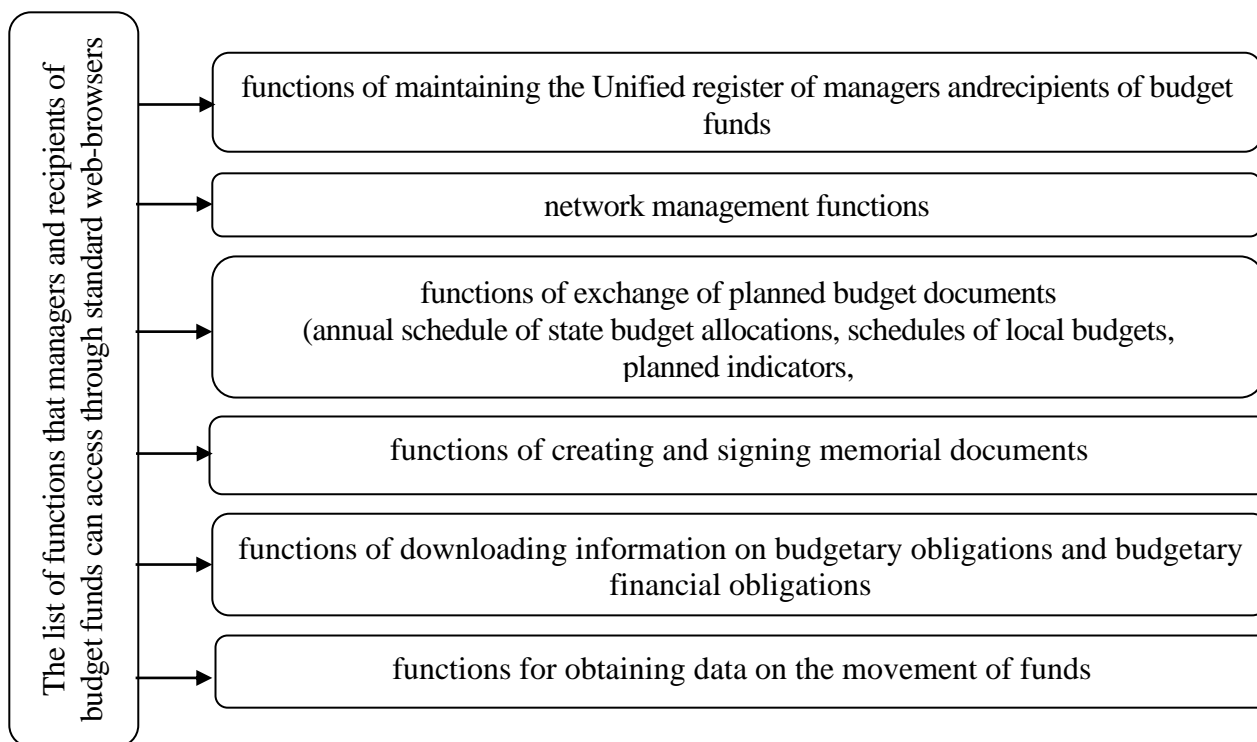


Figure 3. The list of functions that managers and recipients of budget funds can access through standard web-browsers.

The specific weight of documents submitted through the remote service system in the total number of documents processed by the treasury bodies is shown in Fig. 4. The given dynamics of the specific weight of documents submitted through the RSS testifies to the advantages of this system and ensures the saving of budget funds due to the reduction of financial costs of managers and recipients of budget funds, eliminates duplication of data, ensures the implementation of control over the effectiveness of the State treasury service of Ukraine.

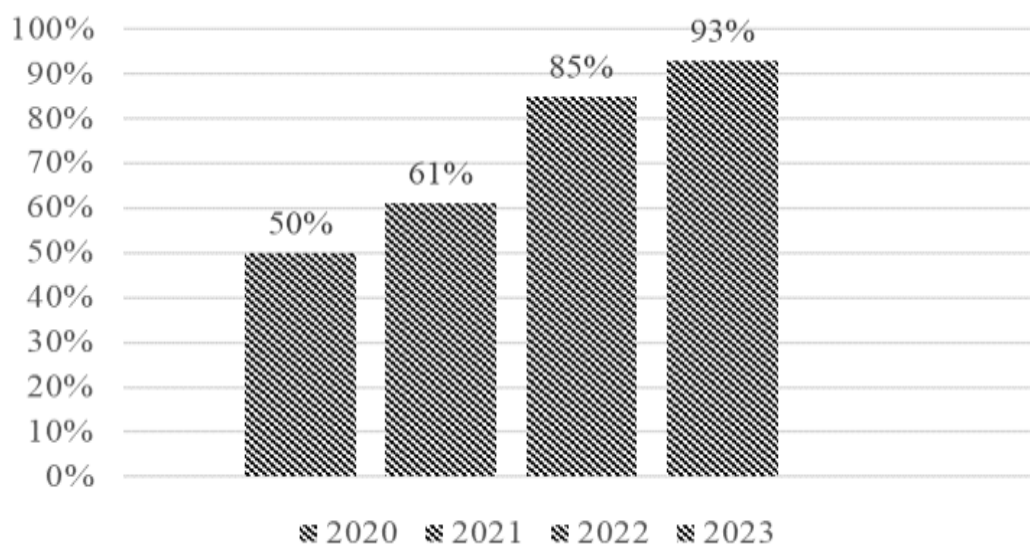


Figure 4. The number of documents processed by RSS the treasury bodies.
Source: compiled by [17].

Eliminating the flow of paper documents, in addition to direct cost and time savings, provides another advantage. Supporting documents (budgetary obligations and budgetary financial obligations, etc.) accompanying the payment documents will be sufficient to be submitted to the treasury body only once.

An electronic copy of such a document is stored in the database, so its further use to confirm the next payment will be made only by reference to the saved copy. Since all electronic documents (electronic copies of paper documents) are signed with an electronic digital signature, the information in the database is a complete, reliable and completely legitimate copy of the original document.

The number of documents submitted by clients to treasury bodies through the RSS is shown in Fig. 5.

In order to optimize the work of the core element of the financial system of society, through which it is possible to identify the problems of the formation and effective use of budget funds, it is necessary to: ensure the formation of a systematic and complete regulatory and legislative framework for the functioning of the treasury system; carry out a functional restructuring of the treasury; improve information technologies and create electronic communication channels; to ensure professional training and advanced training of treasury employees [3, p. 171].

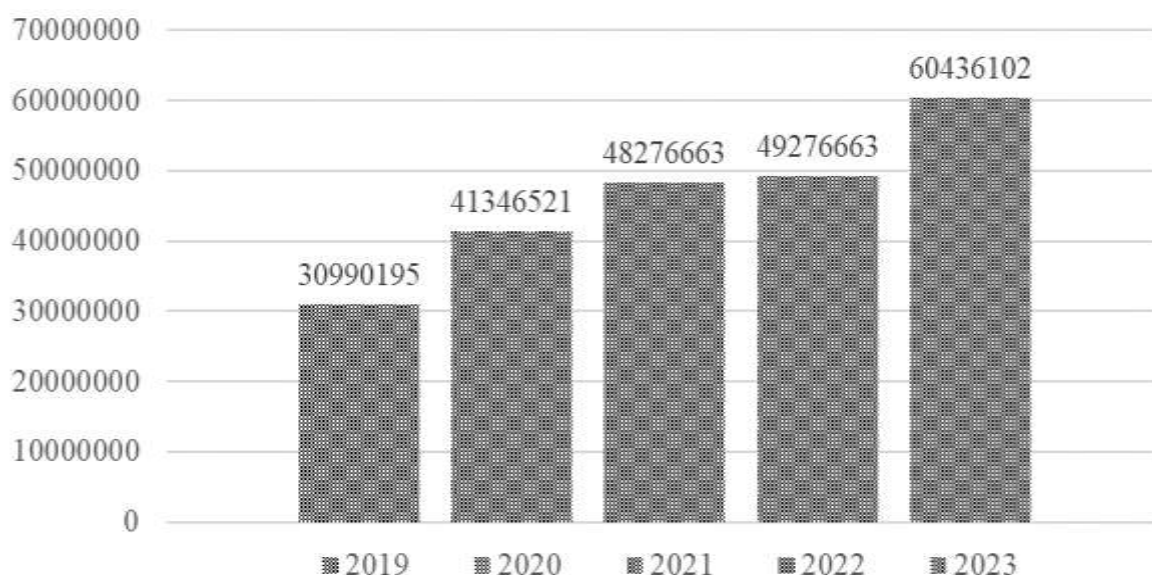


Figure 5. The number of documents submitted by clients to treasury bodies through RSS.

Source: compiled by [17].

Thanks to this decision, the load on data transmission channels between the bodies of the Treasury of Ukraine and managers of state funds will be reduced, the process of servicing the expenditure part of budgets at all levels will be simplified, and the risk of making mistakes will be reduced.

Web-access is provided to treasury clients of all levels, mandatory state social and pension insurance funds, and other clients who have accounts opened in the State treasury service of Ukraine. That is, web-access to the system must be provided to clients of the State treasury bodies for settlement and cash service. The list of such clients includes budgetary institutions, state authorities, as well as organizations created by them in accordance with the established procedure, which are fully supported at the expense of the relevant state or local budget.

Using the Internet as a communication channel of the global network will allow connecting new external users (clients) to the information space of the Treasury without additional costs from both external clients (institutions, organizations) and the Treasury of Ukraine [20, 21]. The use of a web browser to organize remote access to software corresponds to the modern approach adopted in the field of information technologies throughout the world. This approach allows you to create a user interface in the form of web pages, so that on the side of the owner of an automated system to which remote access is provided, all the functionality of such a system remains, and the end user receives only the means of managing this functionality, which are available through a web browser.

The advantage of this approach is that there is no need to install any specialized software for organizing work with information resources of the Treasury of Ukraine on the side of remote users (territorial bodies of the Treasury, managers and recipients of budget funds). In the case of further modernization of automated systems or software and technical complexes of the Treasury of Ukraine, there is no

need to update existing or install new software on computers of remote users. All the specified changes will become available to them immediately after the launch of modernized versions of automated systems and software and technical complexes in the Treasury of Ukraine.

The development of IP-telephony is undergoing important qualitative changes: it is gradually turning from an additional service into a basic service, which will soon become one of the components of multiservice technology. In the strategic plan, IP-telephony is the only technical platform that will allow combining solutions for data and voice transmission, as well as for processing and further use of this.

It is thanks to this service that a significant saving of public funds is guaranteed and the provision of cheap telephone communication for employees, between departments of the State treasury service of Ukraine (the system gives every employee the opportunity to call any treasury body).

As experience shows, means of communication based on IP-technologies allow to effectively solve all communication tasks. The implementation of converged IP-infrastructure, which provides simultaneous secure transmission of data, voice and video, really increases the efficiency of processes and reduces the total cost of communication.

Due to the fact that broadband Internet has recently become economically and technically available, interest in services based on IP-technology, such as IP-telephony, etc., has increased. Using them makes it possible to significantly reduce the cost of delivering the necessary content to almost any point on the planet without laying own trunk communications. Costs for technical provision of access to the global network consist of the organization of "last mile" communication channels of sufficient capacity and reliability.

The main benefit of the introduction of IP-telephony in distributed corporate networks is considered to be the benefit obtained due to savings on long-distance calls. The choice of IP-telephony technology for the organization of corporate communication is fully justified. The implementation of these concepts will allow to reduce costs due to the integration of data and voice networks, will allow significant savings on domestic and long-distance calls. At the same time, a large number of additional services will appear, which will contribute to increasing the quality and productivity of employees' work. Installation of new equipment will ensure increased availability and strengthening of network security, will create a basis for its further development. All these factors lead to increased labor efficiency. When implementing the IP-telephony system in the treasury service, when using the IP-telephony system, the State treasury service of Ukraine will use the SIP voice transmission protocol and a numbering plan based on the free Asterisk system, which has the ability to connect to the existing mini-ATE.

Conclusion. The introduction of electronic document flow in terms of providing documents and reports in electronic form will save time, money and consumables. The implementation of the software and technical complex "Treasury client - Treasury" opened wide opportunities for remote service of managers and recipients of budget funds, in particular, the preparation and execution of financial and payment documents by them via the Internet using reliable means of protection.

It can be concluded that the creation of a state "cloud" to combine existing state information and technological resources is to a large extent an organizational and methodological rather than a purely technical task. It is necessary to work out in detail the concept and algorithm of combining available information resources in the "cloud", to develop rules and procedures for the exchange of computing and information resources, a single profile of a civil servant.

The implementation of modern information technologies in treasury services contributes to the creation of qualitatively new forms of organization of the activities of the State treasury service of Ukraine and their structural divisions, optimization of interaction with state authorities and local self-government bodies and civil society institutions by providing access to state information resources, the ability to receive electronic services from using the Internet, simplifying technological operations thanks to the automation of individual processes and eliminating duplication of data in systems, increasing the efficiency of management decision-making in the implementation of state policy in the field of treasury services thanks to operational access to reliable consolidated information.

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