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TRANSFORMATIONAL SCENARIOS OF THE DEVELOPMENT OF PUBLIC SERVICES IN THE FOOD SECTOR IN THE CONTEXT OF ELECTRONIC AND FAST COMMERCE IN UKRAINE

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As a result of the research, the transformational scenarios for the development of public services in the food sector under conditions of electronic and rapid commerce were comprehensively analyzed, expanded and systematized. This enabled the formation of an analytical foundation for constructing a new paradigm of digital governance, which redefines the functional nature of the state as an active participant in the digital ecosystem. Categories of future public services were identified, not as digital replicas of traditional procedures, but as new models of interaction based on transparency, algorithmic data management, preventive risk management and digital compliance. A holistic architecture of digital transformation of public services was presented, integrating procedures of registration, licensing, certification and digital reporting into a unified institutional system. Based on this, a leapfrogging strategy was substantiated allowing for a transition to new service formats without the need to gradually refine outdated models. The necessity of moving from a unitary model to a multi-level ecosystem of interaction was justified, relying on open APIs, smart protocols, integrated registries and digital risk management platforms. The newly developed services are to be embedded into a unified institutional matrix with standardized data protocols, blockchain-based registries and real-time analytics enhancing both the effectiveness and adaptability of the regulatory environment. Special emphasis was placed on the digital transformation of regulatory authorities, the development of digital skills among market operators, the creation of open risk registries and the adaptation of national legislation to European directives. The resulting multi-level modernization strategy combines efficiency, transparency and institutional trust, while laying the groundwork for Ukraine's digital sovereignty, integration into global value chains and enhanced international competitiveness. Ultimately, an interconnected conceptual model of state regulation was developed, setting new benchmarks for the digital advancement of the food sector amid dynamic commercial transformation.

Key words: *government services, digital transformation of government services, food industry, q-commerce, e-commerce, government service scenarios.*

Олійник О. М. Трансформаційні сценарії розвитку державних послуг у харчовій галузі в контексті електронної та швидкої комерції в Україні

У результаті дослідження було всебічно проаналізовано, розширено та систематизовано трансформаційні сценарії розвитку державних послуг у харчовій галузі в умовах електронної та швидкої комерції. Це дозволило сформувати аналітичну основу для побудови нової парадигми цифрової державності, яка переосмислює функціональну природу держави як активного учасника цифрової екосистеми. Виділено категорії майбутніх державних сервісів, які не дублюють традиційні процедури в цифровій формі, а утворюють нові моделі взаємодії на основі прозорості, алгоритмічного управління, превентивного ризик-менеджменту та цифрової відповідності. Представлено цілісну архітектуру цифрової трансформації державних послуг, що об'єднає процедури реєстрації, ліцензування, сертифікації, цифрової звітності в єдину інституційну систему. На цій основі обґрунтовано стратегію випереджального стрибка, що дозволить перейти до нових форматів державних послуг без необхідності вдосконалення застарілих моделей. Обґрунтовано необхідність переходу від унітарної моделі до багаторівневої екосистемної взаємодії на базі відкритих API, смартпротоколів, інтегрованих реєстрів і цифрових платформ ризик-менеджменту. Сформовані сервіси будуть інтегровані в єдину інституційну матрицю з уніфікованими протоколами даних, блокчейн-реєстрами та аналітикою в реальному часі, що зміцнить ефективність і адаптивність регуляторного середовища. Окрему увагу приділено цифровій трансформації контролюючих органів, розвитку цифрових навичок операторів ринку, створення відкритих реєстрів ризиків і адаптації

законодавства до європейських директив. Сформована багаторівнева стратегія модернізації, поєднує ефективність, прозорість і інституційну довіру, водночас закладаючи основи цифрового суверенітету України і її інтеграції в глобальні ланцюги вартості та посилення міжнародної конкурентоспроможності. У підсумку була сформована взаємопов'язана концептуальна модель державного регулювання, що визначає нові орієнтири цифрового розвитку харчової галузі в умовах динамічної комерційної трансформації.

Ключові слова: *державні послуги, цифрова трансформація державних послуг, харчова промисловість, швидка комерція, електрона комерція, сценарії державних послуг.*

Formulation of the problem. The problem of this area lies in the deep gap between the traditional model of public service delivery in the food sector and the new realities of digital and rapid commerce, which demand efficiency, transparency, integration and technological flexibility. The system of state regulation remains fragmented, poorly adapted to algorithmic governance and the needs of the digital economy. The absence of a holistic digital architecture, limited use of smart tools, inconsistency between registries, flawed risk management and the slow adaptation of legislation all these factors hinder the modernization of the food sector. At the core of the issue is the critical need to rethink the role of the state not as an administrator of procedures, but as an active player in the digital ecosystem one that builds trust, fosters innovation and ensures the country's digital sovereignty amid global competition.

Analysis of recent achievements and publications. In the current academic discourse, the digitalization of administrative services is viewed as the foundation of a service-oriented model of the state, where accessibility, efficiency and security are prioritized. Krakivska A., Babyk M. [1] emphasize the strategic role of digitalization while pointing out regulatory gaps and procedural challenges. Krymchak L., Vikhtiuk L., Rudnichenko Ye. [2] focus their efforts on the terminological standardization of concepts, forming a methodological basis for digitalization through the unified platform «Diia». Pulina T. V., Shytikova L. V., Ryzhenko O. M. [3] broaden the focus to the level of local self-government, highlighting digitalization barriers in Administrative Service Centers (CNAPs), particularly due to the lack of regional portals and flawed document flow, which underscores the uneven access to public services across regions. Kovalova T. V., Hunbina O. V. [4] explore legal contradictions in the field of digital identification and electronic document management, emphasizing the need for comprehensive legal adaptation. Their analysis shows that digital mechanisms deeply penetrate classical spheres of administrative regulation, necessitating conceptual updates. Lysenko R. [5] adds an ethical dimension, focusing on trust in the digital state, data protection and the legitimacy of electronic interaction, allowing digital transformation to be viewed as a social phenomenon that shifts the paradigm of state presence. Karkovska V., Dziurakh Yu. [6] establish a link between public digitalization and the specifics of the food industry, emphasizing its regulatory dimension. Public bodies act not only as observers but also as active participants in ensuring the quality and safety of products through digital standards, inspections and informational mechanisms. All authors, in various ways and from different analytical perspectives, demonstrate that digital transformation is not a linear process of technical modernization, but a complex shift in institutional roles, managerial practices and legal frameworks. This comprehensive vision creates the theoretical and empirical basis for defining the topic of transformational scenarios for the development of public services in the food sector in the context of electronic and rapid commerce. Considering the challenges of digital accessibility, legal gaps and managerial fragmentation, this research direction enables the integration of fragmented elements into a coherent model of public service transformation that meets the current

demands of a fast-paced digital economy and the specificities of a sector that is critically sensitive to quality, safety and consumer trust.

Purpose is article. To identify and develop transformational scenarios for the development of public services in the food sector, capable of adapting to the challenges of electronic and rapid commerce through the construction of a new digital regulatory architecture.

Presentation of the main material. The rapid digitalization of the global consumer market and the emergence of new formats of electronic and rapid commerce are met with the pressing need for a fundamental transformation of public services in the food sector. Traditional regulatory models, oriented toward centralized inspection, rigid procedural frameworks and sequential bureaucratic hierarchies, prove incapable of ensuring the necessary responsiveness, flexibility and effective integration into dynamic digital ecosystems. In this context, there arises a need to reconsider the institutional foundations of state intervention by adapting the infrastructural functions of control and service provision to the conditions of fast-moving logistics, fragmented supply chains and increasing consumer expectations regarding transparency and food quality. Particularly relevant is the development of scenarios based on the use of digitalized risk management platforms, interoperability of interagency systems and the concept of «intelligent oversight», which allow for compliance with safety requirements and support an innovative business environment. Therefore, we face the task of forming future scenarios for the development of public services in the food sector in the context of electronic and rapid commerce, including: «Registration and Licensing»; «Certification and quality control»; «Transparency and traceability of food products»; «Food safety and risk management»; «Food logistics and transportation»; «Implementation, use and regulation of smart contracts and blockchain technologies in the food industry»; «Development of rapid commerce in the food industry».

We will illustrate the services of each category of future public services in the food sector in the context of electronic and rapid commerce separately, see Figures 1–7.

Let us illustrate future directions of public service projects under the category «Registration and Licensing», see Figure 1.

As seen in Figure 1, the proposed public services under the «registration and licensing» category will form a holistic ecosystem of electronic services operating on the basis of interconnected state registers, integrated digital platforms and automated processes that ensure reliability, speed and transparency in every segment of regulatory activity. The service of «Registering food industry enterprises» through the «State business registration portal with automatic entry» into the «Unified register of food market operators (URFMO)» will become the first entry point into the updated system of the producer's digital presence, minimizing information duplication and ensuring instant legal visibility for all authorized bodies. The service of «Obtaining a license for food production» via digital document submission to the State service of Ukraine on Food safety and consumer protection will facilitate a shift from formal control to digital compliance, where the focus is not on the number of inspections but on the quality of preliminary data verification. In this context, the registration of food market operators in the URFMO using electronic identification and automatic compliance confirmation with established criteria will enhance trust in business entities even before the start of their active operations. The service of «Submitting an application for a state inspection of the enterprise» through an integrated regulatory oversight system will establish a standard for proactive supervision, where a risk-based model enables both the recording of violations post-factum and the prevention of such violations already at the planning

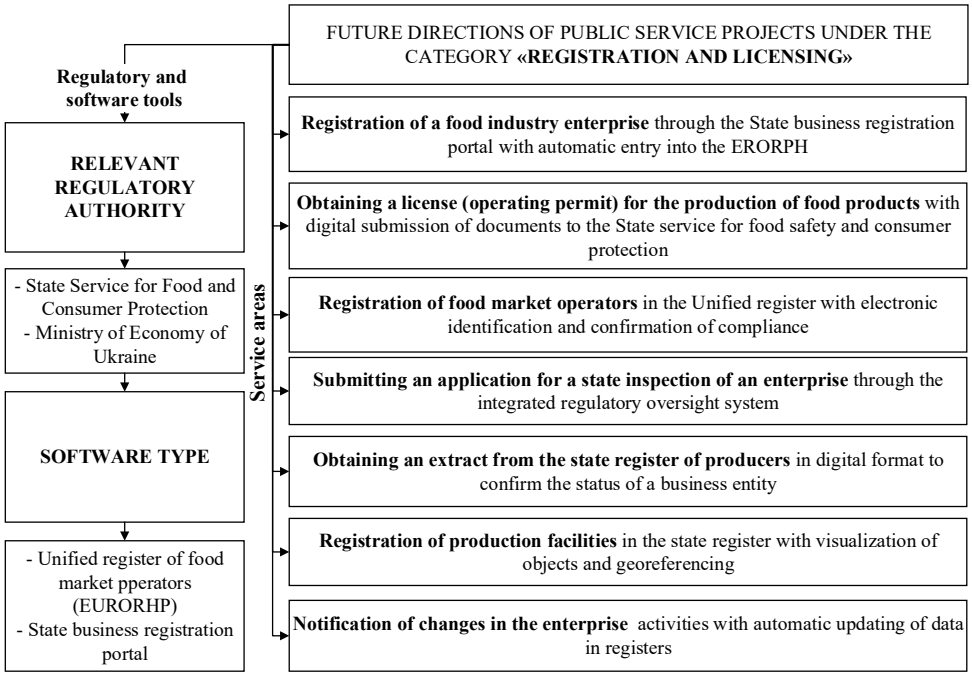

Fig. 1. Future directions of public service projects under the category «Registration and licensing» [developed by the author]

stage. In turn, obtaining an extract from the state register of producers in digital format will enhance convenience and serve as a means of legal self-verification of a company's status in both domestic and international legal contexts.

Particular attention is given to the registration of production facilities in the state register with visualization of the sites and their geolocation, which will create the potential for building analytical maps of the industry, zoning of food production and effective management of infrastructural resources. The final service proposed under this category is the «Notification of changes in the company's activities», with automatic data updates in the registers. This service addresses long-standing issues in business-state interaction: instead of the traditional system of submitting separate applications for each change, a business will gain the ability to maintain a real-time digital model of its status. This will become critically important under conditions of high mobility, seasonality and innovation-driven change in the industry.

Let us illustrate future directions of public service projects under the category «Certification and quality control», see Figure 2.

According to the data in Figure 2, the proposed public service «Obtaining an electronic certificate of product compliance» through the «Electronic register of quality certificates (ERQC)» with a digital signature and QR code will simplify the process of product verification at any stage of the supply chain.

The service of «Submitting an application for laboratory testing of products» via an integrated platform with precise identification of samples and control objects will lay the foundation for standardized analytical data collection, which in the long term will allow the construction of large datasets for predicting safety risks. The service «Provision of laboratory analysis results in digital format», with automatic entry into

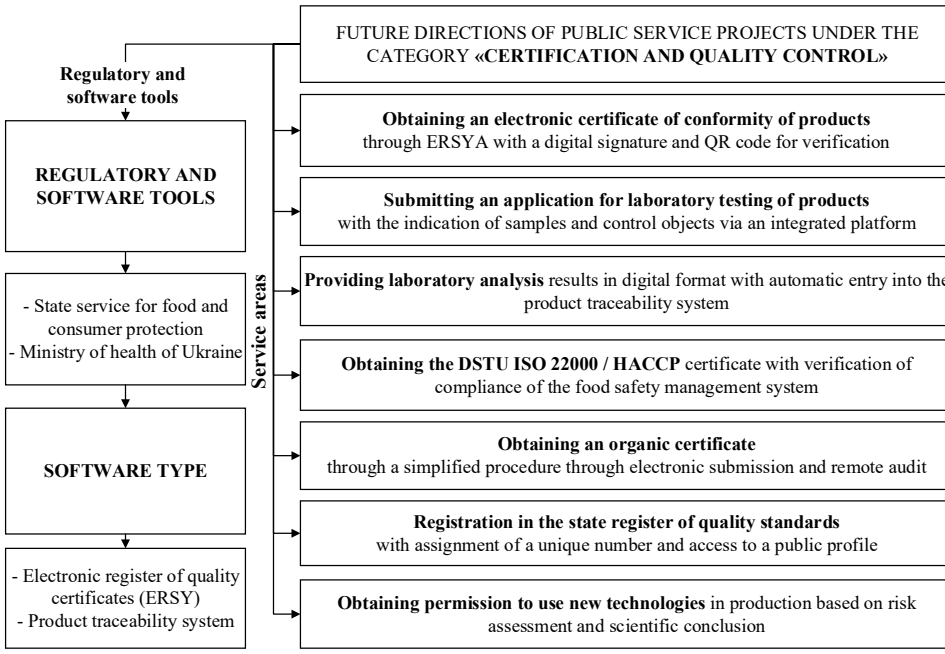

Fig. 2. Future directions of public service projects under the category «Certification and quality control» [developed by the author]

the product traceability system, will eliminate time delays and ensure instant access to up-to-date data for both business entities and government authorities, thereby creating the conditions for a shift toward preventive control. Obtaining the DSTU ISO 22000 / HACCP certificate through electronic verification of food safety management system's compliance will harmonize national practices with international standards without placing excessive administrative burden on businesses, which is critically important for the integration of Ukrainian products into European and global markets. In this logical sequence, obtaining an organic product certificate through a simplified procedure via electronic submission and remote audit will serve as an innovative response to the growing demand for organic products, lowering entry barriers for small and medium-sized producers and improving the transparency of certification procedures. The service of «Registration in the state register of quality standards» with the assignment of a unique number and creation of a public profile will become a new tool of transparency and a new marketing asset for enterprises, as public visibility of compliance with standards stimulates trust from consumers and partners. The final service in this category is «Obtaining a permit for the use of new technologies in production» based on risk assessment and scientific opinion, which will establish institutional support for innovation in the food sector, enabling the integration of scientific and technological progress into production processes without compromising consumer safety.

Let us illustrate future directions of public service projects under the category «Transparency and traceability of food products», see Figure 3.

As seen in Figure 3, the proposed public services in the category «Transparency and traceability of food products» constitute a systemic shift in the paradigm of interaction between the state, business and consumers, through the introduction of a digital QR

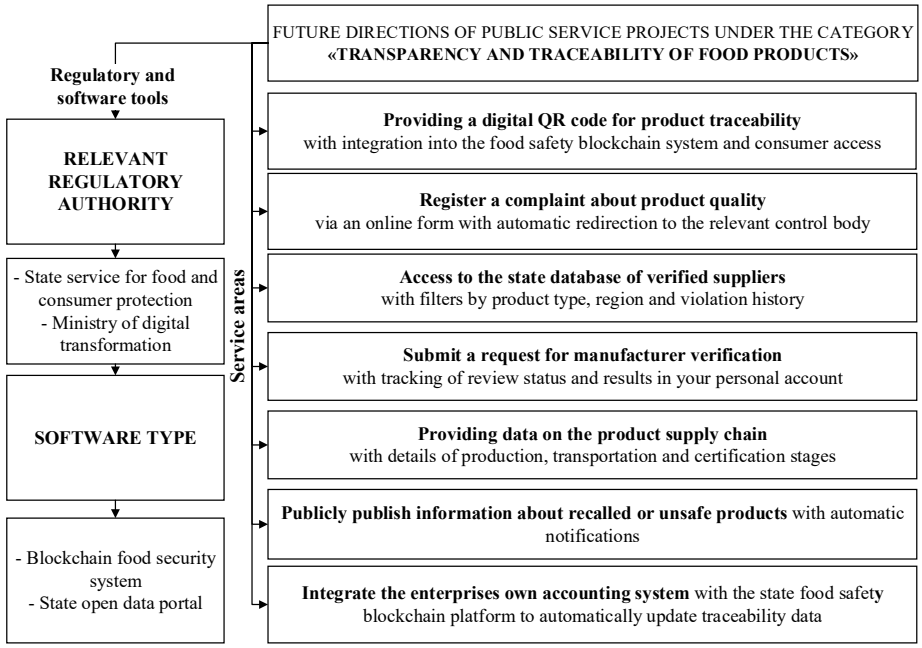

Fig. 3. Future directions of public service projects under the category «Transparency and traceability of food products» [developed by the author]

code for product traceability integrated into a blockchain-based food safety system. This, in turn, will create a fundamentally new level of control over the origin of food products, in contrast to traditional certification methods where data were fragmented and difficult to access. In turn, the service «Filing a complaint about product quality» through an online form with automatic redirection to the appropriate regulatory authority will reduce response time to potential health threats while also creating a digital footprint of complaints for future analytical review. The service «Access to the state database of verified suppliers» with filters by product type, region and history of violations will allow consumers to make more informed choices, which will, in turn, encourage producers to adhere to high standards through a public reputation mechanism that is far more effective than conventional selective inspection campaigns.

The service «Submitting a request for producer inspection» with the ability to track the status and results in a personal account will improve the accountability of government bodies, as transparency at all stages of review will create conditions to prevent manipulation and delays in processes. The service «Providing data on the product supply chain» with detailed information on each stage of production, transportation and certification will make it possible to instantly evaluate the full history of the product something that in the classical model would require accessing multiple separate registries and spending time on verification. The service of «Publishing information about recalled or hazardous products» in open access with automatic notifications will help minimize the risks of mass poisonings or violations of sanitary and epidemiological standards in real time, as opposed to traditional paper-based or local notices that arrived with delays. The final service in this category, «Integration of the enterprise's internal accounting system with the state blockchain-based food safety platform», with automatic traceability data

updates, will create a unified ecosystem of reliable data, where each change in the supply chain will be instantly reflected in the publicly accessible system without the risk of data loss or distortion an issue that remained significant in classical models.

Let us illustrate future directions of public service projects under the category «Food safety and risk management», see Figure 4.

As shown in Figure 4, the proposed directions of public services focus on the effectiveness of food safety regulation and risk management, drawing on best international practices and adapting them to national conditions. First and foremost, it will be necessary to initiate the service «Registration of the food safety management system» through a specialized digital platform with mandatory documentation of HACCP procedures and responsible persons, to unify control processes at the national level and ensure their transparency. Complementarily, the service «Submitting an application for risk assessment in food production» with the upload of structured data on production processes, ingredients and control points into a unified digital risk assessment platform will ensure higher accuracy of analysis and personalization of regulatory decisions. The next step will be the introduction of the service «Obtaining permission for the development and use of innovative food safety management technologies», which will be accompanied by expert evaluation and the inclusion of relevant information into the state register to ensure legal certainty and transparency of innovation processes. For operational internal control at enterprises, the implementation of a digital internal food safety audit using a standardized digital checklist and automatic report generation is proposed. This will speed up self-inspection processes and create a reliable evidence base for regulators. Another important direction will be the introduction of the service «Verification of

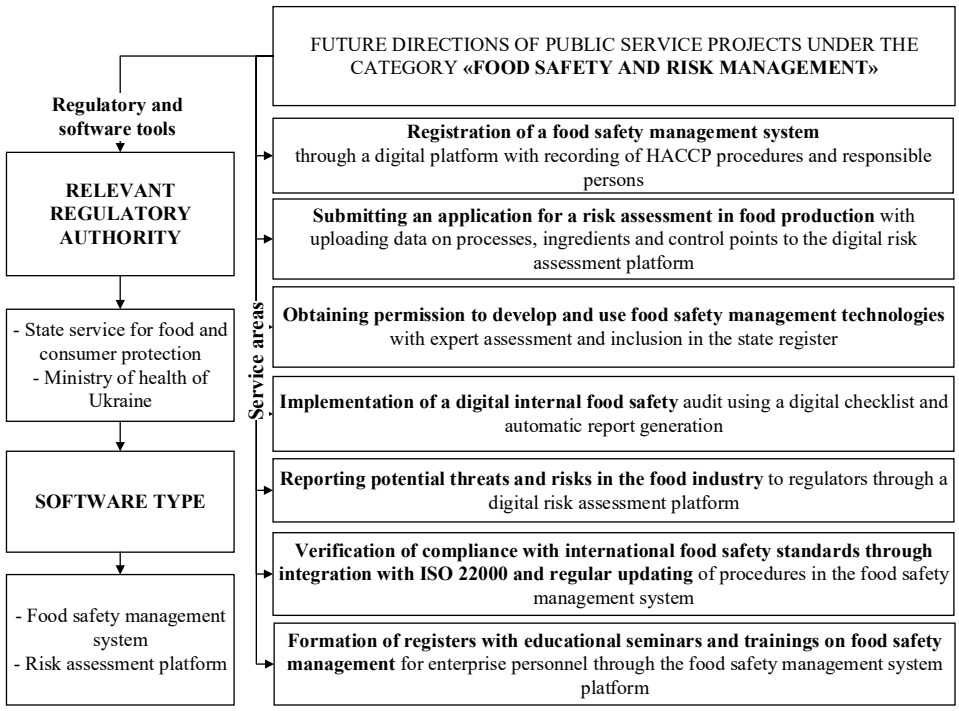

Fig. 4. Future directions of public service projects under the category «Food safety and risk management» [developed by the author]

compliance with international safety standards» through integration with standardized ISO 22000 systems with regular updates of procedures in food safety management systems, enabling harmonization of Ukrainian practices with international requirements.

The final service in this category will be «Formation of digital registries of training seminars and workshops on food safety management» for enterprise personnel via the food safety management system platform, aimed at systematically improving the competence and professional responsibility of market participants.

Let us illustrate future directions of public service projects under the category «Food logistics and transportation», see Figure 5.

According to the data in Figure 5, the implementation of the «Logistics regulation management platform» and the «Transportation monitoring system» under the auspices of the Ministry of transport of Ukraine and the State service of Ukraine on Food safety and consumer protection will lay the foundation for the transition from fragmented local practices to an integrated, centralized food logistics management system. In this context, the service «Registration of carrier companies in the state register of logistics operators» with mandatory confirmation of compliance with sanitary and veterinary norms will become a strategic tool for shaping a controlled and transparent service market, eliminating the involvement of unverified logistics operators in critically important food transportation processes. Simultaneously, the service «Obtaining permits for the use of vehicles for food transportation» under a clear regulatory framework will improve not only the quality of transport infrastructure but also directly reduce logistics risks and ensure compliance with safe supply conditions. The mechanism «Integration of digital sensors for monitoring temperature and conditional parameters during transportation»

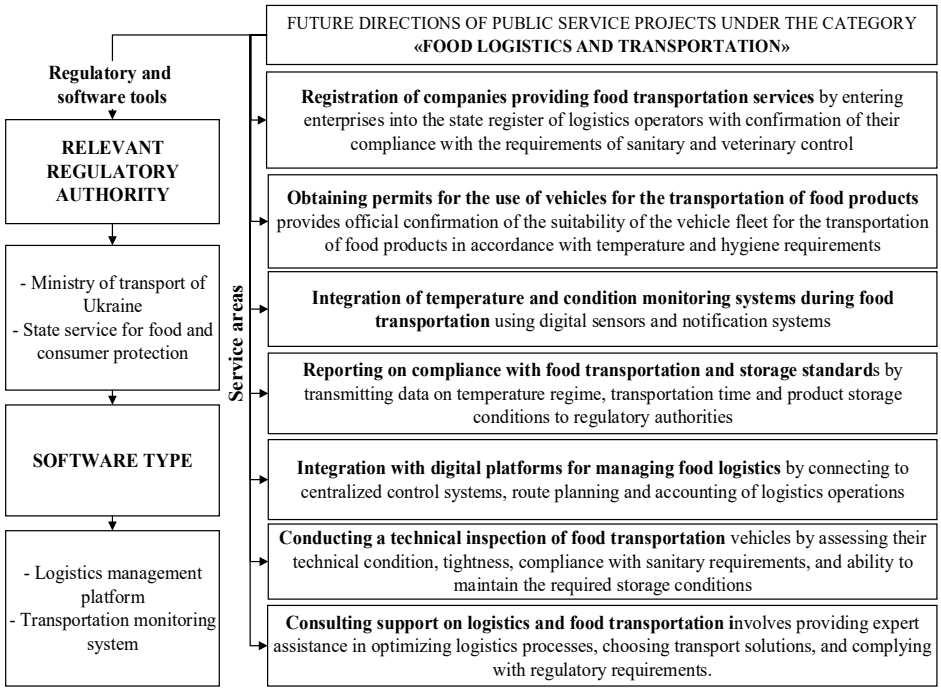

Fig. 5. Future directions of public service projects under the category «Food logistics and transportation» [developed by the author]

will be supported by an enhanced automated alert system, providing continuous real-time control over product conditions, transforming food logistics into a new level of responsive deviation management from established standards.

Thus, technical support in the form of submitting reports on compliance with transportation conditions including information on temperature regimes, transportation duration and storage conditions will become an element of regulatory accountability and a foundation for deep sectoral process analytics and systemic risk forecasting. The additional «Integration with centralized digital platforms for managing food logistics» will enable enterprises to plan optimal routes and manage transportation resources, which, through synchronization of their operations with national monitoring and control standards, will pave the way for building a unified informational ecosystem in food logistics. In this light, the service «Technical inspection of vehicles» will become a mandatory stage in the certification process of logistics operators, where the focus shifts from mere technical compliance to a systematic assessment of the fleet's ability to maintain the necessary conditions for transporting food products, including airtightness, temperature stability and hygiene. At the same time, the service «Consulting support for enterprises on food logistics and transportation» is being transformed from a formal advisory function into a tool for strategic business development.

It provides support in shaping effective logistics strategies, selecting modern technological solutions and aligning operations with current regulatory trends becoming a decisive factor in enhancing the competitiveness of Ukrainian companies in global food supply chains.

Let us illustrate future directions of public service projects under the category «Implementation and use of smart contracts and blockchain technologies in the food industry», see Figure 6.

As shown in Figure 6, with the global adoption of Web 3.0 technologies, government policy in the food industry is acquiring a new dimension. It entails a systemic transformation of traditional services through the integration of smart contracts and blockchain-based solutions, with a focus on transparency, process automation and strengthened trust among market participants. In this context, a new suite of public services is proposed, aimed at ensuring the comprehensive adoption of digital tools where the development and conclusion of smart contracts for supplier agreements is viewed not merely as an innovation, but as a foundational element for building a new paradigm of interaction within food supply chains. A logical link in this transformation is the mechanism of «Registration of agreements in digital registries» with automated verification of contract performance. The use of blockchain technologies will significantly reduce opportunities for fraud, forgery and data manipulation, while creating a secure digital footprint of all business transactions. Simultaneously, the introduction of «Real-time monitoring of smart contract execution» will allow for full control over the stages of obligation fulfillment with instant detection of deviations, drastically increasing the responsiveness of managerial decisions and reducing the risk of logistical and production disruptions. The improvement of the regulatory environment through mechanisms for the «Integration of smart contracts into food certification and quality control systems» becomes a catalyst for automating verification procedures and a tool for ensuring continuous compliance monitoring with established norms and standards without human intervention – significantly enhancing the objectivity and reliability of inspections. At the same time, the service «Obtaining legal support and certification of smart contracts» will secure digital agreements within the legal framework, ensuring their indisputable legitimacy in relations between businesses, the state and consumers. The «Integration of Smart contracts into the payment infrastructure of the food

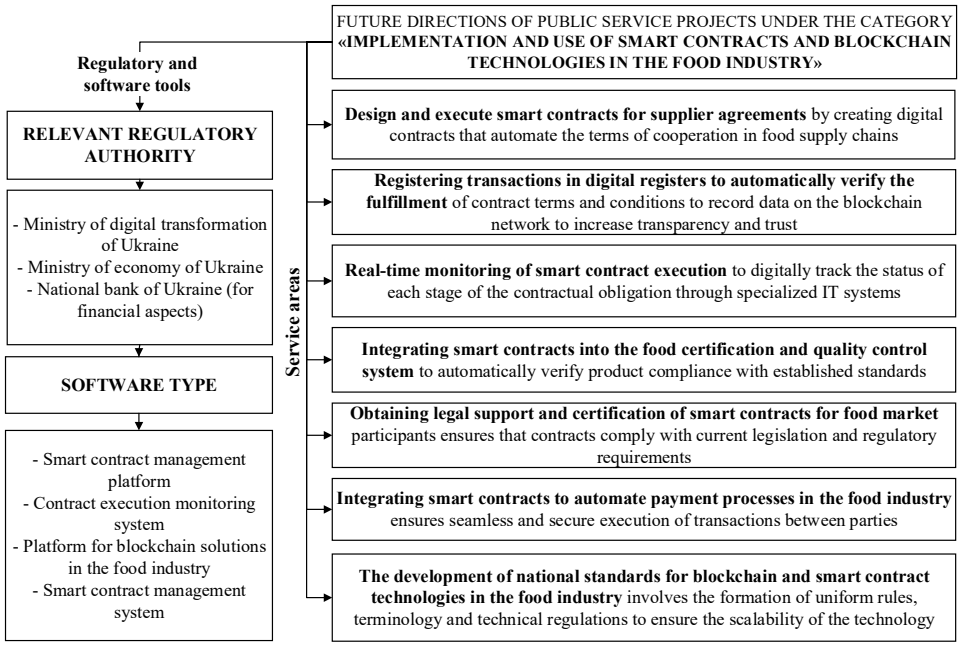

Fig. 6. Future directions of public service projects under the category «Implementation and use of smart contracts and blockchain technologies in the food industry» [developed by the author]

industry» becomes particularly significant, as automating financial transactions through secure and self-executing contracts will guarantee continuity of financial flows, reduce transactional costs and minimize the risks of delays and non-fulfillment of payment obligations. At the strategic level, the «Development of national standards for blockchain and smart contract technologies in the food industry» should become a key element in forming a comprehensive regulatory framework.

This will not only ensure legal clarity and technical compatibility among market participants but also lay the foundation for integrating Ukrainian food products into global digital value chains.

Let us illustrate future directions of public service projects under the category «Development of quick commerce in the food industry», see Figure 7.

According to the data in Figure 7, under the leadership of the Ministry of economy of Ukraine, the State service of Ukraine on Food safety and consumer protection and the Ministry of digital transformation of Ukraine, the implementation of a «Quick commerce platform» and «Delivery management system» will establish a comprehensive digital ecosystem. This system is intended to ensure a systemic transition from fragmented initiatives to comprehensive state regulation of the market. Accordingly, the service «Registration and certification of quick commerce platforms for food products» will create a foundation of trust between consumers, the state and businesses, as only officially registered and certified entities will have the right to sell and deliver food products in accordance with defined standards.

In parallel, the mechanism of «Standardization and automation of the food delivery process» using robotic systems and drones will not only signal the technological

Fig. 7. Future directions of public service projects under the category «Development of quick commerce in the food industry» [developed by the author]

maturity of the state's approach but also open new opportunities for improving logistics efficiency, minimizing the human factor and enhancing the safety of food transportation. The mechanism of «Integrating digital tracking systems for food supply chains», combined with real-time temperature monitoring, will transform traditional supply chains into transparent, controllable processes where every transportation stage is subject to constant technical supervision significantly reducing the risk of product spoilage. Further enhancement of interaction with e-commerce platforms for the effective sale of food products will enable the integration of quick commerce into the overall digital marketplace, optimizing processes from ordering to delivery and providing consumers with the most convenient shopping experience through popular online platforms. An integral part of this transformation will be the integration of online payments with guaranteed security of financial transactions, as the implementation of certified payment systems with consumer financial data protection will stimulate economic activity in the quick commerce segment. Simultaneously, «Integration of mobile applications for food ordering and delivery» will ensure a new level of service accessibility, providing users with convenient interfaces for placing orders, tracking their status and promptly receiving updates, which significantly increases customer loyalty and promotes the development of omnichannel service. An important final element of this ecosystem will be the «Integration of systems for optimizing logistic routes for food delivery», where the use of advanced algorithms will enable the identification of the fastest, safest and most cost-effective routes, significantly reducing transportation time and lowering logistics costs becoming a critical factor in enhancing the overall efficiency of quick commerce operations.

Conclusions. Based on the results of the conducted research, the roles of the state were rethought in the context of the rapid development of electronic and quick commerce in Ukraine's food industry and ways to transform public services in response to new digital challenges and market needs were identified. As a result, a holistic vision was formed of what modern digital services should be in order to ensure effective, transparent and dynamic interaction between the state, business and the consumer. The analytical findings provide a foundation for developing a new model of state regulation that not only modernizes outdated institutions but also lays the groundwork for Ukraine's digital sovereignty and global competitiveness.

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