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IMPLEMENTATION OF SMART TECHNOLOGIES IN THE JUDICIAL SYSTEM: FOREIGN EXPERIENCE OF IMPLEMENTATION

The article examines foreign experience in implementing smart technologies in judicial systems. The relevance of digital transformation of justice, driven by the need to increase efficiency and transparency of judicial proceedings, has been analyzed. The most common forms of smart technological solutions are being examined within contemporary judicial processes. It has been determined that online dispute resolution systems are actively used in the Netherlands, the United Kingdom, the USA, India, China, Kazakhstan, through international platforms eBay, Smartsettle, Virtual Courthouse, and Modria. Blockchain technologies and smart contracts are utilized to automate the fulfillment of contractual obligations. However, their implementation gives rise to new types of disputes due to the complexity of interpretation and technical vulnerabilities.

China's experience as a pioneer in creating virtual "internet courts" has been highlighted. It is noted that since 2022, Chinese judges have been required to consult with artificial intelligence systems when considering cases. The system has access to government agency databases and controls the execution of court decisions. However, the Chinese model creates risks of violating the principles of separation of powers and strengthening state control. Unique foreign practices have been analyzed: court proceedings in the metaverse in Colombia, the use of ChatGPT by British judges for writing decisions, the virtual enforcement court in Saudi Arabia, and the Italian mobile application "Collega" for finding lawyers. Digitalization strategies of Kazakhstan (Torelik portal), Brazil (100% digital court), India (virtual courts for minor disputes), the Netherlands (Virtual Court platform), and the USA (virtual courtrooms) have been studied.

It is emphasized that the choice of technologies depends on the characteristics of national judicial proceedings, legislation, and technological capabilities of the country. Recommendations for Ukraine have been formulated regarding the implementation of an online dispute resolution system based on the experience of the Netherlands and the USA, specialized applications for legal assistance to military personnel and internally displaced persons. The need for comprehensive legal regulation to maximize advantages (accessibility of justice, transparency, reduction of corruption) and minimize threats (technical failures, cybercrime, algorithm biases, violation of the right to a fair trial) has been emphasized.

Keywords*: smart technologies, digitalization of justice, online dispute resolution, smart contracts, blockchain, virtual courts, artificial intelligence, judicial system.*

Банах С., Ковальчук О.
Імплементація смарттехнологій у судову систему: зарубіжний досвід впровадження

У статті досліджено зарубіжний досвід впровадження смарттехнологій у судові системи. Проаналізовано актуальність цифрової трансформації правосуддя, зумовлену необхідністю підвищення ефективності та транспарентності судочинства. Розглянуто найпоширеніші форми смарттехнологій у сучасному судочинстві. Визначено, що системи онлайн вирішення спорів активно використовуються в Нідерландах, Великобританії, США, Індії, Китаї, Казахстані через міжнародні платформи eBay, Smartsettle, Virtual Courthouse, Modria. Технології блокчейн та смартконтракти застосовуються для автоматизації виконання договірних зобов'язань, хоча їх впровадження породжує нові типи спорів через складність інтерпретації та технічні

вразливості.

Висвітлено досвід Китаю як піонера створення віртуальних «інтернет-судів». Зазначено, що 2022 року китайські судді зобов'язані консультуватися з системами штучного інтелекту при розгляді справ. Система має доступ до баз даних державних органів та контролює виконання судових рішень. Проте китайська модель створює ризики порушення принципів поділу влади та посилення державного контролю. Проаналізовано унікальні зарубіжні практики: судові процеси у метавсесвіті в Колумбії, використання ChatGPT британськими суддями для написання рішень, віртуальний суд примусового виконання в Саудівській Аравії, італійський мобільний додаток «Collega» для пошуку адвокатів. Досліджено стратегії цифровізації Казахстану (портал Torelik), Бразилії (100%-й цифровий суд), Індії (віртуальні суди для дрібних спорів), Нідерландів (платформа Virtual Court), США (віртуальні зали судових засідань).

Підкреслено, що вибір технологій залежить від особливостей національного судочинства, законодавства та технологічних можливостей країни. Сформульовано рекомендації для України щодо впровадження системи онлайн вирішення спорів за досвідом Нідерландів та США, спеціалізованих додатків для правової допомоги військовослужбовцям та внутрішньо переміщеним особам. Наголошено на необхідності комплексного правового регулювання для максимізації переваг (доступність правосуддя, прозорість, зниження корупції) та мінімізації загроз (упередження та галюцинації алгоритмів, кіберзлочинність, технічні проблеми, порушення права людини на справедливий суд).

***Ключові слова**: смарттехнології, цифровізація правосуддя, онлайн вирішення спорів, смартконтракти, блокчейн, віртуальні суди, штучний інтелект, судова система.*

Statement of the problem. In the realm of modern justice, there is an urgent need for understanding and implementing innovative technological solutions, particularly smart technologies, as an integral component of the judicial system. This paradigm is driven not only by progressive trends in digitalization of social relations, but also by the imperative to increase efficiency and transparency of judicial proceedings.

Developed countries, which are at the forefront of technological innovation, have already accumulated significant empirical material regarding the integration of smart solutions into judicial practice. Their experience provides a valuable epistemological foundation for the further development and improvement of judicial systems on a global scale. An analysis of foreign experiences in implementing smart technologies in court activities opens new horizons for the modernization of justice, creating a foundation for synergy between traditional legal institutions and innovative technological solutions.

The state of research on the problem. A review of scientific literature on the implementation of smart technologies in judicial proceedings [1–5] provides grounds to assert that the institutional and organizational foundation of this process is the phenomenon of smart applications, the prevalence of mobile technologies, and the lack of effective public services [6]. The development of the smart justice environment has become a global trend today. The number of scientific publications devoted to the implementation of «smart» technologies in judicial systems worldwide is growing. In particular, these issues have been studied by P. Sathyaprakasan, G. Lupo, D. Carnevali, K. Demertzis, M. Wojcik, A. Zhuk, D. Barysė, and other researchers. An international environment for the fruitful exchange of ideas and best practices in this field has been formed to date. However, it remains insufficiently studied. Moreover, information technologies are developing rapidly, constantly offering new technological solutions. Therefore, scientific research on the problems of implementing «smart» technologies in court activities is extremely relevant and promising.

The research aims to conduct a comparative analysis of foreign experience in integrating smart technologies into justice systems and identifying optimal pathways for their adaptation to improve judicial proceedings in Ukraine.

Presentation of the main research material. Numerous countries globally are rapidly implementing smart tools in judicial systems. They integrate modern technologies into judicial processes by moving court hearings online, reducing human intervention, and increasing automation of procedures. «Smart» courts use innovative technologies to increase the efficiency of judicial processes. Modern smart justice has reached such a level of development that the entire procedure can be conducted online [7].

One of the most widespread smart technologies used by progressive countries today is online dispute resolution. In particular, these are the Netherlands, the United Kingdom, India, the USA, the United Arab Emirates, Malaysia, Kazakhstan, Pakistan, South Korea, Singapore, and China. Various international commercial platforms commercialize their own online dispute resolution systems. The most well-known among them are the dispute resolution platforms eBay, Smartsettle, VirtualCourthouse, and Modria [8]. This technology has evolved into smart courts, which include blockchain technologies and smart contracts [9].

«Smart contracts» are software that automatically execute contracts based on blockchain technology. They are designed to ensure the execution and verification of contractual terms in a decentralized, transparent, secure, and reliable manner. Implementing blockchain-based smart contracts can effectively solve traditional problems of involving third parties, eliminate the influence of external factors, ensure the authenticity and reliability of information, and prevent fraud. Smart contracts implement the definition of rights and obligations, as well as protect the legitimate rights of both parties to the agreement [10].

However, due to the complexity and technical nature of smart contracts, it is almost impossible to completely avoid situations where discrepancies arise in the interpretation of their content. Problems also arise with their execution due to inconsistency and vulnerability. The question arises as to how such disputes between parties should be resolved. Uncertainty also exists concerning dispute resolution mechanisms for smart contracts. Consequently, their implementation may generate novel types of disputes that will require alternative conflict resolution mechanisms based on blockchain technology. Blockchain-based contracts are a source of new disputes that require resolution [9]. At the same time, they are a technology enabling the development of novel dispute resolution approaches. Notwithstanding its capabilities, blockchain adoption in jurisprudence requires careful study and resolution of a series of legal, regulatory, and technological issues.

Decentralized justice platforms are smart courts that use blockchain technology. They are designed to settle disputes through jury participation. The adjudication procedure on such platforms is encoded as blockchain-based smart contracts to prevent legal ambiguity. These frameworks primarily replicate digital dispute resolution workflows. These mechanisms largely model online dispute resolution processes. The first smart court in the world was a court in China. The basic structure of a nationwide «smart court» in this country has already been formed. China is implementing the «Smart Courts» Initiative and creating fully virtual «internet courts». This is a component of reforming and modernizing the justice and governance system [11].

To date, there is no universal definition of the concept of «smart court». This stems particularly from the reality that various judicial institutions employ different smart technologies. The traditional understanding of this term includes the presence of a data platform used in the courtroom. Such a platform integrates judicial processes, personnel, applications, data, processing of judicial information, and dynamic monitoring of the judicial process. It uses AI to collect evidence, analyze cases, read and analyze legal documents, and provide information support for «smart» judicial proceedings [11].

A smart court is not necessarily a court where everything is fully automated, and a «robot judge, which is self-learning, considers cases without human intervention. It is a court where judges use software to conduct judicial proceedings in a digital environment, and the capabilities of intelligent programs that can provide expert legal advice or make decisions leveraging large-scale data analytics and without human intervention are still limited [12].

Records indicate that beginning in 2022, judges in China have been mandated to seek consultation with AI systems when considering each case. If the judge's decision does not coincide with the AI recommendation, a detailed written justification must be provided. China's «smart" judicial system has gained direct access to extensive databases of the police, the prosecutor's office, and other government agencies. AI also controls the execution of court decisions, which was previously problematic due to staff shortages. Thanks to access to various databases, the system can quickly locate and seize the property of convicts, putting it up for online auctions. In addition, it can apply other sanctions, such as prohibiting the use of transport, air travel, or social services for debtors [13]. However, the "smart» judicial system, created with the participation of Chinese technology giants, may grant excessive power to a small group of technical specialists who developed the code, algorithms, or manage the database. Moreover, smart technologies are used in China to strengthen state control over the judicial system and collect data on citizens. This contradicts adherence to the principles of separation of powers and rule of law, which are components of human rights protection..

Italian courts use the smart application «Collega». It is designed to search for a legal representative by place of residence, replace a lawyer at a hearing, or find a lawyer who may participate in administrative activities. The application operates under an agreement with the Italian Association of Young Lawyers (Associazione Italiana Giovani Avvocati) [14].

In Saudi Arabia, a virtual enforcement court has been operating since 2022. It provides users with services on the enforcement of court decisions without human intervention. The process is fully automated – from applying through a web portal to issuing a final verdict. All electronic enforcement documents are certified through the Nafith platform. Such effective implementation of smart technologies in the digital transformation of the judicial system

contributes to achieving swift justice and prompt delivery of legal services. At the same time, the fundamental rights of all parties and the interests of society are ensured [15].

Another country that is actively implementing smart technologies in judicial proceedings is Colombia. It is one of the first in the world to test real court hearings in the metaverse [16].

The metaverse is a digital space where people and objects interact using modern technologies. It is an alternative reality that blurs the boundaries between the real and imaginary worlds. In the metaverse, users «enter» a virtual space and lead a full life there through their avatars. They can interact with other avatars and virtual objects, exchange information, and communicate [17]. A court hearing in which a case in proceedings will be considered can take place in such a format.

On the 24th of February 2023, Colombia's administrative tribunal held the first court trial in the metaverse. Each participant was represented by a digital avatar in a virtual courtroom. The trial in virtual reality lasted two hours. Quiñones (the judge-avatar) confirmed the constitutional legitimacy of the virtual court [18]. The use of the metaverse in court proceedings in Colombia is only at the experimental stage. Its implementation requires specialized technical equipment. Entry into the digital realm that merges physical, augmented, and virtual dimensions is feasible with a personal computer, laptop, or expensive VR glasses. This creates problems for ensuring equality and accessibility of justice. However, Colombia is actively engaging innovative smart technologies.

The United Kingdom has been experimenting with video technology in courts since 1999. In particular, in 2023, judges in England and Wales were allowed to use ChatGPT for writing court decisions, despite concerns that AI may fabricate fictitious cases. This technology can be useful for analyzing large volumes of texts or for administrative tasks. This country is actively implementing «smart» technologies that provide "powerful opportunities to create better, faster and more cost-effective digital justice» [19].

Kazakhstan introduced smart technologies in courts in 2013 and continues this process. It is implementing several national strategies. In particular, the Strategy for Digitalization of the Judicial System of the Republic. The Supreme Court of Kazakhstan endorsed it in 2019. According to this Strategy, innovative technologies were to be implemented in every aspect of the Kazakh judicial system by 2022. The main focus of the Strategy is on the Torelik system. This is a judicial internet portal visited by 5,000 users daily. Smart contracts and blockchain technologies in Kazakhstan are developing mainly in the private sector. This is due to the limitations of the aforementioned national strategy [20].

Brazil is actively implementing smart solutions in its judicial system to optimize judicial processes, increase efficiency and manage a substantial backlog of cases. The National Judicial Council, in October 2020, allowed Brazilian courts to introduce a 100% digital court. In this system, all procedural actions are carried out exclusively in electronic format and remotely via the Internet. Resolution No. 345/2020 establishes what information the parties to the process must provide, and regulates the conduct of hearings and sessions, the presence of lawyers, and, along with the voluntary character of the complete digital court option [21].

India has developed a concept of effective use of court resources and providing parties to judicial proceedings with an effective way to resolve minor disputes. The concept provides for the non-obligatory presence of the plaintiff or lawyer in court when considering cases on a virtual platform. A virtual court can be managed by a judge through a virtual electronic platform. Its jurisdiction can extend to the entire state and operate 24/7. The judicial process can be conducted without the physical presence of the judge and participants in the process. Virtual courts are used to consider cases in which it is possible for the accused to plead guilty or for the defendant to ensure compliance with the terms of the court decision after receiving an electronic summons. Such cases can be resolved by paying a fine [22]. This country continues to introduce new technologies into the judicial system. The spread of smart solutions should guarantee that all people can obtain justice without unnecessary delays or costs.

The Netherlands implemented pilot projects for conducting videoconferences in courts since 2002. In 2011, many courtrooms were redesigned to use videoconferencing technologies. These «irtual» courts were actually one court divided into two physical parts. One housed the judge, prosecutor, secretary, and representatives of the public. The second physical component of the digital courtroom was situated within the correctional facility. It was attended by the defendant, defense counsel, and, if necessary, an interpreter [23]. Today, Dutch courts are actively implementing smart technologies in judicial proceedings. This country is implementing a concept aimed at eliminating the presence of the plaintiff or lawyer in court and considering the case online. In particular, the digital platform «Virtual Court» provides participants in the judicial process with the opportunity to file a lawsuit in electronic form through a special e-Filing service, pay a court fee or fine online [24].

The USA is purposefully implementing innovative technologies in judicial proceedings. Many court hearings occur within virtual courtrooms. One of the reasons for the rapid implementation of virtual justice is

delays in court proceedings due to the non-appearance of hearing participants [25]. Virtual court simplifies access to justice for all participants in the judicial process. For example, low-income Americans do not receive the necessary legal assistance to resolve 92% of their serious civil law problems [26]. Virtual courts can increase the efficiency of judicial proceedings, thanks to which access to it will become available to everyone. Smart courts provide faster processing, storage, and transmission of evidence.

Each country implements different smart technologies in its judicial system. Their choice depends on the peculiarities of judicial proceedings in each specific country, current legislation on the use of innovative technologies, the country's technological capabilities, and the readiness of the system itself and society. China should be especially noted. This is a highly technological country that uses smart technologies for state control and coercion of judges. There exists a possibility of its expansion its technologies to other countries as well. This poses a serious threat to ensuring fundamental human rights and freedoms and ensuring the independence of the judiciary.

Ukraine can adopt the successful experience of implementing smart technologies in the judicial systems of other countries, which will significantly accelerate the process of digital transformation of judicial proceedings and increase their efficiency. For example, under the circumstances of the legal regime of martial law, the experience of the British, the USA, and the Netherlands in introducing a comprehensive system of online dispute resolution and virtual courts is interesting. It is also advisable to introduce specialized mobile applications for quick search and replacement of lawyers, following the example of the Italian «Collega». This is especially relevant for cases concerning the safeguarding of rights of internally displaced persons, military personnel, and war victims. Such a tool will also contribute to the integration of the Ukrainian legal system into the European space, where digital solutions for providing legal assistance have already become the norm.

At the same time, to maximize the advantages of implementing smart solutions in the judicial system, in particular, convenient and quick access of citizens to justice, reduction of bureaucratic red tape, transparency of case consideration, and reduction of corruption risks, Ukraine must implement these technologies based on comprehensive legal regulation. It is important to minimize potential threats, such as technical failures, cybercrime, possible algorithm biases, violation of the right to a fair trial, and ethical dilemmas, by ensuring effective control mechanisms, independent oversight, and continuous improvement of digital solutions.

Conclusion. The conducted comparative examination of international practices in adopting smart technologies in judicial systems demonstrates a global trend of digitalization of judicial proceedings, which has encompassed countries of different legal systems and levels of economic development. The most common smart technologies are online dispute resolution, virtual courts, blockchain technologies, artificial intelligence, and court hearings in the metaverse. Each country chooses a specific trajectory for implementing smart solutions depending on the peculiarities of national judicial proceedings, current legislation, and technological capabilities. China demonstrates a radical approach with mandatory use of AI systems by judges, which raises concerns about the independence of the judiciary. European countries choose a moderate path, maintaining a balance between technological modernization and adherence to fundamental principles of justice. The adoption of smart technologies creates significant advantages: increasing accessibility of justice, accelerating judicial processes, minimizing corruption vulnerabilities, and effective resource management. At the same time, there are potential risks: technological inequality, cybersecurity threats, algorithmic biases of AI, excessive state control, and possible violation of the right to a fair trial.

For Ukraine, the selective adoption of successful practices is relevant, taking into account the legal regime of martial law and European integration processes. Priority directions are the implementation of an online dispute resolution system, development of specialized mobile applications for legal assistance to internally displaced persons and military personnel, phased introduction of virtual courts, and creation of a regulatory framework for blockchain technologies. Effective adoption necessitates a holistic strategy: detailed legal regulation, ensuring technological infrastructure, training of judges, creating control mechanisms, guaranteeing independence of courts, and ensuring cybersecurity. Prospects' subsequent investigation resides in creating particular frameworks for implementing smart technologies, analysis of legal mechanisms for regulating AI in judicial proceedings, and examining the ethical dimensions of judicial digitalization.

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