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FEATURES IMPLEMENTATION OF THE INSTITUTIONAL APPROACH IN THE CONTEXT OF DIGITAL TRANSFORMATION OF THE FOOD INDUSTRY: KEY ASPECTS, MECHANISMS AND TOOLS

The article examines the features of implementing an institutional approach in the context of the digital transformation of the food industry. The focus is on modernizing the regulatory framework and utilizing digital technologies to improve the quality, transparency, and safety of production. Key aspects were highlighted, such as the implementation of digital platforms for product certification, the use of blockchain for supply chain tracking, and the automation of regulatory procedures, which ensure increased efficiency in regulatory processes and reduce administrative costs for businesses. The article explores modern models for realizing the institutional approach, including the «Regulatory Shift» model, which is based on the gradual updating of legislation, and the «Digital Platform» model, aimed at accelerated automation of regulatory functions through centralized digital systems. The advantages and disadvantages of both approaches were highlighted, and the importance of flexibility and rapid adaptation of legislation to modern technological demands was emphasized. Recommendations were formulated regarding the necessity of close cooperation between the government, businesses, and educational institutions for the successful implementation of digital initiatives in the food industry. Additionally, solutions were proposed to address key challenges such as insufficient funding, low technical skills, and the lengthy processes of adapting the regulatory framework to new conditions. It was concluded that the institutional approach is essential for creating a flexible and adaptive legal system that can support the digital transformation of the industry and enhance the competitiveness of Ukrainian producers in international markets. The successful implementation of digital technologies in the food industry depends on the state's ability to provide adequate funding, technical support, and stimulate innovation through effective regulation.

Key words: institutional approach, digital transformation, legal aspects, mechanisms of state regulation, instruments of state regulation, regulatory sandbox technology, regulatory compliance management.

Statement of the problem. The modern food industry is undergoing rapid changes driven by digital technology implementation and global market transformations. A critical aspect of these changes is the need to modernize institutional mechanisms that ensure regulation, control, and development of this sector. The challenge lies in the lagging regulatory framework behind the pace of digitalization, creating risks for product safety, quality, and the competitiveness of producers on the international stage. Excessive bureaucracy, uneven access to digital platforms, and limited resources for technological adaptation also hinder the implementation of an institutional approach in the food industry.

Analysis of recent research and publications: The essence, characteristics, advantages, and disadvantages of the institutional approach have been studied by the following national and foreign experts: Douglass C. N. [1], Williamson O. E. [2], Kovbasyuk S. V.

[3], Kukhar O. [4], Bolotina E. V., Shubna O. V., Shirikova A. D., Bondarev Ya. G. [5], Novikova L. V., Chernishova L. O. [6], Kulaga E. [7]. However, the issue of defining key aspects of the institutional approach, mechanisms, tools, and international experience in the context of state regulation of food industry enterprises has not been previously addressed.

Task statement is a definition of key aspects, mechanisms, and tools of the institutional approach for the effective implementation of digital transformation in the food industry, with an emphasis on the need to modernize the legal framework, improve regulatory procedures, develop digital platforms for quality control, and ensure adequate support from the state and international partners.

Outline of the main material of the study. The institutional approach to economic management is particularly important in the context of digital transformation in the food industry, which faces

new challenges related to increasing product quality requirements, business process transparency, and international integration. In the era of market globalization, food enterprises must ensure compliance with international standards while swiftly adapting to new regulatory requirements. A crucial component of this process is the use of digital solutions, such as electronic certification, blockchain for supply chain tracking, and the automation of licensing and certification procedures. Digitalization creates new opportunities for product quality and safety control but also requires profound changes in regulatory frameworks. The accelerated implementation of advanced technologies faces institutional constraints, necessitating improvements to existing legal mechanisms and ensuring adequate support from public authorities. At the same time, the state should play an active role in supporting digital transformation by creating a flexible and adaptive legal framework aimed at fostering innovation, as well as providing businesses with essential financial and advisory support. However, implementing such changes is a complex process that demands significant resources, time, and efforts from all stakeholders, including public authorities, businesses, and international organizations.

Therefore, it is worthwhile to take a closer look at the essence, features, advantages and shortcomings of the institutional approach in Fig. 1.

As shown in Fig 1, Douglass North, in his work *Institutions, Institutional Change, and Economic Performance*, emphasizes the fundamental role of institutions in shaping economic development. He demonstrated that stable institutions promote long-term growth, while weak or corrupt institutions can hinder development. North's ideas significantly impacted economic history and institutional economics, highlighting the evolution of societal norms as a critical factor in economic stability. Oliver Williamson, in his work *Markets and Hierarchies: Analysis and Antitrust Implications*, expanded economic theory by focusing on issues of organizational structure and transaction management. He introduced the concept of transaction costs, showing that the efficiency of economic activity is determined by organizational structure, which is key to understanding how firms organize their internal processes and interact with the market. The institutional approach of Douglass North and Oliver Williamson underscores the importance of institutional mechanisms and regulatory frameworks.

In the context of digital transformation, these institutions must evolve to meet new challenges, such

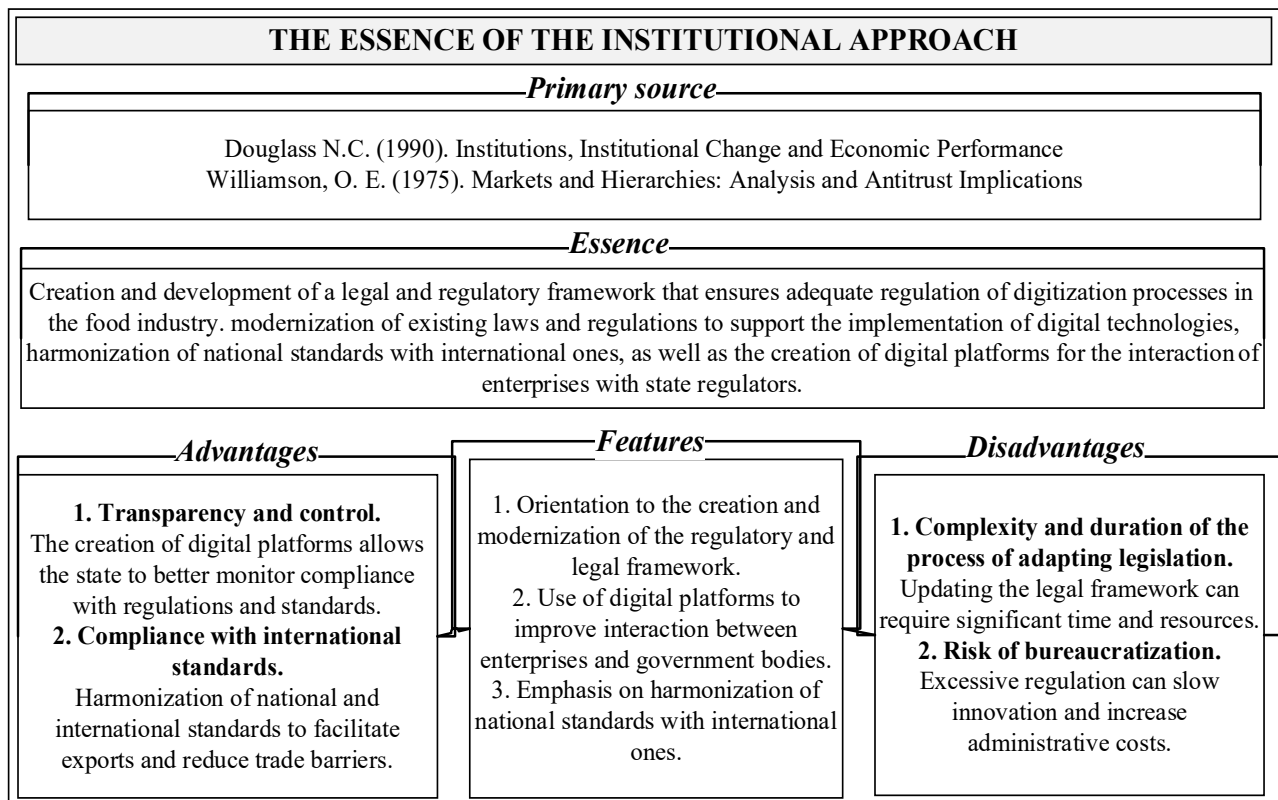


Fig. 1. The essence of the institutional approach
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as the development of digital platforms, tracking systems, and product certification. The state, in turn, should play a key role in creating conditions to ensure transparency and safety within the food industry. The institutional approach in the food industry is a crucial element for establishing an effective legal framework that supports the adoption of new technologies. A primary aspect of this approach is the modernization of the regulatory system to enable the management of digital processes in line with contemporary market demands and international standards. The use of digital platforms for interaction between enterprises and public regulators facilitates process transparency, enhances compliance monitoring, and fosters trust in product quality. Harmonizing national standards with international ones is a significant element of this approach, aiding in export operations, reducing trade barriers, and improving competitiveness in the global market, allowing domestic producers easier integration into international supply chains. How-

ever, implementing this approach faces challenges related to the adaptation and updating of legislation, which is a lengthy, complex process that demands considerable resources and time. There is also a risk of bureaucratization, where excessive regulation may slow innovation and increase administrative costs for businesses. Thus, the institutional approach requires a balanced development of the legal framework and the harmonization of international standards, aiming to avoid over-regulation and ensure flexibility for rapid adaptation to new technological demands.

Let's look at the key elements of the institutional approach and their interaction in Fig. 2.

According to the data in Fig 2, the institutional approach to digitalizing the food industry is a comprehensive and multi-level strategy that includes modernizing the legal framework, utilizing digital platforms for quality management, and implementing standards aligned with international norms. The key role of public regulators in this process involves

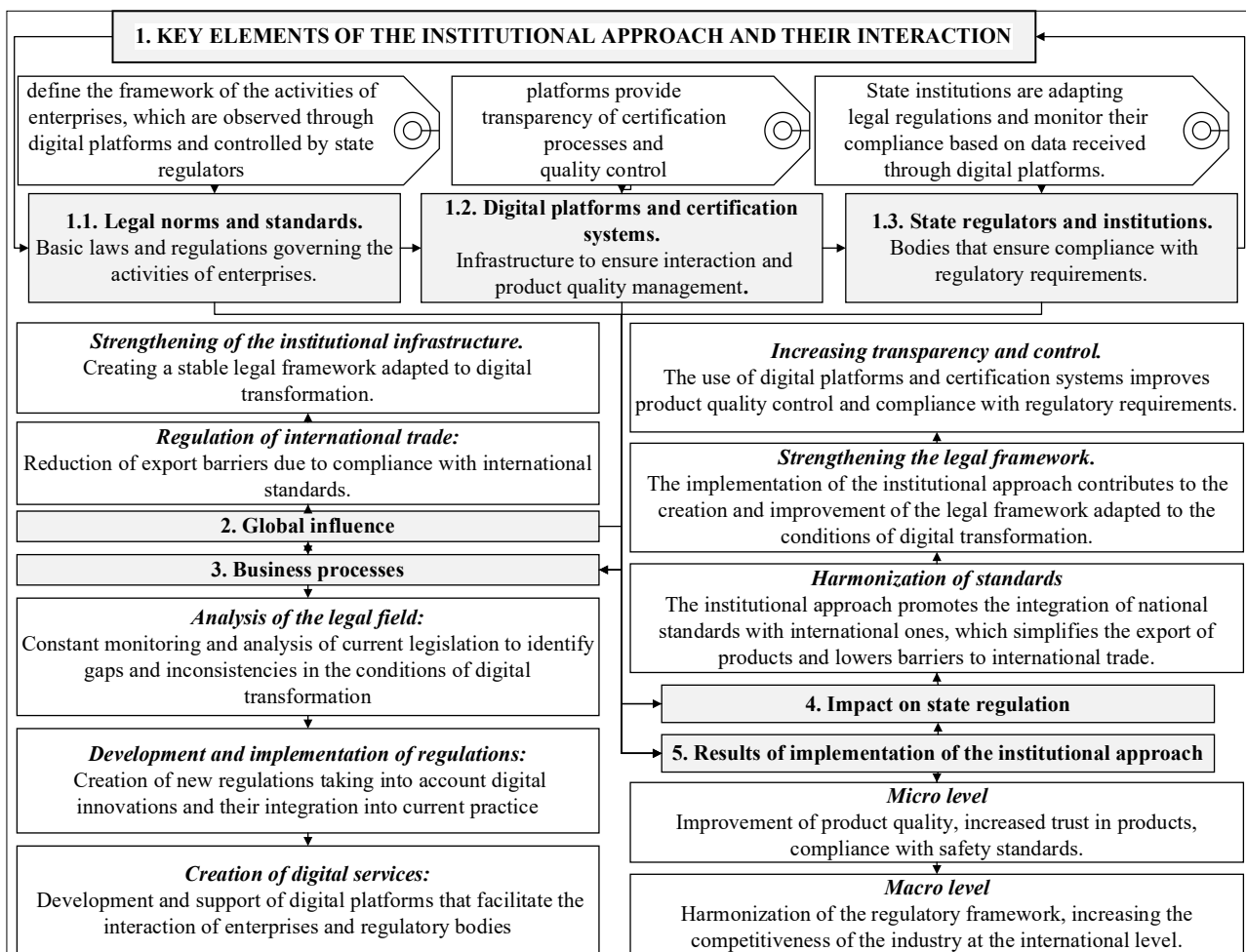


Fig. 2. Key elements of the institutional approach and their interaction
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not only monitoring compliance with standards but also actively adapting legislation to meet the demands of the e-commerce market. Using digital platforms as a primary mechanism for interaction between businesses and regulatory authorities significantly improves the accuracy and speed of data processing, which is critically important for timely decision-making in product quality control. Additionally, creating an effective feedback mechanism will help businesses respond quickly to changes in the regulatory environment. The analysis indicates that the main challenge in implementing the institutional approach lies in the complexity and length of adapting the regulatory framework to digitalization conditions, requiring significant resources and time, which may slow the adoption of new technologies in production. Equally important is the risk of bureaucratization and over-regulation, which can increase administrative costs for businesses, creating barriers to innovation.

On the other hand, harmonizing national standards with international ones is crucial for expanding export opportunities by reducing trade barriers and facilitating access to global markets, an essential factor for developing the food industry in Ukraine. The use of digital platforms further enables certification and quality control of products, serving not only as a tool for internal regulation but also as a means to enhance competitiveness in the international market. Overall, applying the institutional approach in the context of digitalization is critically important for modernizing the food industry and integrating it into global supply chains. However, this largely depends on the ability of public authorities to promptly adapt the legal framework, provide adequate funding, and implement digital solutions. Without these conditions, digitalization will remain fragmented, failing to achieve its primary goals of increasing transparency, quality, and competitiveness of food products on the global market.

Let's take a look at the features of the implementation of the "Institutional Approach" models in Fig. 3.

According to the data in Fig 3, the institutional approach in the context of digital transformation can be implemented through two key models: the «Regulatory Shift» and the «Digital Platform». Each model addresses contemporary challenges arising from technological changes, increased transparency requirements in the food industry, enhanced efficiency, and the drive for sustainable development. These models differ but share a common goal of modernizing institutional frameworks to create a more flexible and adaptive regulatory environment.

The «Regulatory Shift» model is based on the principles of institutional economics and the works of Douglass North [1] and Oliver Williamson [2]. This model suggests that government regulation must continuously adapt to the new economic and technological demands of the market.

The «Regulatory Shift» model enables the state and the food industry to respond flexibly to changes in the external environment, considering the emergence of new digitalization and automation technologies that significantly impact market functioning. A key element of this model is the extensive involvement of specialized experts, analysis of international practices, and consultations with stakeholders, creating the foundation for substantial changes in the legal framework to effectively regulate the food industry. However, it is important to note that implementing the «Regulatory Shift» model is lengthy and complex, involving thorough analysis, synchronization of many factors—including institutional constraints, technological innovations, challenges, and barriers of a changing market environment. An essential component of the «Regulatory Shift» model is flexibility, constant monitoring, and ongoing adjustments to legislative norms based on their practical effectiveness, allowing for sustainable and progressive government regulation that meets contemporary demands.

In contrast, the «Digital Platform» model is based on the use of information technology to modernize regulatory processes, involving the creation of a centralized digital platform that integrates all major functions of regulatory bodies. The «Digital Platform» model aims to automate processes for registration, certification, licensing, and monitoring of food enterprises through digital solutions, significantly reducing the administrative burden on businesses. Additionally, digital platforms facilitate the integration of state information systems into a unified platform for comprehensive regulation of various aspects of enterprise activities. Thus, one of the main advantages of the «Digital Platform» model is the acceleration of regulatory processes and the enhancement of public administration efficiency. For example, digital certification enables food industry enterprises to quickly and securely obtain necessary documents online, greatly reducing the time and costs associated with administrative procedures. Digital licensing minimizes the risk of corruption by conducting operations in a transparent electronic format, where all data is readily available for analysis and oversight. Integration with other state systems, such as tax and customs authorities, ensures comprehensive monitoring of enterprise activities and allows for rapid responses to any changes.

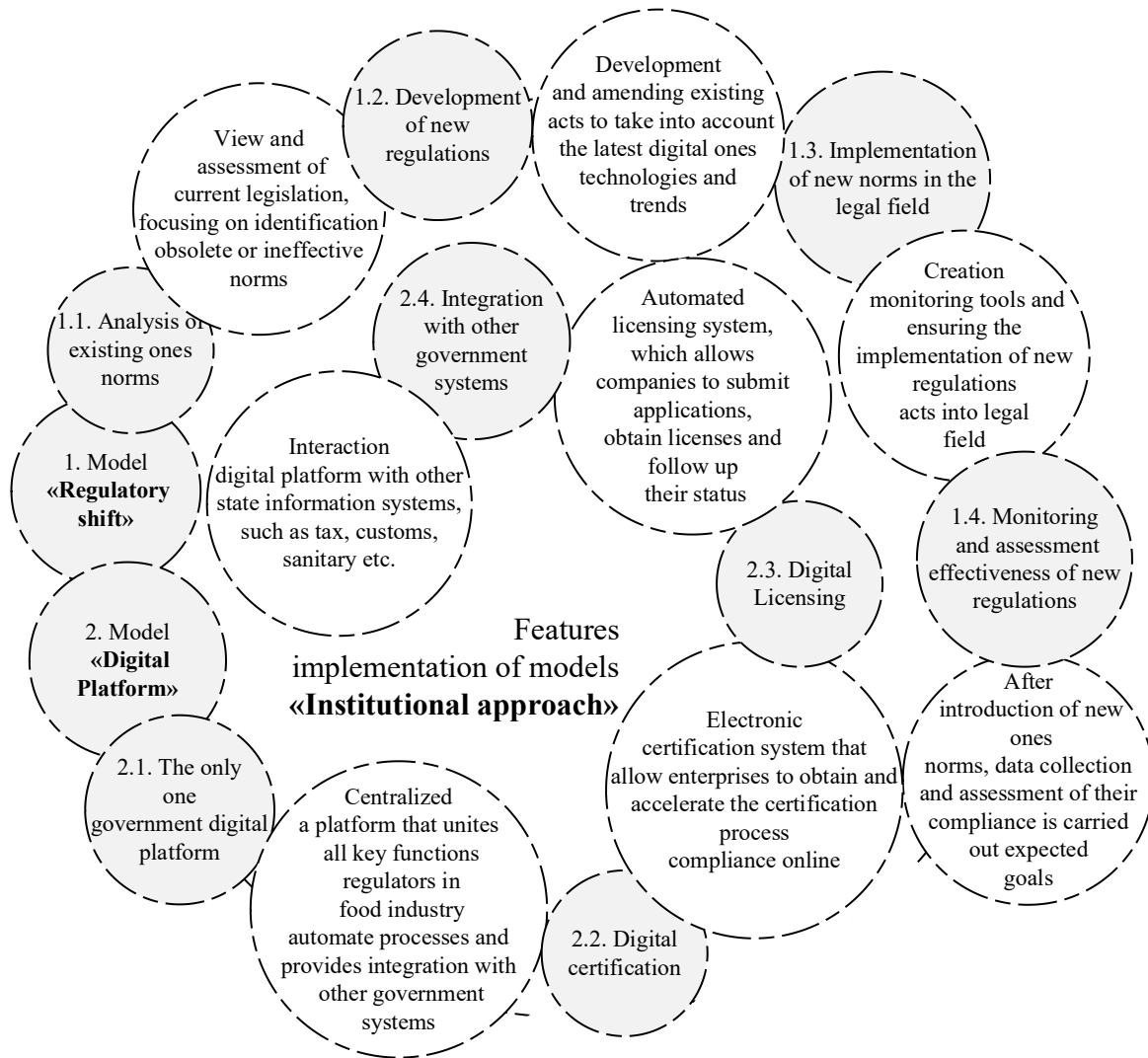


Fig. 3. Features of the implementation of the «Institutional approach» models

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Comparing the «Regulatory Shift» model with the «Digital Platform» model, the latter offers a more innovative and technologically advanced approach to public regulation, fostering the development of a digital ecosystem that not only improves the efficiency of government agencies but also promotes the digital economy transformation. However, significant drawbacks to implementing this model include the need for substantial investment in technological infrastructure development and staff training, which poses a barrier for public authorities with limited resources.

In summary, the «Regulatory Shift» model provides a more traditional and gradual path to reform, while the «Digital Platform» represents a faster but technologically complex approach. Both approaches can successfully coexist and ensure comprehensive and flexible regulation that addresses modern challenges and requirements in public governance within the context of digital transformation.

Let's take a look at the «Legal aspect» of the state regulation of grub enterprises behind the structure of the «Regulatory framework» in Fig. 4.

According to the data in Fig 4, the legal aspect of regulating the food industry is carried out through legislative acts, international standards, and safety regulations, which directly impact its stable development. Legislative acts are enacted by parliament and implemented by the government to establish clear regulatory rules, yet adaptation to technological changes occurs slowly due to bureaucracy and lobbying processes. Slow updates to laws may also lead to lagging behind international standards, negatively affecting the export of products and services. International standards primarily help companies enter new markets; however, meeting these requirements is complex and costly for small enterprises.

Safety regulations and standards are primarily aimed at protecting consumers, enhancing trust

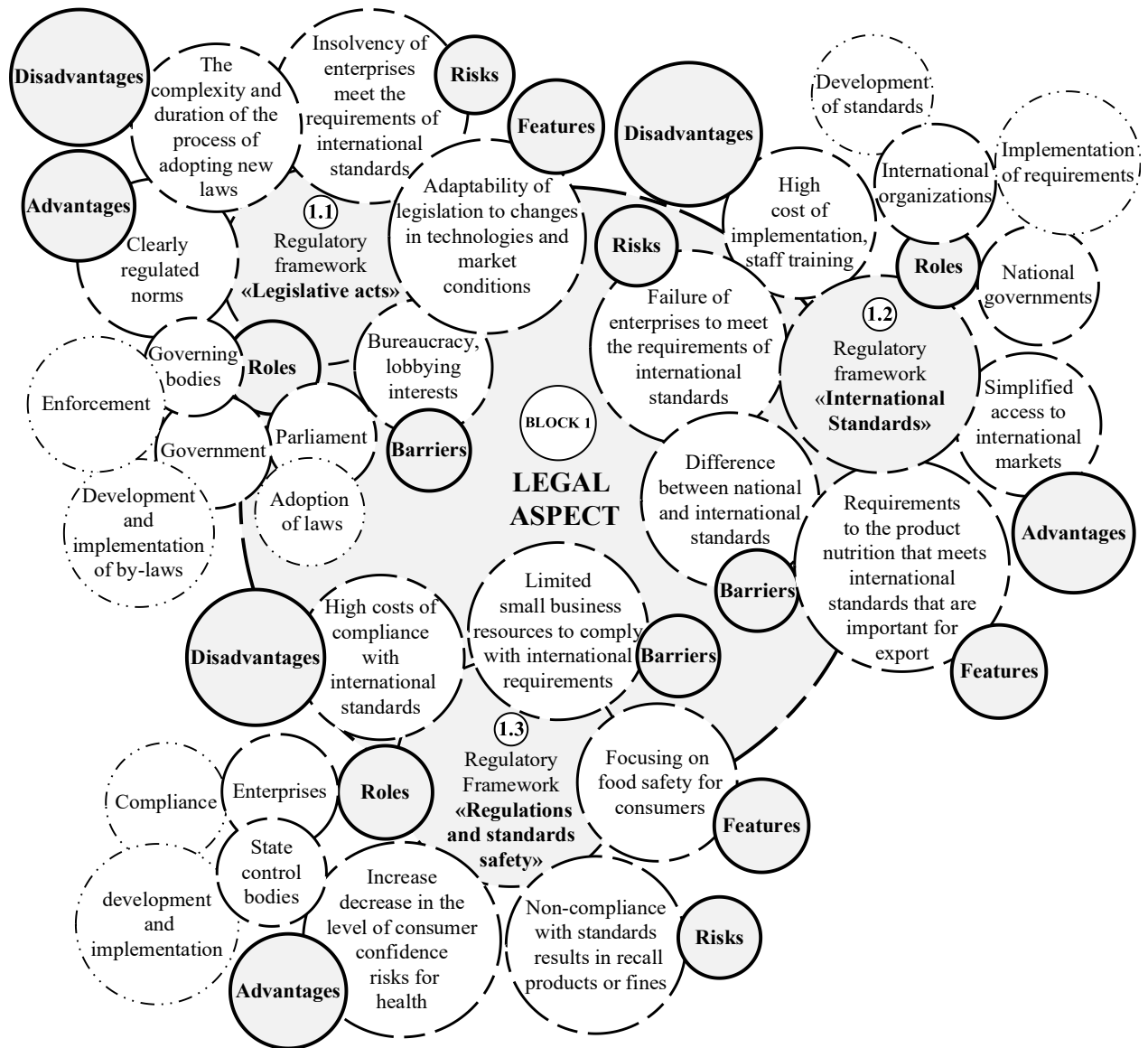


Fig. 4. «Legal aspect» of state regulation of food industry enterprises according to the «Regulatory and legal framework» structure
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in products through significant financial investments by businesses. However, companies that fail to meet these requirements risk facing costly recalls and fines, which can negatively impact their future operations and consumer trust in their products.

Let's consider the «Legal aspect» of state regulation of food industry enterprises according to the «Licensing and certification» structure in Fig. 5.

As shown in the data in Fig. 5, licensing and certification of food industry enterprises are essential elements of government control to ensure that products comply with established quality and safety standards. The «Licensing Process» plays a key role in determining the legitimacy of business activities. How-

ever, it faces bureaucratic obstacles, delays, and high costs, which can pose risks to the stable operation of businesses.

In turn, the «Product Certification» element enables enterprises to access new markets and improves their competitiveness. Yet, implementing the certification process involves significant expenses, requires specialized experts, and demands regular internal and external inspections, which present serious challenges for enterprises, especially those with limited infrastructure.

The «Process Automation» element in licensing and certification is achieved through the use of digital platforms, which can significantly reduce bureaucratic burdens and speed up administrative

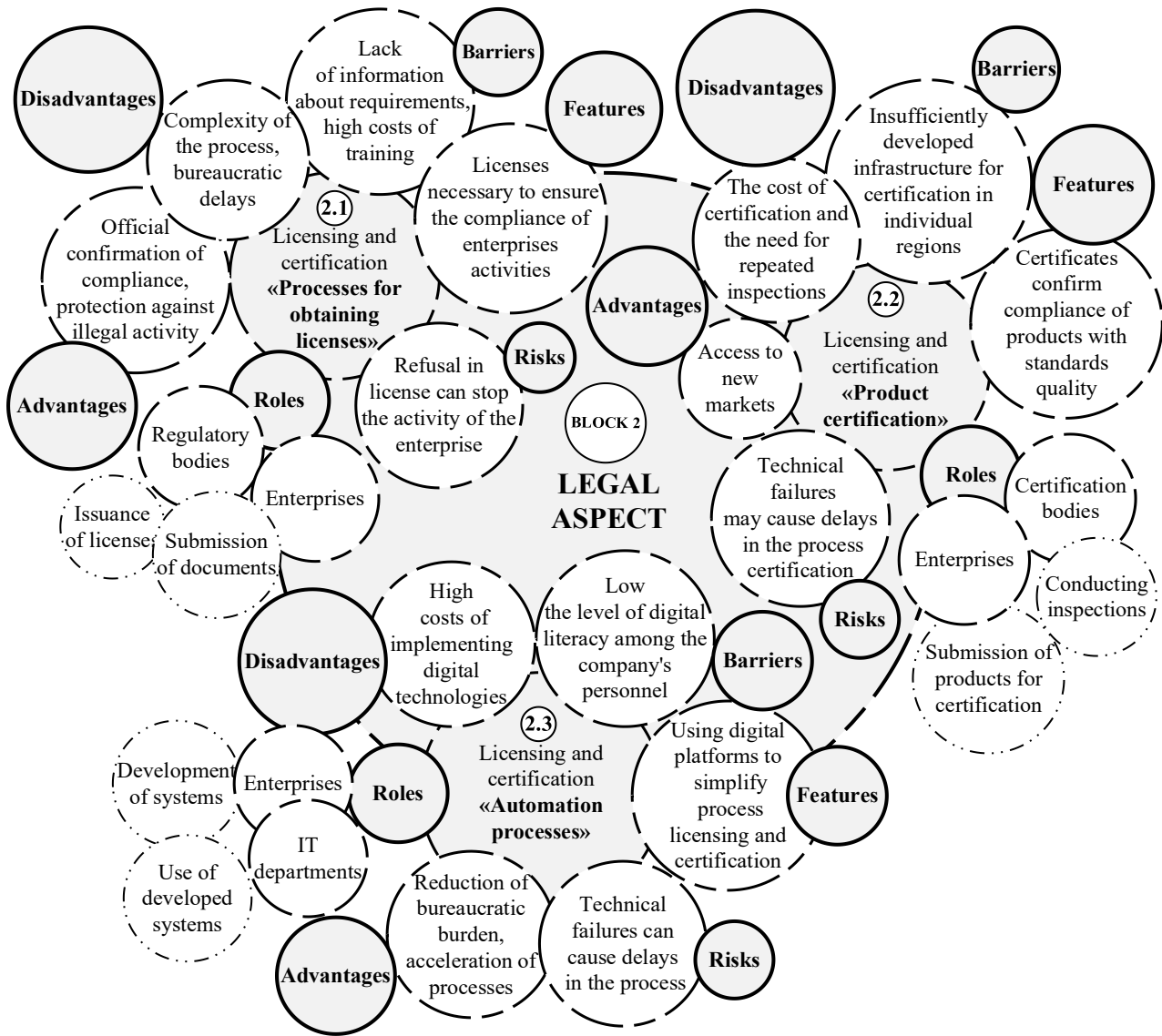


Fig. 5. «Legal aspect» of state regulation of food industry enterprises according to the structure of «Licensing and certification»
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procedures. However, despite the clear advantages of increased transparency and efficiency, the implementation of digital technologies requires a high level of technical staff training, system support, and financial investment. Additionally, the likelihood of technical failures creates additional risks for the continuous execution of business processes.

Therefore, effective implementation of technologies and automation tools requires careful planning and substantial investment in the development of both physical and digital infrastructure, as well as training specialized experts to mitigate further risks.

Let's consider the regulatory tools in the category «Electronic product certification» and «Regulation of electronic commerce through quality standards» in Fig. 6.

As shown in Fig. 6, the «Electronic Product Certification» category is aimed at streamlining business processes by using government platforms for automation to accelerate certification, reduce bureaucratic delays, and ensure compliance with international quality standards. The implementation of these elements is reinforced by the practical experience of the European Union, which uses the digital platform TRACES NT to support the export of animals, animal and plant products, and foodstuffs, representing a valuable model for integrating and optimizing regulatory processes [12]. Integrating such digital platforms with enterprise ERP systems ensures efficient data exchange and control over regulatory compliance. Thus, electronic certification is a key tool for maintaining high-quality standards and reducing administrative procedure costs.

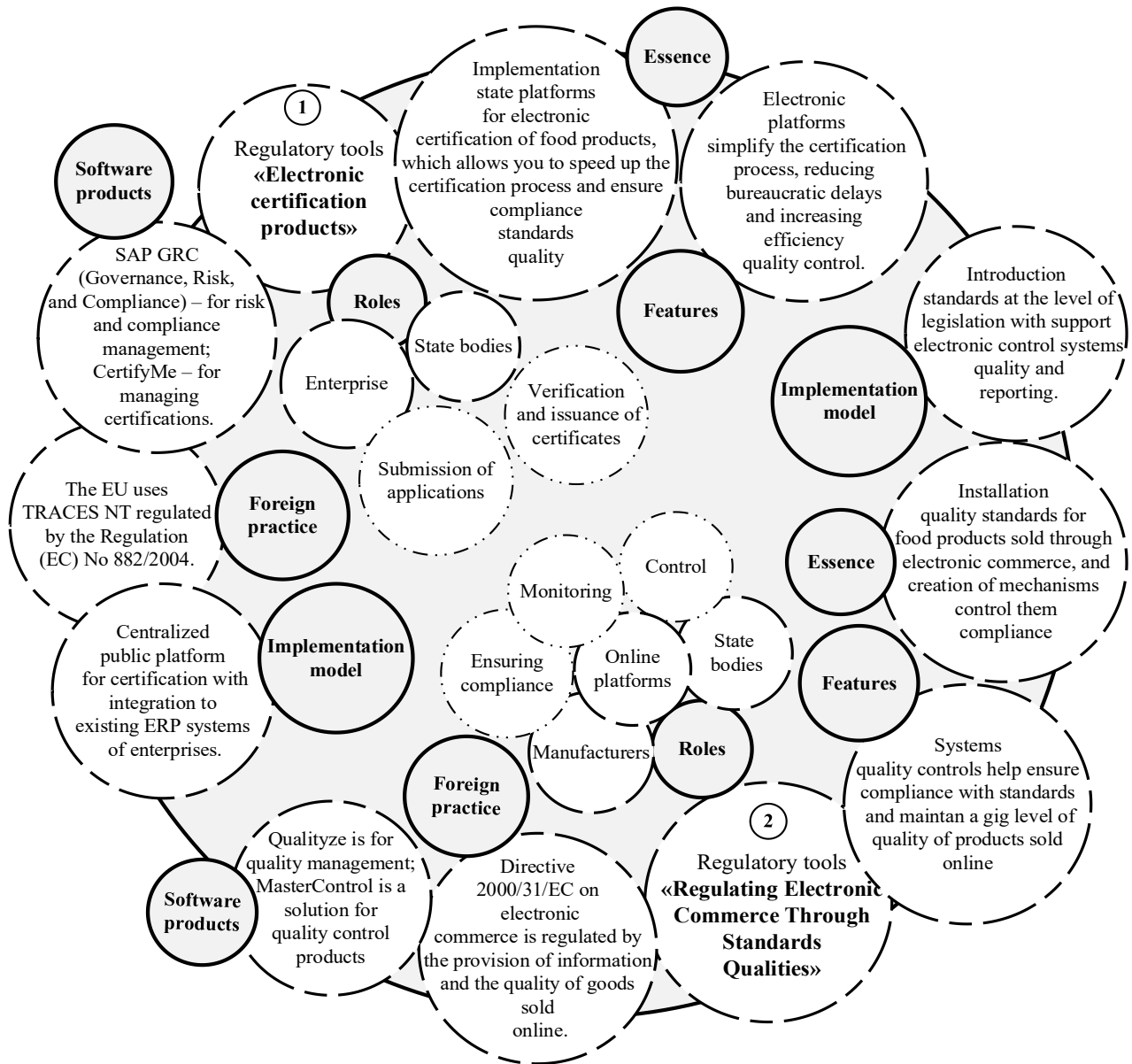


Fig. 6. Regulatory tools by category «Electronic product certification» and «Regulation of electronic commerce through quality standards»
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The category «Regulation of E-commerce through Quality Standards» focuses on establishing clear regulatory rules for the safe production of food products sold through online sales channels. It is essential to note the role of manufacturers, who must meet specific requirements for selling food products on online platforms. These requirements differ from those for retail store distribution, necessitating additional monitoring. Government agencies play a key regulatory role in this process, ensuring that compliance with standards related to the delivery and storage of food products in appropriate conditions is consistently monitored to avoid cross-contamination risks. Analyzing the international practice of the European

Union, the application of «Directive 2000/31/EU» [10] is aimed at strict regulation of product quality, with detailed information on composition and origin. Combined with electronic systems like Qualityze and MasterControl, this approach enables manufacturers to maintain compliance with standards through real-time automation of control and audit processes.

Let's consider the mechanism of state regulation according to the structural element «Technology of the regulatory sandbox» in fig. 7.

As shown in Fig. 7, the Regulatory Sandbox model [8] is an effective tool for testing new technologies and innovations, allowing companies to experiment with new approaches to food production

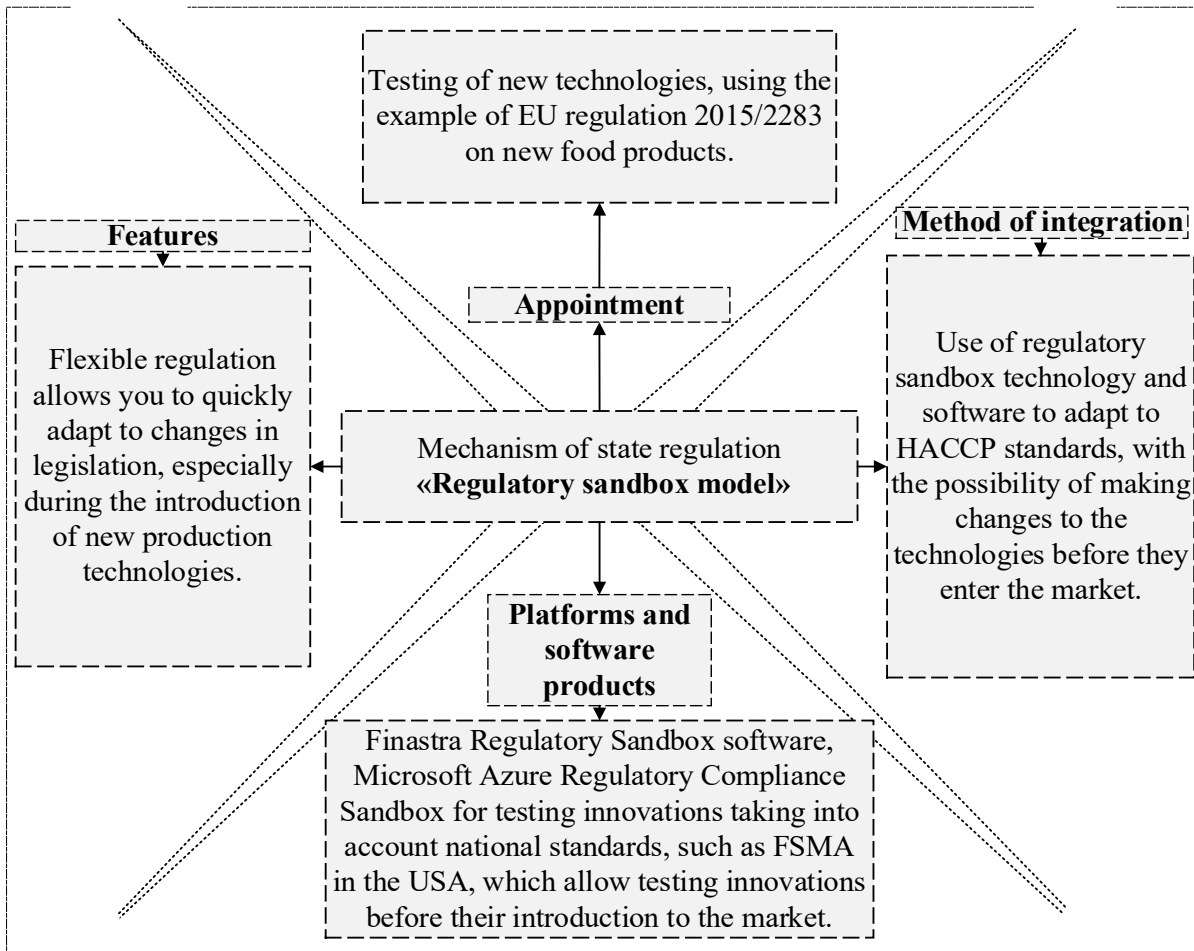


Fig 7. State regulation mechanism by structural element «Regulatory sandbox technology»
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while complying with the regulatory requirements of the European Union’s «Regulation 2015/2283» [11]. The ability to test innovative technologies in a simulated and controlled environment provides flexibility in adapting national standards, allowing companies to trial innovations before market introduction. This reduces the risk of non-compliance with regulatory requirements and speeds up the adoption of new technologies in production, enhancing product safety since innovations undergo thorough testing and adaptation to existing standards following HACCP principles.

However, the use of the Regulatory Sandbox model presents challenges related to the complexity of integrating new technologies with traditional production processes, especially if changes impact fundamental aspects of food safety. Additionally, it requires continual legislative updates to accommodate new technological solutions, which may delay companies’ adaptation to new regulatory requirements.

The advantages of a regulatory sandbox include the flexibility of regulatory processes, allowing for

quick adaptation to changes in legislation and production standards.

This is particularly important in the context of market globalization and the development of e-commerce, where the speed of response to changes becomes critical for maintaining competitiveness.

Let’s consider the mechanism of state regulation according to the structural element «Software for managing regulatory compliance» in Fig. 8.

As shown in Fig. 8, meeting strict regulatory requirements necessitates integrating modern compliance management mechanisms through automation, enabling food enterprises to quickly respond to legislative changes, manage future internal and external risks, and adhere to quality and safety standards. Utilizing advanced software such as SAP GRC, Qualys, and ComplianceQuest enables the automation of verification, reporting, and monitoring processes for regulatory changes, minimizing non-compliance risks and potential penalties. Integrating these solutions with ERP, QMS, SCM, and CRM systems ensures broader automation of the entire supply chain, which

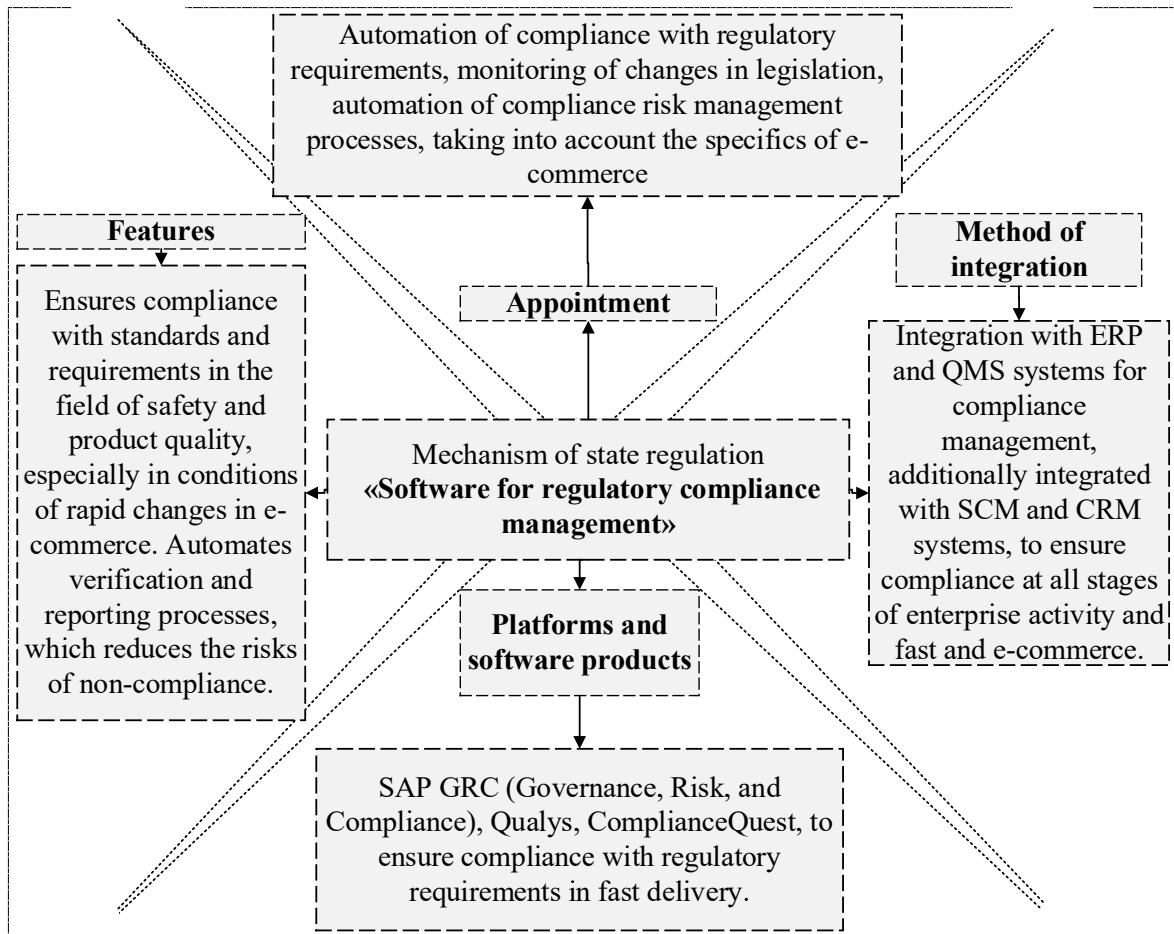


Fig 8. Mechanism of state regulation by structural element «Software for regulatory compliance management»
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is particularly important for enterprises operating in the dynamic global market.

However, implementing such systems comes with challenges related to the high cost of licensing and maintenance, as well as the complexity of integrating them with existing management systems, which serve as significant barriers for many companies. Additionally, ongoing updates to compliance solutions in response to legislative changes require additional resources and specialized expertise, complicating practical implementation. On the other hand, the benefits of automating compliance processes are clear, as automated solutions reduce manual work and increase the accuracy of document-related checks, crucial in a market where speed and accuracy are key elements for success.

Conclusions. The digitalization of the food industry creates new opportunities for improving product quality and safety but requires significant modernization of the regulatory framework. Key elements of this approach include implementing electronic certification, blockchain for supply chain traceability, and

automation of licensing procedures, which increase transparency and reduce administrative costs. However, the implementation of these technologies faces several challenges, with major issues including insufficient funding, a low level of technical training among personnel, and the need for rapid legislative adaptation to new market conditions. Government regulation should not only serve as a controlling mechanism but also encourage innovation by creating a flexible legal framework to support the development of the food industry. An institutional approach allows for effective modernization of regulatory processes and ensures compliance of national standards with international ones, which is essential for enhancing the competitiveness of Ukrainian producers in the global market. However, successful implementation of these changes is only possible with close collaboration between the state, business, and educational institutions, ensuring the long-term and sustainable development of the food industry in a digitalized environment.

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Олійник О.М. ОСОБЛИВОСТІ РЕАЛІЗАЦІЯ ІНСТИТУЦІЙНОГО ПІДХОДУ В КОНТЕКСТІ ЦИФРОВОЇ ТРАНСФОРМАЦІЇ ХАРЧОВОЇ ГАЛУЗІ: КЛЮЧОВІ АСПЕКТИ, МЕХАНІЗМИ ТА ІНСТРУМЕНТИ

У статті було розглянуто особливості впровадження інституційного підходу в контексті цифрової трансформації харчової галузі. Основна увага приділялася модернізації нормативно-правової бази та використанню цифрових технологій для покращення якості, прозорості та безпеки виробництва. Було виділено ключові аспекти, такі як впровадження цифрових платформ для сертифікації продукції, використання блокчейну для відстеження ланцюгів постачання та автоматизація регуляторних процедур, що забезпечують підвищення ефективності регуляторних процесів і зниження адміністративних витрат для підприємств. Були розглянуті сучасна модель для реалізації інституційного підходу «Регулятивний зсув», яка базується на поступовому оновленні законодавства, та модель «Цифрова платформа», що орієнтована на прискорену автоматизацію регуляторних функцій через централізовані цифрові системи. Виділено переваги та недоліки обох підходів, а також підкреслено важливість гнучкості та швидкої адаптації законодавства до сучасних технологічних вимог. Були сформувані рекомендації щодо необхідності тісної співпраці між державою, бізнесом та освітніми установами для успішної реалізації цифрових ініціатив у харчовій промисловості. Окрім цього, було запропоновано шляхи подолання основних викликів, таких як недостатнє фінансування, низький рівень технічної підготовки кадрів та тривалі процеси адаптації нормативно-правової бази до нових умов. Зроблено висновок, що інституційний підхід є необхідним для створення гнучкої, адаптивної правової системи, яка здатна підтримувати цифрову трансформацію галузі та підвищити конкурентоспроможність українських виробників на міжнародних ринках. Успішне впровадження цифрових технологій у харчовій галузі залежить від здатності держави забезпечити належне фінансування, технічну підтримку та стимулювати інновації через ефективне регулювання.

Ключові слова: інституційний підхід, цифрова трансформація, правові аспекти, механізми державного регулювання, інструменти державного регулювання, технологія регуляторної пісочниці, управління дотриманням нормативних вимог.