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Food audit in Ukraine: Problems and challenges in an unstable environment

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Abstract. The full-scale invasion of Russia against Ukraine in 2022 significantly disrupted the functioning of the food safety control system, necessitating the adaptation of audit and certification procedures in order to minimise public health risks and maintain the resilience of the food sector. The purpose of this study was to comprehensively identify the specific features of food safety and quality auditing under martial law in Ukraine and to determine pathways for improving control mechanisms in the context of post-war recovery. The research employed analysis and synthesis of regulatory and legal acts, comparative analysis of international standards in the field of food safety management, as well as SWOT analysis to assess the strengths and weaknesses of the audit system under wartime conditions. The findings indicate that martial law led to a reduction in the number of inspections, limited access of inspectors to enterprises, and an increase in violations related to the documentation of food safety procedures. Significant difficulties were identified in laboratory testing due to resource shortages and infrastructure destruction. It was established that enterprises were forced to adapt production through relocation, changes in technological processes, and the modernisation of supply chains. The SWOT analysis revealed the need to strengthen state control, develop laboratory capacity, improve audits of humanitarian supplies, and enhance producers' awareness of food safety requirements. The results of the study can be used by enterprises in developing food safety control systems,

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by public authorities to improve inspection mechanisms under crisis conditions, and by certification bodies to adapt audit procedures to the realities of wartime

Keywords: food quality management; assessment of production processes; risk-oriented approaches; laboratory diagnostics of products; regulatory and technical requirements; certification procedures

Introduction

The audit of food products is one of the key mechanisms for ensuring food security, particularly since the beginning of Russia's full-scale invasion of Ukraine in 2022, when the control of product quality and safety became critically important. Military operations have significantly affected the functioning of Ukraine's food industry: many enterprises have been forced to reduce production, adjust logistics routes, or temporarily suspend operations. In these circumstances, auditing plays an essential role in verifying compliance with established food safety requirements, preventing hazardous products from entering the market, and supporting the stable functioning of the food supply chain.

Despite numerous challenges, Ukraine's agro-industrial sector demonstrated resilience: producers gradually resumed operations, logistics chains were reorganised, and consumers increasingly preferred Ukrainian goods. This trend reinforces the importance of strengthened quality control mechanisms across all stages of production, storage, transportation, and distribution. Changes in consumer behaviour during the war further increased the importance of food safety audits, as Ukrainian consumers increasingly prioritised domestically produced goods and brands perceived as reliable and compliant with safety standards (Gradus Research, 2022; 2023).

During the 2020-2025 years a substantial body of research has examined the functioning of food safety systems, audit mechanisms, and risk management in crisis conditions. L. Bal-Prylypko *et al.* (2024) emphasised the growing importance of Hazard Analysis and Critical Control Points (HACCP) implementation in Ukrainian enterprises, noting that the system remains an effective audit tool even under unstable conditions. Research of I.D. Bezerra *et al.* (2024) emphasised that crisis conditions significantly complicate food safety auditing by restricting physical access, disrupting infrastructure, and limiting laboratory capacity, thereby increasing the need for flexible and adaptive audit mechanisms.

Ukrainian researchers, such as O.M. Boiko (2022) highlighted ethical dilemmas in audit practice, focusing on the risks of non-compliance and the need for transparency and professional responsibility – issues that have become particularly relevant during wartime. HACCP functions not only a preventive system but also a core internal audit instrument, enabling enterprises to maintain safety standards despite resource limitations. The effectiveness of food quality audits depends on the maturity of internal control systems and the consistency of documentation, both of which tend to deteriorate under crisis conditions.

At the international level, research indicated a clear shift towards digitalisation and technology-assisted audits. In particular, blockchain- and IoT-enabled solutions have been highlighted as tools for strengthening traceability, data integrity, and verification across the supply chain, which becomes especially relevant when logistics are disrupted and physical access is constrained (Sugandh *et al.*, 2023; Pelé *et al.*, 2023). In addition, reviews of AI-driven inspection systems emphasise the growing role of image processing and automated control tools in supporting food safety assurance under operational uncertainty (Chen & Yu, 2022), while more recent studies demonstrate practical applications of machine vision and deep learning for detecting non-conformities when laboratory capacity is limited. I.D. Bezerra *et al.* (2024) argued that remote and hybrid audit formats may partially replace traditional on-site inspections – an approach that is particularly relevant for wartime Ukraine.

In connection with the crisis and rapid changes in the market, the audit helps enterprises adapt to new conditions, adhere to safety standards and maintain consumer confidence in Ukrainian products. Similar relationships between consumer confidence and the effectiveness of food safety control mechanisms have been identified in the European agri-food sector, where trust in food products is closely linked to the transparency and reliability of audit and inspection systems (Bánáti *et al.*, 2024). This is consistent with findings in the European agri-food sector, where improved reporting and audit practices have been shown to enhance corporate efficiency and resilience (Zabolotnyy, 2024). In wartime conditions, special attention should be paid to the flexibility of audit procedures, adaptation of requirements to current challenges (disruptions in logistics, evacuation of personnel, limited access to laboratory research) and ensuring the continuity of food safety control.

However, existing research does not fully address how wartime disruptions affect micro-level audit procedures within enterprises – including access to documentation, the operation of internal monitoring systems, and the performance of laboratory analyses when facilities are damaged or inaccessible. Previous studies also lack systematisation of auditors' practical challenges related to restricted mobility, security threats, fragmented supply chains, and inconsistent access to regulatory updates. Furthermore, academic research about how international audit standards should be adapted to extreme conditions are insufficient. These gaps highlighted the need for a comprehensive study focused specifically on audit-

ing practices during the war, the functionality of food safety management systems under extreme constraints, and the development of resilient audit mechanisms adapted to the realities of military conflict. Therefore, the purpose of this article was to identify the specific features and challenges of conducting food safety and quality audits in Ukraine under martial law, as well as to assess the impact of wartime conditions on auditing and certification processes, and to justify priority directions for improving audit methodologies and strengthening the resilience of the national food safety control system during post-war recovery.

Materials and Methods

This study applied a combination of theoretical, empirical and analytical methods to evaluate how wartime conditions affect food safety and quality control systems in Ukraine. The methodological framework consisted of four sequential stages: (1) regulatory analysis, (2) analysis of institutional practices, (3) assessment of certification dynamics, and (4) strategic analytical synthesis using SWOT analysis. Each method was selected to address specific research tasks and identify systemic vulnerabilities under martial law. The regulatory and standards analysis involved examining the Law of Ukraine No. 771/97-BP (1997), HACCP guidelines (Codex Alimentarius Commission, 1997), ISO 22000:2018 (ISO, 2018), DSTU ISO 22000:2019 (2019) and the FSSC 22000 scheme (FSSC, 2020) to determine the mandatory requirements food enterprises must follow during wartime. This method was chosen because wartime introduces regulatory uncertainty, making it essential to establish a baseline for assessing compliance risks and audit challenges. The analysis of official statistical and sectoral data used inspection statistics of the State Service of Ukraine on Food Safety and Consumer Protection (n.d) and International Finance Corporation (IFC), analytical materials and TIC-Ukraine (n.d.), reports on ISO 22000 and FSSC 22000 certification dynamics. The practical data examined included changes in inspection frequency and structure, disruptions in certification processes, documentation and logistics problems, staffing shortages due to military mobilisation, and limitations in laboratory capacity. This method revealed systemic disruptions not identifiable through legislation alone.

The empirical generalisation of industry practices summarised real operational challenges based on audit reports, production inspection publications (Shaluru, 2025), studies on laboratory and HACCP implementation (Maliuk & Saprykina, 2018) and case descriptions of infrastructure damage, supply chain failures and breakdowns of prerequisite programmes. The data were qualitative, derived from documentary sources, expert assessments and descriptive industry cases; quantitative indicators (such as declines in certification) served only as supportive evidence. This method enabled the identification of typical non-conformities and technological and organisational failures specific to wartime conditions.

The SWOT analysis systematised strengths, weaknesses, opportunities and threats affecting food safety audits. SWOT factors were developed using HACCP guidelines, ISO 22000, DSTU ISO 22000 and FSSC 22000 requirements, State Service inspection reports, IFC assessments and scientific and sectoral studies (Kotsanopoulos & Arvanitoyannis, 2017; Bezerra *et al.*, 2024). Factors were included only in case they were directly relevant to wartime audit conditions, confirmed by authoritative sources, had a clear impact on audit feasibility or accuracy and reflected wartime or post-war realities. The SWOT analysis was qualitative; no scoring or weighting was applied, as the aim was strategic systematisation rather than quantitative prioritisation. The overall research logic followed a consistent sequence: identifying normative requirements, comparing them with actual wartime practices, extracting bottlenecks from empirical and sectoral data and synthesising the results into a SWOT framework to develop strategic recommendations. This ensured reliable triangulation of regulatory, empirical and analytical insights.

Results and Discussion

The assessment of audit findings and identified non-compliances was conducted against the mandatory food safety requirements established by national legislation and international standards, including the Law of Ukraine No. 771/97-BP (1997) and Codex Alimentarius Commission (1997). The analysis revealed that food safety and quality auditing practices in Ukraine have undergone significant procedural adjustments under conditions of instability. These findings are consistent with post-pandemic trends in the global food and beverage industry, where resilience, flexibility, and the restructuring of control and reporting mechanisms have become essential for maintaining operational continuity (Veronesi & Schiavello, 2023). These adjustments concerned the organisation of audit stages, documentation requirements, and the use of laboratory and inspection resources. As a result, the key stages of food safety and quality audits currently applied in Ukraine were identified and systematised. The comparative analysis of international food safety standards demonstrated that the formal requirements of HACCP-based systems, ISO 22000, and FSSC 22000 remain largely aligned; however, their practical implementation under wartime conditions is primarily constrained by organisational, infrastructural, and human resource limitations rather than regulatory inconsistencies. The structured sequence of these stages is illustrated in Figure 1.

The figure reflects a structured sequence of stages in a food safety and quality audit, covering preparation, risk analysis, evaluation of production processes, laboratory testing, and documentation of results. The scheme takes into account the specifics of martial law, in particular threats to supply chains and the impact of hostilities on the sanitary and technical condition of production.

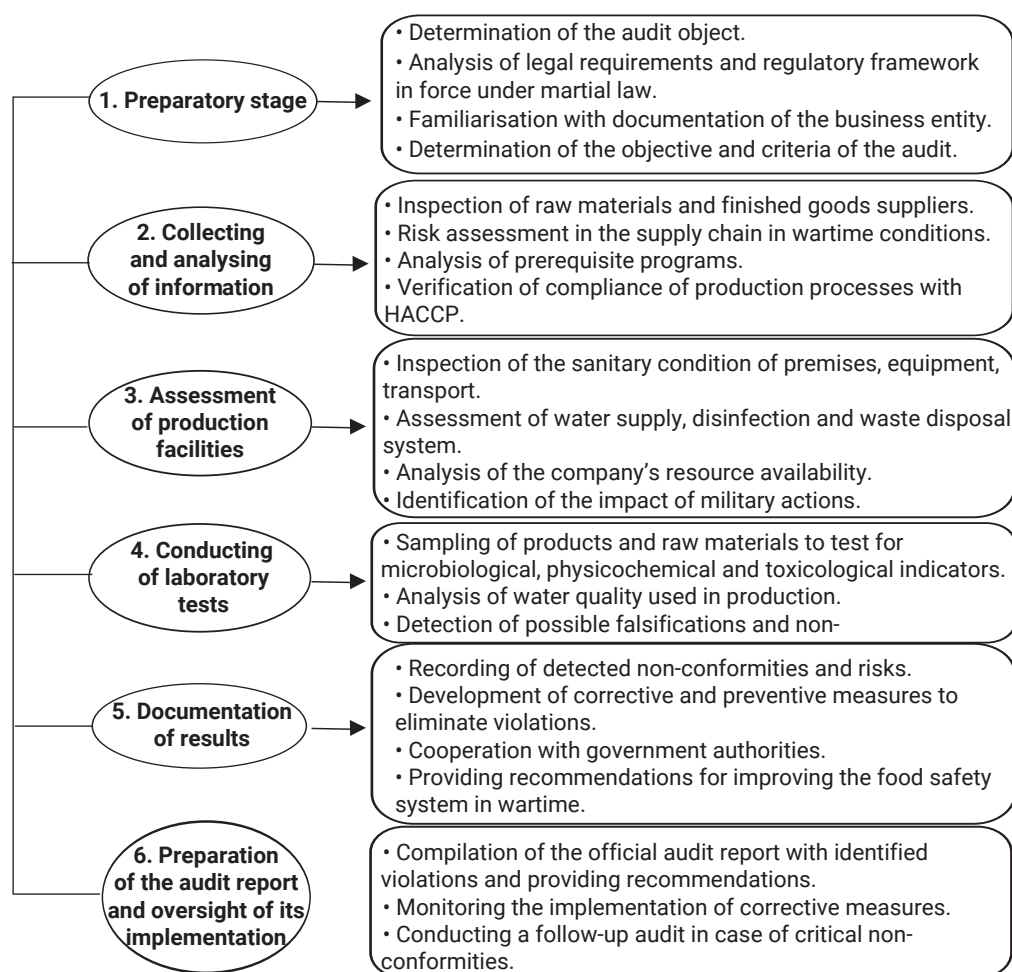


Figure 1. Stages of a food safety and quality audit in Ukraine

Source: created by the authors based on SGS Digicomply (2024)

The audit of the food safety system during wartime is much more complex process, as it requires the consideration of additional security and instability factors that significantly complicate the normal audit process (Kotsanopoulos & Arvanitoyannis, 2017). The overall structure of food safety audits follows internationally recognised approaches, which emphasise process verification, documentation review and corrective actions. The audit begins with careful preparation, which includes the identifying the object of inspection, studying of the legal requirements and regulatory framework applicable under wartime conditions. At this stage, the company's documentation is also analysed, the audit objective is formed, and evaluation criteria are established. An important component of this phase is the selection of the audit team, which may include quality experts, microbiologists, technologists and other specialists.

According to the State Service of Ukraine on Food Safety and Consumer Protection (n.d.), the share of enterprises that do not properly perform document management in the field of food safety has increased significantly during the war. Challenges at this stage include restricted access to relevant regulatory documents due to active hostilities, making compliance verification difficult. These

organisational difficulties are consistent with broader structural constraints reported in the food industry, including deficiencies in documentation systems and resource shortages.

Rushed legislative changes are often not properly communicated to companies. Moreover, forming an audit team is also complicated by the military mobilisation or displacement of specialists, which is consistent with observations regarding personnel shortages and difficulties in maintaining audit procedures. The next stage involves collecting and analysing information about the enterprise. Raw material and finished product suppliers are inspected, and supply chain risks are assessed, particularly considering martial law. Prerequisite programs are analysed, the compliance of production processes is evaluated with HACCP standards (ISO 22000:2018, 2018), and staff availability to act in emergency situations is verified. Challenges at this stage include difficulties in monitoring suppliers due to logistics disruptions and limited access, as well as increased supply chain risks due to infrastructure damage and road blockages. Additionally, there is a shortage of microbiological laboratories to test products, caused by infrastructure destruction and staff limitations.

One of the key tools of the audit is the assessment of the HACCP system's implementation (Maliuk & Saprykina, 2018). The audit of ongoing procedures based on HACCP principles includes verification of continuity and effectiveness of their application. This involves analysis of documents, accuracy of records, inspection of processes that affect food safety, evaluation of the operator's internal control system, analysis of corrective actions taken upon identifying non-conformities, and assessing personnel qualifications. Issues include non-compliance with HACCP procedures (TechConsult Ukraine, 2024) due to a reduced number of critical control points resulting from disrupted technological processes, and difficulties in personnel training or shortages caused by military mobilisation or relocation. Assessing the effectiveness of process control is challenging because many companies cannot properly document all steps due to the lack of electronic systems.

Assessment of production facilities is a crucial part of the food safety management system certification process, as this stage determines both the safety of the final product and the enterprise's ability to maintain production standards. It involves a detailed inspection of the sanitary condition of premises, equipment, and transport vehicles, which are essential for ensuring safe production conditions. Such inspections are essential for identifying sanitary, infrastructural and technological risks across production sites (Shaluru, 2025). Water supply, disinfection, and waste disposal systems are also analysed, as their effectiveness is crucial for preventing product contamination. At the same time, it is important to assess whether the enterprise possesses necessary resources to maintain food safety and how wartime disruptions affect its operations. Among the primary challenges, confronting this stage is damage to production facilities as a result of hostilities, which leads to significant losses in production capacity. The loss of access to consistent supply of water and disinfectants complicates safety standard compliance. Disruptions in the logistics chain of transport network pose a significant challenge to the effective transportation and storage of finished products, which can result in health risks for consumers (Cwikowski & Kahraman, 2023).

Particular attention should be paid to laboratory testing, which ensures product quality and compliance with safety standards (Maliuk & Saprykina, 2018). Sampling of raw materials and finished products for microbiological, physicochemical, and toxicological analysis is a crucial part of this process. It also includes water quality testing used in production. Laboratory analyses help detect potential violations of standards and identify product adulterations (Gil-Ramírez & Díaz-Romero, 2025). However, significant challenges may arise at this stage due to shortages of laboratory supplies and materials caused by disrupted

deliveries and funding deficits. The use of artificial intelligence, image processing, and robotic inspection systems has been identified as a promising approach to enhancing food safety inspections and audit procedures, particularly when traditional control methods are constrained (Chen & Yu, 2022). More recent studies, conducted by C. Shen *et al.* (2024), further demonstrate the application of advanced machine vision and deep learning techniques to support audit and inspection processes under resource and capacity limitations. Ensuring the accuracy of product composition and compliance with declared characteristics is a critical element of consumer protection, as demonstrated in international studies on food authenticity and labelling (Sussman *et al.*, 2019). In some instances, the damage or inaccessibility of laboratories located within active combat zones complicates the analysis process. Logistical challenges arising from infrastructure damage and unstable transport networks also affect sample collection and testing, potentially delaying the certification process (Shevchenko *et al.*, 2024).

After completing all necessary analyses, the results are recorded and documented. The identification of non-conformities and potential risks is followed by a thorough analysis, resulting in the development of specific corrective actions. If it is necessary, auditors may collaborate with governmental authorities responsible for food safety control to ensure compliance (State Service of Ukraine on Food Safety and Consumer Protection, n.d.). However, certain difficulties arise at this stage, such as the loss of documentation due to archive damage or server inaccessibility. Challenges in coordinating with control authorities may also occur due to restrictions and inspection delays caused by military operations. The challenges posed by communication difficulties and infrastructure failures further complicate the timely reporting of violations to government agencies (TechConsult Ukraine, 2024).

The final stage of the audit process is the preparation of an audit report, which documents all identified non-conformities and provides recommendations for improvement (Lupenko, 2025). This is a critical step, as the report forms the basis for determining the necessity for further corrective actions. In cases of critical violations, a follow-up/second audit may be required to verify corrective measures. However, this stage presents challenges in the organisation of repeated audits due to the constant changes in the security situation. Under such instability and hostilities, enterprises may be forced to prioritise efforts to ensure their own survival rather than addressing non-compliance issues (Shostak *et al.*, 2024). The audit results play a significant role in determining the risk level of market operator activities and in establishing the frequency of state control measures, as illustrated in Table 1.

Table 1. Frequency of scheduled state control measures

Risk level	Type of control	Frequency
Very high-risk level	Inspection	No more than four times a year
	Audit	No more than once a year

Table 1, Continued

Risk level	Type of control	Frequency
High risk level	Inspection	No more than three times a year
	Audit	No more than once a year
Medium risk level	Inspection	No more than twice a year
	Audit	No more than once a year
Low risk level	Inspection	No more than once every two years
	Audit	No more than once every two years
Insignificant risk level	Inspection	No more than once every two years
	Audit	Not conducted

Source: State Service of Ukraine on Food Safety and Consumer Protection (n.d.)

One of the main issues is the loss or damage of documentation, as well as the unavailability of relevant regulatory materials due to hostilities and disruptions in logistics chains. A significant number of enterprises are incapable of providing the necessary documentation to demonstrate compliance with ISO 22000 standards. According to the study by M. Cwikowski & T. Kahraman (2023), the certification of enterprises for compliance with ISO 22000 in the context of the war in Ukraine is complicated by difficulties related to the movement of auditors and damage to infrastructure. In this context, remote and hybrid audit formats may serve as a viable alternative to traditional on-site inspections, allowing audit activities to continue despite restricted mobility, security risks, and limited physical access to enterprises (Bezerra *et al.*, 2024). The ongoing hostilities have resulted in significant challenges, including auditors' mobility and limit access to certain enterprises due to damaged infrastructure and security threats. These challenges in the certification process have been confirmed by A. Shevchenko *et al.* (2024), who observed that a considerable number of employees have been mobilised or forced to leave their workplaces. In this context, digital solutions such as IoT-based monitoring and blockchain technologies may enhance audit traceability, data integrity, and documentation reliability, particularly under conditions of disrupted logistics and limited physical access to enterprises (Pelé *et al.*, 2023). Blockchain-based traceability systems may further strengthen audit reliability by enabling secure tracking, authentication, and verification of food products throughout disrupted supply chains (Sugandh *et al.*, 2023).

Due to disruptions in logistics chains and the lack of access to relevant regulatory materials caused by the hostilities, numerous enterprises are unable to provide the necessary documents to confirm compliance with ISO 22000 (Uyttendaele *et al.*, 2016). Moreover, due to restrictions in Ukraine regarding the conduct of regular surveillance audits, some enterprises are compelled to seek certification through international certification authorities, which further complicates the certification process. Simultaneously, some enterprises are unable to afford switching to a new certification authority due to the additional financial burden. Figure 2 presents the certification process of the food safety management system in Ukraine. The flowchart reflects the standard sequence of certification of the

Food Safety Management System according to DSTU ISO 22000:2019 (2019) – from application submission and preliminary analysis of documentation to stage I and II audits, decision-making on certification and subsequent supervision. It demonstrates the logic of conformity assessment and emphasises that a safety system requires not only initial confirmation, but also ongoing monitoring of its effectiveness. The total number of enterprises certified under ISO 22000 or FSSC 22000 in Ukraine during the war has decreased by 20-25% compared to the pre-war period (TIC-Ukraine, n.d.). Nevertheless, a notable trend has appeared in the maintenance of certification among enterprises that had already obtained it, despite significant challenges. Enterprises encounter numerous barriers, including damaged documentation, loss of access to databases, logistical disruptions, and resource supply issues. Simultaneously, certification persists as a crucial instrument in maintaining consumer trust and facilitating access to international markets, which is essential for the national economic recovery.

The war in Ukraine has significantly affected the food safety control system, causing a number of challenges. Due to the hostilities, government agencies have been forced to redirect resources to critical areas, leading to a decrease in the number of inspections in the food industry. These circumstances weaken food safety controls and increase risks to consumer health. Many professionals have moved abroad or changed their field of activity due to security threats and economic difficulties caused by the war. Such factors complicate the conduct of quality audits and reduce the effectiveness of control over compliance with food safety standards. Limited financial resources hinder the upgrading of equipment and the conduct of modern laboratory tests, which affects the reliability of inspections and the ability to detect hazardous substances in food products. These challenges reflect broader structural changes in the food industry observed at both regional and national levels during the wartime period (Smolinska *et al.*, 2025).

According to the State Service of Ukraine on Food Safety and Consumer Protection (n.d.), experts from the IFC have provided recommendations for improving state food safety control measures, which is especially important under conditions of limited funding. Many producers are not interested in undergoing independent audits due to high costs and the lack of significant sanctions for non-compliance.

These problems lead to lower product quality and potential risks for consumers. The Government of Ukraine is trying to

combat food fraud by supporting draft laws aimed at strengthening labelling and sales requirements for food products.

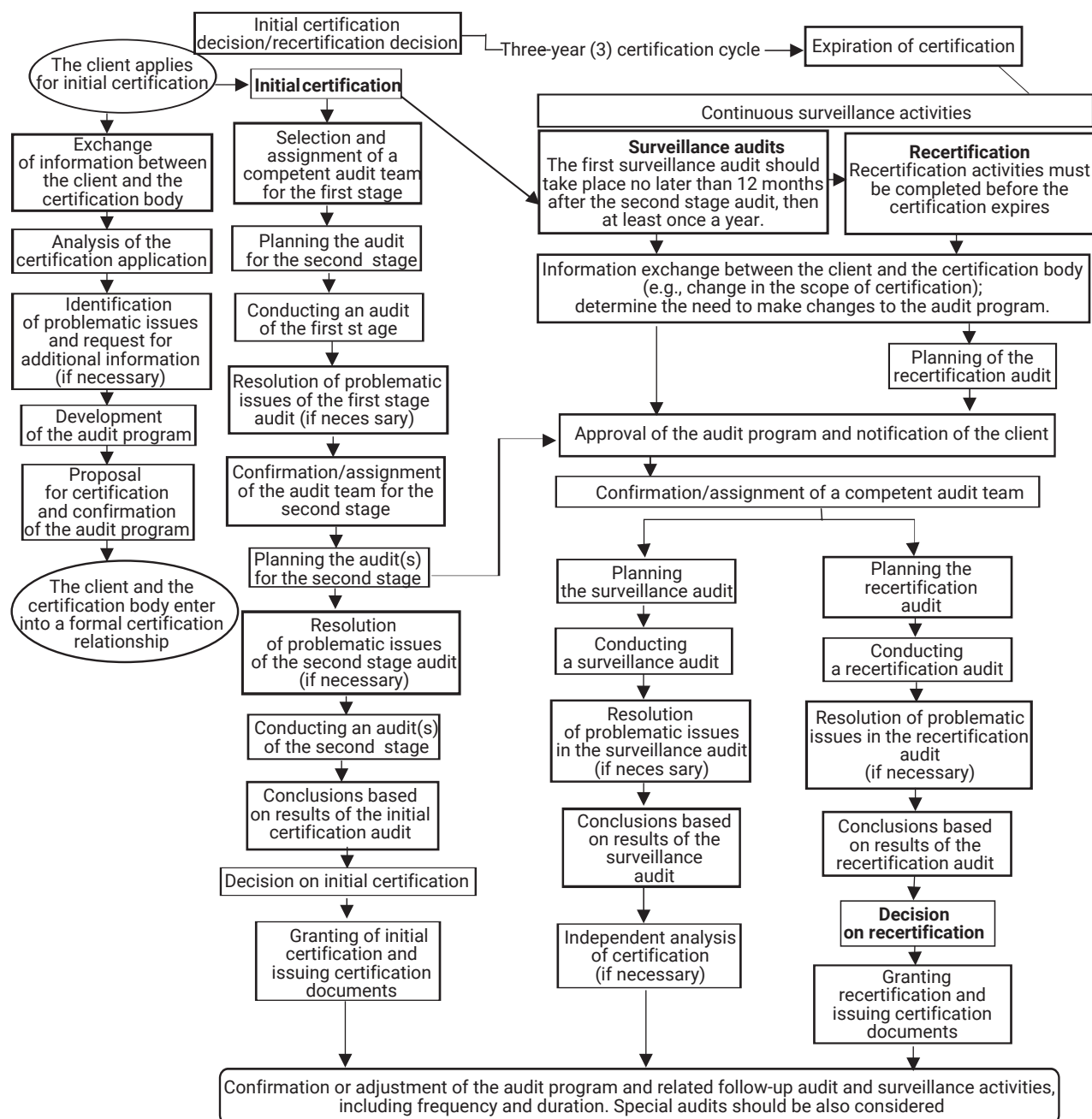


Figure 2. Flowchart of the food safety management system (FSMS) certification process

Source: created by the authors based on SE "Kharkovstandartmetrology" (2021)

In times of war, it is crucial to strengthen international co-operation and attract additional resources to support the food safety control system, ensuring the protection of public health and the stability of the country's food security (Shevchenko *et al.*, 2024). To minimise the consequences of the war and ensure effective post-war recovery, it is necessary to identify priority directions for food security regulation, particularly in the area of food quality and safety auditing (Table 2). The consequences of hostilities in Ukraine have had a significant impact on food

safety and quality audits, necessitating the adaptation of existing control mechanisms and the expansion of audit functions to ensure food security. Strengths, such as auditing humanitarian aid and monitoring the effectiveness of food infrastructure rehabilitation, contribute to stabilising the food market and restoring the agricultural sector to normalcy. However, there are also significant weaknesses, such as gaps in state quality control of humanitarian products and the lack of an effective audit mechanism in temporarily occupied territories.

Table 2. SWOT analysis of the impact of military actions in Ukraine on the conduct of food safety and quality audits

Strengths	Weaknesses
Conducting food quality audits of humanitarian aid delivered to affected areas.	Gaps in state control and audit of the quality of humanitarian food products.
Control and assessment of the effectiveness of measures to restore food security.	Insufficient funding for state food safety audits.
Monitoring the state of the agricultural sector and assessing the effectiveness of agricultural recovery measures.	Absence of an effective mechanism for auditing the supply of products to the temporarily occupied territories.
Auditing the physical and economic accessibility of food, contributing to the stabilisation of the food market.	Limited state control over environmental safety in food production.
Implementation of environmental audits to minimise the negative impact on the environment.	
Assessment of the effectiveness of food infrastructure recovery and implementation of innovations in food safety.	Lack of an effective audit mechanism for food supply to temporarily occupied territories.
Audit of programs to promote healthy eating and assess their impact on the population.	
Opportunities	Threats
Expanding the audit system to meet the population's needs for food security.	Impact of active hostilities on the possibility of conducting food security audits.
Implementation of innovative methods of auditing the effectiveness of humanitarian aid, including the monitoring of material resources and products.	High financial costs of implementing effective food sector audit systems.
The use of food quality audits to stabilise the market and increase consumer trust.	The threat posed by mined areas, which complicates the audit of food availability.
Strengthening environmental audits through the implementation of zero-waste production.	Price instability for food products, requiring regular audits of pricing policies.
Adaptation of state audit mechanisms to current challenges in the area of food security.	The risk of increased production of GMO products due to insufficient control over compliance with standards.
Audit of programs to promote healthy eating and introduce mechanisms to reduce prices for organic products.	Low public awareness of the role of audit in ensuring safe and quality food.

Source: created by the authors based on K.V. Kotsanopoulos & I.S. Arvanitoyannis (2017)

Opportunities for expanding the audit system to meet the population's needs allow for the adaptation of state control mechanisms to new conditions, as well as the introduction of innovative methods for monitoring humanitarian assistance and evaluating its effectiveness. However, these opportunities are accompanied by risks,

such as the impact of ongoing hostilities on the accessibility and security of audits, as well as the high financial costs required to implement effective audit systems. A SWOT analysis allows the assessment of key strengths, weaknesses, opportunities, and threats that affect the audit process under martial law (Table 3).

Table 3. Priority directions for food safety and quality audits in Ukraine

Directions	Results
Audit of food production	Increasing the volume of production of high-quality and safe products
Inspection of the food storage system	Formation of strategic agricultural product reserves
Audit of critical elements of the agricultural sector	Increasing the efficiency of key enterprises and productions
Monitoring the state of food security in the affected regions	Restoring access to quality food products in war-affected areas
Monitoring the continuity of food chains	Restoration of logistic connections and stable supply of products
Assessment of the level of security of agricultural territories	Demining of agricultural lands for the restoration of sowing operations.
Analysis of the efficiency of logistics processes	Optimisation of food transportation routes
Social audit of providing the population with products	Strengthening social protection and access to necessary food products
Audit of healthy food programs	Improvement of the state system of promotion of a healthy lifestyle and nutrition

Source: created by the authors based on M. Cwikowski & T. Kahraman (2023)

The implementation of the identified priorities will help ensure the stability of the food sector and strengthen the mechanisms of food quality control, which is critical for

the country's food security. The transition to priority directions in food safety and quality audits in Ukraine involves a number of key tasks that aim to overcome challenges aris-

ing from wartime conditions. In particular, auditing food production, inspecting food storage systems, and monitoring the continuity of food supply chains are essential for restoring access to safe food in affected regions. Other important areas – such as monitoring food security and auditing healthy eating programmes – not only contribute to stabilising the food market but also play a significant role in improving public health during the post-war recovery period. The results obtained in this study demonstrate that food safety and quality audits in Ukraine during wartime undergo substantial transformation due to disrupted logistics, unstable production processes, limited laboratory capacity and restricted access to enterprises. These findings align with and complement the conclusions of other researchers who have examined the functioning of food safety systems under crisis conditions.

The documented reduction in the number of inspections and increased difficulties in maintaining documentation correspond with the observations of L. Bal-Prylypko *et al.* (2024), who emphasised that the redistribution of state resources during martial law has weakened supervisory activities within the food sector. Similarly, M. Cwikowski & T. Kahraman (2023) highlighted the deterioration of record-keeping procedures at food enterprises and the challenges of implementing international standards due to staff mobilisation or relocation. These findings corroborate the results of the present study, especially the difficulties associated with assessing compliance with HACCP procedures and ensuring continuity in recording critical control points.

The results also indicate a significant decline in the availability of qualified specialists in the food industry during wartime, primarily due to displacement, mobilisation and disruptions in enterprise operations. This corresponds to observations of this study regarding challenges in forming audit teams and ensuring regular inspections. This research further showed that personnel shortages additionally affect laboratory operations, limiting the ability to conduct microbiological and toxicological analyses.

The identified challenges in laboratory operations during wartime are consistent with the findings of I.D. Bezerra *et al.* (2024), who indicate that insufficient funding and outdated laboratory equipment undermine the reliability of food safety assessments. Likewise, Y. Motarjemi & S. Mortimore (2014), analysing laboratory practices in crisis contexts, argue that disruptions in sampling and transportation can cause significant delays in certification and increase food safety risks. The results of this study confirm these global trends and illustrate their specific manifestations in Ukraine's wartime context.

The study's analysis of production facility inspections under martial law – particularly with regard to sanitation, waste management, and infrastructure damage – corresponds with the conclusions of O.S. Maliuk & T.V. Saprykina (2018), who underlined the importance of maintaining hygienic processes even under extreme conditions. However, this study adds a new dimension by showing how direct hostilities destroy production sites, disrupt

water supply, and block transportation routes, creating unprecedented risks that have not been thoroughly addressed in prior research. The study also revealed notable obstacles in the certification of enterprises under DSTU ISO 22000:2019 (2019). These findings are consistent with the conclusions of M. Uyttendaele *et al.* (2016), who emphasised that disruptions in logistics chains and limited access to regulatory documents hinder conformity assessment processes. At the same time, this study identified a new trend that had not been highlighted in previous works: enterprises increasingly turn to foreign certification bodies due to the suspension or delays of supervisory audits in Ukraine.

The SWOT analysis conducted in this study provides additional insights by identifying both vulnerabilities and emerging opportunities for strengthening food safety control. While K.V. Kotsanopoulos & I.S. Arvanitoyannis (2017) mainly focused on environmental audits and waste minimisation in food production, the present study broadened the analytical scope by incorporating war-time-specific threats such as mined territories, damaged agricultural land and unstable supply chains. Moreover, the proposed priority directions – such as enhancing monitoring of supply chain continuity and conducting social audits of vulnerable populations – extended the issues raised in previous research and offer practical implications for Ukraine's post-war recovery.

From a regulatory perspective, the identified challenges in food safety auditing highlighted the importance of a coherent legal framework that ensures effective control, traceability, and compliance throughout the food supply chain. Similar principles underpin food safety regulation in the European Union, where legal mechanisms integrate risk-based approaches, transparency requirements, and accountability across all stages of production and distribution. Such regulatory alignment has been identified as a key factor in maintaining food safety under conditions of systemic stress (Golovko, 2019).

A comparison of the obtained results with existing literature indicated that many Ukrainian and international researchers identified similar systemic weaknesses, including insufficient state control, financial constraints and disruptions in logistics. However, this study contributed new empirical evidence on how audits function under the direct impact of hostilities, including the loss of documentation archives, destruction of laboratory infrastructure and the need for enterprises to adapt production processes under extreme conditions. Furthermore, the SWOT analysis provided a structured framework for assessing the challenges and prospects of food safety audits during and after the war – an aspect that remains insufficiently explored in the existing literature.

Overall, the discussion confirms that although previous studies have examined certain aspects of food safety management in crisis conditions, the complexity and scale of the challenges faced by Ukraine during wartime require a broader and more integrated audit approach. The results

of this study therefore addressed an important research gap by offering a comprehensive analysis of audit stages, vulnerabilities and priority directions for strengthening food safety control in wartime and post-war contexts.

Conclusions

The war and economic instability in Ukraine have significantly affected the food market, leading to disruptions in production and supply chains. Nevertheless, food production and distribution have gradually resumed as enterprises adapted to new operating conditions and consumer demand stabilised. Safety audits help minimise risks to consumer health and prevent the spread of diseases. Compliance with HACCP standards and certification of safety management systems, such as ISO 22000 and FSSC 22000, is important for maintaining consumer confidence and access to international markets. It is predicted that only a fraction of companies will be able to obtain a new certification, but it is important to maintain certification for those who already have it. The SWOT analysis highlights strengths, such as auditing humanitarian aid and infrastructure restoration, but also identifies risks, including financial difficulties, instability in the regions, and restrictions in the temporarily occupied territories.

Thus, the research has shown that in times of war and economic instability, the adaptation of existing safety standards and prompt response to new challenges are critical to protecting consumers and maintaining trust in national producers. Supporting certification processes and developing new audit approaches that consider the

specifics of wartime will help strengthen food security and contribute to the country's economic recovery. It is important that all market participants, from producers to regulatory authorities, act in a coordinated and effective manner to overcome the consequences of the war and ensure the quality and safety of food products for Ukrainian consumers.

Future research should focus on developing audit methodologies that remain effective under crisis conditions and allow the wider use of remote or hybrid verification tools. It is also essential to assess post-war reconstruction needs related to laboratory and certification infrastructure, as these elements will determine the capacity of the food safety system to operate fully. Further academic attention should be directed toward studying the resilience of food supply chains under military risks, evaluating the effectiveness of ongoing reforms in risk-based state control, and analysing best practices for auditing humanitarian food aid to ensure its quality, transparency and traceability. Together, these directions will contribute to building a more sustainable and robust food safety control system in Ukraine during the post-war recovery period.

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Conflict of Interest

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Аудит харчових продуктів в Україні: проблеми та виклики в умовах нестабільності

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Анотація. Повномасштабне вторгнення росії до України у 2022 році суттєво порушило функціонування системи контролю безпечності харчових продуктів, що зумовило необхідність адаптації аудиторських і сертифікаційних процедур з метою мінімізації ризиків для здоров'я населення та підтримання стійкості продовольчого сектору. Метою дослідження було комплексне виявлення особливостей проведення аудиту безпечності та якості харчових продуктів у період воєнного стану в Україні та визначення шляхів удосконалення механізмів контролю в умовах післявоєнного відновлення. У статті використано аналіз і синтез нормативно-правових актів, порівняльний аналіз міжнародних стандартів у сфері управління безпечністю харчових продуктів, а також метод SWOT-аналізу для оцінки сильних і слабких сторін системи аудиту в умовах війни. Дослідження засвідчило, що воєнний стан спричинив скорочення кількості перевірок, ускладнення доступу контролерів до підприємств та зростання кількості порушень у сфері документування процедур безпечності. Значні труднощі виникають під час лабораторних досліджень через нестачу ресурсів і руйнування інфраструктури. Установлено, що підприємства змушені адаптувати виробництво шляхом релокації, зміни технологічних процесів і модернізації ланцюгів постачання. SWOT-аналіз показав потребу у посиленні державного контролю, розвитку лабораторної бази, удосконаленні аудиту гуманітарних поставок і підвищенні рівня інформованості виробників щодо вимог безпечності. Результати дослідження можуть бути використані підприємствами під час побудови систем контролю безпечності, державними структурами – для вдосконалення механізмів перевірок у кризових умовах, а сертифікаційними організаціями – для адаптації процедури аудиту до реалій воєнного часу.

Ключові слова: стратегічне управління; орієнтованість на інноваційність; гнучкість і соціальна відповідальність; структурна модернізація економіки; зміни зовнішнього середовища
