



Exploring e-Government Implementation in Kosova's Food Processing and Agriculture Sector: Challenges and Opportunities

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Article History	Abstract
Received: 01 June 2023 Revised: 07 Aug 2023 Accepted: 27 Aug 2023	<p>The application of e-government in the food and agriculture sector enhances governance efficiency, transparency, and food safety. This study examines the implementation of e-government in Kosovo's agriculture and food industry. The research employs qualitative methodology and includes eight interviews with government officials responsible for digitalizing processes in this sector. Our data analysis utilizes content analysis, quantitative analysis, and comparative methods. The results show substantial advancements in the digitization of services by government entities, leading to enhancements in the agriculture and food sector. Efficiency and transparency have improved, benefiting both farmers and food processors. Food safety monitoring and collaboration between the government and the sector have strengthened, resulting in cost reductions and time savings. However, challenges persist, encompassing a lack of awareness about e-government, resistance to change, inadequate technical skills among officials, insufficient ICT infrastructure, corruption, lack of connectivity and standardization of existing systems, staffing shortages, political changes, bureaucratic procurement procedures, and budgetary constraints. These issues demand government attention and resolution.</p>
CC License CC-BY-NC-SA 4.0	Keywords: E-Government, Information and Communication Technology (ICT), Food Processing, Agriculture, Programs

1. Introduction

Improving the internal functions of the public sector and access to public information and services has been a significant challenge for governments for many years. This process began in the late 1990s with the development of the Internet and the emergence of the concept of "E-Government.[1]

Since then, there has been a significant focus on the strategic and coordinated utilization of Information and Communication Technology (ICT) in public administration and policymaking. These efforts have been accompanied by substantial investments to enhance ICT capabilities in the public sector, both in developed and developing countries, which have adopted national strategies for e-governance [2].

The term e-governance encompasses a series of definitions with different perspectives, all of which relate to its three main objectives: the efficiency of governance, the provision of quality services to citizens and businesses, and the enhancement of democratic processes [1].

According to infoDev/World Bank, e-governance refers to the use of ICT to transform relationships with citizens, businesses, and between government units. The goal is to improve service delivery, empower citizens through access to information, and enhance interaction with the public sector. This results in a more efficient, accountable, transparent, less corrupt, and revenue-increasing government. e-Government establishes interaction between government and citizen (G2C), government and business enterprise (G2B), and government and its employees (G2G) to make it more friendly, two-way, adaptable, accessible, and transparent [3].

Lindgren evaluates e-Gov in terms of (1) responsiveness to citizen and business interactions and needs, (2) its efficiency and effectiveness, as well as (3) transparency and democratic nature [4]. Developing countries recognize the importance of e-Governance and see its implementation as a critical tool for achieving economic stability, promoting growth, and establishing transparent and less corrupt governance [5].

The food and agriculture sector is an important part of the economy and social life of any country. Good governance for these sectors has a direct impact on sufficient food production, environmental protection, rural development, and the well-being of the population. This is achieved by developing good policies for food and agriculture, ensuring good governance and oversight, fostering collaboration and coordination among institutions, integrating innovation and technology utilization, as well as through education and information dissemination.

E-governance provides excellent opportunities for the food and agriculture sectors to bring about positive changes toward achieving the goals of these sectors, improving performance, collaboration, and transparency. Based on this, many governments around the world have taken action and made significant investments in digitizing services for the food and agriculture sector. They have formulated policies and strategies, invested in innovation and ICT, developed public-private partnerships to invest in e-governance, and provided financial assistance and subsidies to encourage these developments.

The application of e-governance in these sectors demonstrates its importance in achieving goals of economic stabilization, promoting sustainable growth, and establishing transparent and less corrupt governance. It offers significant opportunities to improve efficiency, reduce bureaucracy, enhance citizen and farmer access to public services, and increase their participation in decision-making processes.

While it is widely acknowledged that the use of ICT in public services brings benefits, governments, especially those in developing countries, face numerous challenges in implementing e-governance, including in the food and agriculture sector.

The aim of this research is to analyze the challenges encountered in the implementation of e-governance for the food and agriculture sector in the context of Kosovo, as well as to identify the available opportunities. To achieve this goal, the study focuses on analyzing this issue in projects implemented in these sectors and examines the global and national perspectives of e-governance applications. A literature review addressing the themes of e-governance implementation, opportunities, and challenges in general, as well as in the food and agriculture industry specifically, is included in this research.

The findings of this research will contribute to improving policies and practices in the food and agriculture sector in Kosovo and provide a broader perspective on the application of e-governance at the global and national levels.

2. Materials and Methods

On the global stage, the food and agriculture sector has a long history of adopting new Information and Communication Technologies (ICT) to increase production and profitability while improving the environment [6].

On the other hand, ICT developments have significantly influenced the organization of institutions and the delivery of services, including government departments for food and agriculture. These

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developments have transformed government services from traditional modes of delivery to ubiquitous electronic services, leading to the redesign of process flows and government restructuring [7].

Information and Communication Technologies (ICT) refers to a wide range of technological tools and resources utilized for transmitting, storing, creating, sharing, or exchanging information. These tools and resources encompass computers, the Internet and its services, live broadcasting technologies, recorded broadcasting technologies, and telephony [8].

The following table presents new technologies that promise to enhance efficiency in the food sector and redesign processes, both from a business and government perspective (Table 1). These technologies are grouped based on their functions related to data, including collection, analysis, storage, management, and sharing [9].

Table 1: Digital Technologies for Agriculture and Food [9]

Technology purpose	Category	Sub-category
Data collection technologies	Remote sensing	Satellite-mounted data acquisition / monitoring systems
		UAV / drone-mounted data acquisition / monitoring systems
		Manned aircraft data acquisition / monitoring systems
	In situ sensing	Water quantity meters
		Water quality sensors , air quality sensors
		In situ meteorological sensors
In situ soil monitors		
Data analysis technologies	In situ biodiversity, invasive species or pest monitors	Crop monitors
		Livestock monitors
	Crowdsourcing data collection	Data from precision agricultural machinery
		'Serious games' for gathering agri-environmental data
		Citizen science
Online surveys / censuses	Data collection portals (e.g. online census)	
Data storage technologies	Financial / market data collection	Retail scanner data
		Business software for recording financial or market information (e.g. database entry systems)
	GIS-based and sensor-based analytical tools	Digital Elevation Modelling
		Land Use-Land Cover mapping
		Watershed modelling
		Soil mapping
		Landscape modelling
		Software (programs, apps) for translating sensor and other farm data into actionable information
	Crowdsourcing data analysis	Software for automating agricultural machinery which uses sensor or other farm data as input ^d
		Software for measuring and grading agricultural outputs (e.g. carcass grading software)
Data management	Deep learning / AI	Crowdsourcing applications for data sorting / labelling
		Data cleaning algorithms
	Secure and Accessible Data Storage	Big data analysis algorithms
		Machine learning
Data	Data management	Predictive analytics
		Cloud storage
		Confidential Computing
		Virtual data centres
		Distributed ledger technologies (e.g. Blockchain)

management technologies	technologies	Interoperability programs and apps
		Digital data visualization technologies
	Digital communication technologies	Social Media
Data transfer and sharing: Digital communications; trading, payment, and service delivery platforms	Online platforms - property rights, payments, services, and markets	Web-based video conferencing
		Machine-assisted communication (e.g. chatbots, natural language generation algorithms)
		Online property rights and permits registries
		Online trading platforms
		Platform-based crowdfunding for agriculture and agri-ecosystem services
		Online payment platforms (for public programs)
		Service delivery platforms

The application of these technologies in the operations of government units to provide accessible services through the Internet for the food and agriculture sector has brought significant benefits. However, the process of implementing these services and their utilization has faced considerable challenges.

Opportunities and Benefits of e-Government at the Global Level

In relation to the benefits and opportunities of e-governance in both developed and developing countries, there is a broad consensus among the authors who have analyzed this issue. Based on the literature analysis, the findings indicate that e-governance offers a wide range of possibilities and benefits in the administrative context. Among the main advantages of e-governance, as identified by the authors included in such studies, are; (1) Simplifying administrative procedures is one of the key benefits of e-governance [10]. This represents a way to reduce the burden of procedures and promote the use of technology to facilitate information processing; (2) E-governance helps save time for citizens and businesses by providing services through a dedicated portal [10-12]. This form facilitates access and use of services by users and reduces the need for physical appointments and the time required to fulfill government tasks; (3) Increasing government efficiency is presented as a significant benefit of e-governance [13]. The use of information and communication technology can improve information processing and coordination processes, thereby impacting the overall efficiency of government activities; (4) E-governance contributes to reducing the costs of government services. This is presented as a significant benefit for citizens and businesses, offering services at a lower cost compared to traditional methods of service delivery [10][13-14]; (5) Another highlighted benefit is the improvement of the quality of government services [13]. E-governance can ensure a higher quality of services for citizens and businesses by utilizing technology to enhance accessibility, timeliness, and responsiveness to user needs; (6) More efficient management of offices and registries is seen as another benefit of e-governance [10]. The use of information technology can facilitate data processing and management, contributing to the improvement of administrative processes and increasing the efficiency of offices and government registries; (7) High transparency is a fundamental benefit of e-governance. Through the use of ICT, e-governance can promote transparency in governance processes, creating spaces for monitoring by citizens and various organizations, and contributing to the reduction of corruption [10-14]; (8) Lastly, e-governance brings positive impact in areas such as behavior and capacity of the engaged personnel [10], poverty alleviation, strengthening democratic practices, supporting good governance [12], convenience and empowerment [11], accountability, enhancing government capacity, building networks and communities, improving the quality of decision-making processes and promoting the use of ICT in other sectors of society [13-14].

Most researchers, whose findings have been presented above, have mainly focused on studies that address the opportunities and challenges of e-governance for all types of services, while there are few available studies that specifically examine e-governance issues in the food and agriculture sectors. However, some authors have argued for the importance of e-governance in these two sectors and have suggested that most of the identified opportunities are also relevant to these sectors.

For example, Andreopoulou (2009) has highlighted that e-governance in the Forest Service can bring improvements in operational productivity, reduction of bureaucracy, direct contact with central administration, provision of quality services to citizens, faster decision-making, informing employees from central administration, better protection of forests and forest lands, reduction of operational costs, easier implementation of programs, connection with the European Union, improved retrieval of statistical records, and the creation of a better work environment[15].

Furthermore, Kärner (2017) has observed that the transition to e-governance processes in the food industry has brought significant benefits for Estonian farmers, such as easier communication with the government, time savings, and a reduction of errors in documentation. Moreover, subsidy payments have been received more quickly as administrative processes are managed with efficiency [16].

Moreover, Dwivedi and Bharti (2010) have observed that the Gyandoot initiative (Intranet in the Tribal District of Dhar to provide e-governance services) in India has offered benefits for farmers, including lower prices for their crops, fast and easy access to various forms and land records, as well as effective participation in decision-making processes for their welfare through efficient grievance redressal [17]

Challenges in the Implementation of e-Government at the Global Level

The implementation of e-Governance faces a series of complex challenges that impact its success and acceptance. Based on the literature review encompassing studies conducted in the field of e-Governance, challenges, and opportunities, we have identified several important challenges; (1) Social and cultural factors such as gender, poverty, education level, and social exclusion directly influence computer usage and communication with the government through ICT [5], [13], [18]; (2) At the same time, the lack of political consensus between ruling parties and opposition to implement e-Governance projects can hinder their seamless implementation [18]; (3) Human resource challenges are another issue that impacts the efficient functioning of e-Governance. The lack of ICT knowledge and limited training of administrative staff create obstacles to the successful implementation of e-Gov projects [5],[15][17-20]; (4) Digital divide, which represents disparities in accessing public sector services between urban and rural communities, educated and illiterate individuals, and affluent and impoverished populations, is also another challenge in the implementation of e-Governance [5],[13],[17-18]; (5) Weak technological infrastructure is also a major barrier to the success of e-Governance. Telecommunications, internet access, and technology are key elements that need to be present for the successful implementation of e-Governance. The lack of proper technological infrastructure is a challenge for developing countries on the path towards e-Governance [5],[11][13],[17-18],[20]; (6) The lack of public awareness and information about government electronic services poses another challenge. If citizens are not informed and aware of the portal and electronic services offered by the government, the acceptance and use of e-Governance can be negatively impacted [5],[11][13][17-19]; (7) Challenges related to corruption and political elite influence are also factors that hinder the success of e-Governance. Corrupt practices and political influence in directing ICT initiatives can affect the successful implementation of e-Governance [5],[21]; (8) The lack of legal frameworks and government strategies for e-Governance is another challenge. In many cases, the absence of appropriate laws and policies in the field of e-Governance hinders its development and implementation [5],[13]; (9) Dedicated leadership at various government levels is crucial for the success of e-Governance projects. The lack of dedicated leadership, which can provide financial and political support, as well as raise awareness and gain acceptance from stakeholders, can lead to the failure of e-Governance implementation [5],[13],[22]; (10) Resistance to change is an important challenge in e-Governance. Despite the numerous advantages offered by information and communication technologies, there can be fear and resistance towards them in the public sector. This resistance can stem from the fear of power loss, job displacement, or threats to established structures and corrupt schemes [5],[12],[13],[15],[17][19],[20]; (11) Security and data protection are additional challenges in the implementation of e-Governance [5], [13]. Data security and concerns regarding privacy are important issues that need to be carefully addressed to ensure the reliability and integrity of e-Governance; (14) Financing and financial sustainability are also critical challenges for e-Governance. Governance programs require ongoing financial resources to operate

and be sustainable [5], [13], [15], [19]; (15) The lack of involvement of stakeholders in the initial development and implementation process of e-Governance projects is an important challenge. The inclusion of all stakeholders is crucial to ensure the success of e-Governance projects [5], [22], [23]; (16) Collaboration at the local, regional, and national levels, as well as between public and private organizations, is another challenge. Collaboration helps in the sharing of infrastructure, human resources, resources, and knowledge among organizations, thereby fostering trust among institutions, citizens, and users [5], [13], [19], [23].

In conclusion, e-Governance faces numerous challenges in its implementation. Social and cultural factors, lack of political consensus, inadequate human resources, digital divide, weak technological infrastructure, lack of public awareness, corruption, and political influence, lack of legal frameworks and strategies, lack of dedicated leadership, resistance to change, data security and protection, financial and financial sustainability, lack of stakeholder involvement, limited collaboration, are just some of the key challenges that need to be addressed on the path to the success of e-Governance.

After presenting the findings of various authors regarding the challenges and opportunities of e-Governance in different countries, it is important to emphasize that these findings may vary for the circumstances of Kosovo. To address this contextual difference, specific research is needed to identify the challenges and opportunities of e-Governance in the food and agriculture sector in the context of Kosovo, which is the main objective of this research.

In this direction, this study aims to provide an overview of the developments carried out by the Government of Kosovo in integrating ICT to offer accessible services through the Internet for the food and agriculture sector. Based on the experiences of government officials, the objective is to identify the opportunities and challenges encountered during the implementation and utilization of these services.

The research findings have been used to answer the two research questions:

Q1. What developments have been made by the Government of Kosovo to integrate ICT in the food and agriculture sectors?

Q2. What are the opportunities and challenges of e-Governance in the food and agriculture sector in Kosovo?

Methodology

The methodology of this research includes a combination of theoretical and empirical study, using qualitative methods for data collection.

The theoretical study involved reviewing academic literature and documents from international organizations such as the UN and OECD. The aim was to create a comprehensive understanding of the implementation of e-Governance globally and to identify the challenges and opportunities that governments have faced in this field. The acquired information helped us develop a solid foundation of existing knowledge to then compare the findings of the conducted study with the available literature.

The original work of this study involved gathering relevant firsthand information through eight interviews conducted with high-level officials from the Information Society Agency, the institution responsible for e-Governance in Kosovo, as well as officials responsible for digitization in three institutions: (1) Ministry of Agriculture, Forestry, and Rural Development, (2) Agency for Agricultural Development, and (3) the Kosovo Food and Veterinary Agency.

The interviews were conducted in May 2023, and an open-ended questionnaire was used as a tool for conducting them. Most of the interviews were conducted face-to-face with the respondents, while officials whom we could not meet in person were sent the questionnaire via email.

For data analysis, we employed methods of content analysis, quantitative analysis, and comparative analysis to compare the changes and similarities in specific questions. These methods allowed us to identify the main themes, perform statistical analysis of the data (through frequency analysis), and compare the results among different questions.

3. Results and Discussion

E-Government has witnessed significant growth at a global level in recent years. In fact, it has become both a challenge and an opportunity for states and organizations to use technology to achieve their political goals and enhance the efficiency and effectiveness of their administration.

Government electronic systems for the food and agriculture sector at the global level and in Kosovo

Considering the importance of e-governance, international organizations such as the United Nations have developed assessments and indices to monitor and evaluate progress in this field at a global level.

According to the United Nations e-Government Survey 2022 (Department of Economic and Social Affairs), e-governance emerges as a prominent trend at both global and regional levels. European countries demonstrate a high level of development in e-governance systems and lead in utilizing technology to provide more efficient and citizen-centric government services. Indeed, according to the e-Government Development Index (EGDI), Europe is evaluated as the most advanced region in this field (Figure 1), whereas Denmark ranks first with a very high development index (Figure 2) [24].

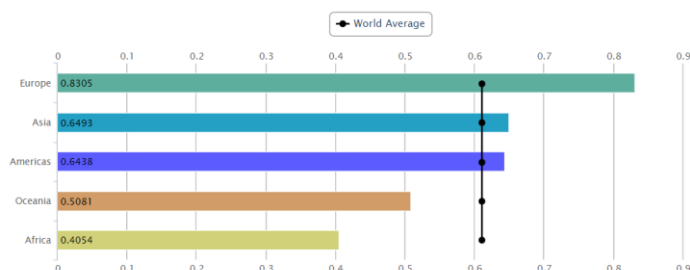


Figure 1: 2022 E-Government Development Index (EGDI) of Global Regions[25].

The EGDI (e-Government Development Index) provides an assessment of the state of e-government development in United Nations Member States. It is a composite measure that takes into account three key dimensions of e-government: the provision of online services (OSI), telecommunication connectivity (TII), and human capacity(HCI)[24].

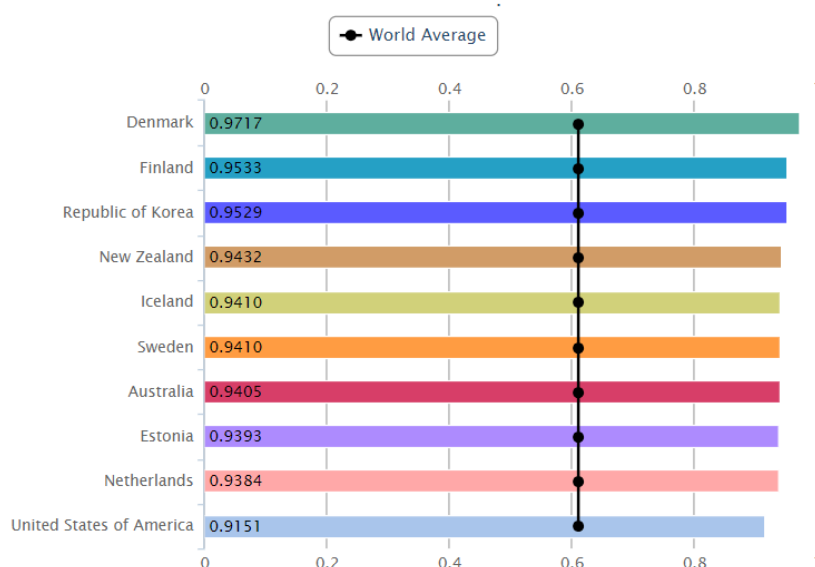


Figure 2: The top ten e-government leaders in the world, based on the EGDI in 2022[25]

At the global level, there have been numerous initiatives to provide electronic services in the food and agriculture sector. Table 2 presents some of the electronic systems developed by governments of various countries, identified from the reviewed literature.

Table 2: A summary of e-Government services for food and agriculture

The Estonian paying agency has been using satellite imaging and remote sensing since 2005, followed by automated control, to remotely monitor mowing activities, thus eliminating the need for physical field inspections. The information is based on GIS data provided by farmers and verified by the agency to make it available to all registered farmers [9]

Digital Registers in Estonia enable farmers to provide various types of information online that previously had to be recorded on paper. For example, farmers can report about the birth of an animal, whether they are moving their pack, and more [9].

LPIS (Land Parcel Identification System)-Estonia [9].

Agricultural projects in India:

Gyandoot is an intranet-based Government-to-Citizen (G2C) service delivery initiative implemented in the state of Madhya Pradesh. This project aims to provide e-governance services, including online application registration, a rural email facility, a village auction site, and more. Additionally, it offers services such as providing information on market rates for agricultural products, online public grievance redressal, issuing caste and income certificates, and offering rural market information. Notably, Gyandoot was recognized as the winner of the Stockholm Challenge IT Award in 2000[11],[17].

BELE - It is a web-based application with a 3-tier architecture for capturing and monitoring major activities and services in the agriculture domain in India [11].

AGMARKNET - It is a project approved by the Department of Marketing & Inspection (DMI), Ministry of Agriculture, Government of India [11].

Comprehensive Modernization of Land Records (CMLR) - This project was initiated by the government of Andhra Pradesh. It aims to integrate functions of property registration, mutations, and updating of field survey maps [11].

Land Record Computerisation - The objective of this project is to computerize activities related to the fresh allotment, land transfer, regularization of occupied land, etc., carried out by the Department of Land Management at the district level [11].

FRIENDS - This project is initiated by the Kerala Government to enable its citizens to make online payments [11].

The GIS system in Estonia integrates geographic data from various sources such as the Estonian Land Board, E-Land Register, and Estonian Agricultural Registers and Information Board, providing easy access to diverse information regarding land, property owners, protected areas, as well as tracking the location and movement of agricultural machinery. These data are often utilized in web and mobile applications for farm management [16].

Estonian Livestock Performance Recording Ltd. (ELPR) is an innovative application for dairy farmers, through which they monitor milk production, milk quality, and animal fertility indicators. ELPR is connected to the Estonian Agricultural Registers and Information Board, enabling the synchronization of herd registration changes without duplicating data entry and minimizing possible errors [16].

Bhoomi - Automation of Land Records is the first project of the e-Governance data management system initiated by the Government of Karnataka. It provides a computerized Record of Rights Tenancy & Crops (RTC), which is required by farmers for purposes such as obtaining bank loans and settling land disputes. A total of 177 taluks and 203 kiosks have been developed to support the Bhoomi Project [17].

Agricultural systems for farmers in various domains:

e-Government: Online Fertilizer Recommendation System (OFRS) in Bangladesh; AFPOH in India; KALRO in Kenya.

Knowledge and information: Weather forecasts, pesticides, and fertilizer information; KALRO mobile applications; Farmers Advisory Systems

Market: eSoko; Tru Trade; E-Wallet Scheme; E-Krishok and Zero Hunger

Farm management: Sensors: Fixed position, UAV, Satellites, UGV; Farm Management Information

Systems (FMIS); Variable rate nitrogen fertilizer (VRNF); CLAAS VRT; Automated yield monitoring system II (AYMS II); fuzzy logic DSS; AgroDSS.

Financial services: Index-based agricultural insurance; AFPOH; M-Banking

Profiling platform: Digital farmer profiling platform [6]

Portals for government electronic services in food and agriculture include:

The portal of the French Ministry of Agriculture (www.agriculture.gouv.fr).

The portal of the Australian Department of Agriculture, Fisheries, and Forestry (www.affa.gov.au).

The portal of the Department of Agriculture of Taiwan(www.eng.coa.gov.tw)

The portal of the United States Department of Agriculture (www.usda.gov)[26]

Regarding e-Government services for the food and agriculture sector at the global level, it is important to emphasize that not all services can be fully conducted online. Although technology and digitization have brought many advancements in this sector, some processes still require individuals to physically visit administrative offices to successfully fulfill the service (Figure 3).

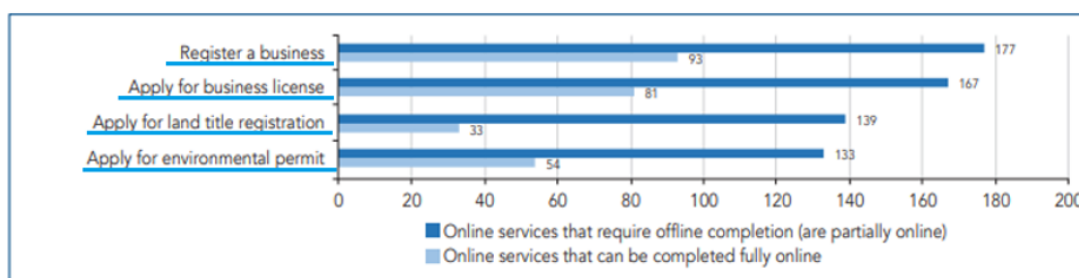


Figure 3: Number of countries offering selected services that can be completed partially or fully online, 2022[24]

Regarding e-Government in Kosovo, during our interviews with representatives from four institutions in the Republic of Kosovo, we observed significant progress in digitizing the food and agriculture sector within the framework of e-Government. The Government of Kosovo has taken important steps to integrate ICT into the services of these sectors. The Information Society Agency (ISA), the Ministry of Agriculture, Forestry and Rural Development (MAFRD), the Agency for Agricultural Development (AAD), and the Kosovo Food and Veterinary Agency (KVFA) have invested in various projects to digitize their services. Table 3 presents some of the electronic systems developed by these institutions for internal operations and interaction with businesses in the food and agriculture sectors.

Table 3: Electronic systems developed by Kosovo institutions for the food and agriculture sectors

The name of the electronic system.	The institution.
System for Electronic Certification and Payment (SCPE)	KVFA
Food Control and Traceability System (FCMS)	KVFA
Laboratory Information Management System (LIMS)	KVFA
Animal Identification and Registration System (INTERTRACE)	KVFA
Online Application for Registration, Import Permits, Various Certificates, etc. https://auvportal.rks-gov.net	KVFA
Electronic Farm Registry(eFR)	AAD
Parcel Identification System(sLPIS)	AAD
Document Management System(DMS)	AAD
Grant and Subsidy Management System	AAD
Direct Payment Management System	AAD
Online Application System for Rural Development Projects-Grants	AAD
Cadastre System for Vineyard and Wine Industry Management in Kosovo (KaVeKo)	MAFRD
Farm Registry System in Kosovo	MAFRD
Kosovo Forest Information System (KFIS)	MAFRD
Agricultural Insurance Information System	MAFRD

Integrated Agricultural Information System	MAFRD
Agromarketks(online market for Kosovo farmers)	MAFRD
Asset Management System	ISA
Electronic Document Archiving System	ISA
Human Resources Management Information System	ISA
Work Presence Monitoring System	ISA
Vehicle Expense Management System	ISA
e-Box	ISA
Online Application for Guarantees and Subsidies, Online Property Tax Payment and Other Payments, as well as Services related to Business Registration and Licensing.	ISA
https://ekosova.rks-gov.net/	
ISA- Information Society Agency	
MAFRD -Ministry of Agriculture, Forestry and Rural Development	
AAD-Agency for Agricultural Development	
KVFA-Kosovo Food and Veterinary Agency	

The above findings provide an answer to question Q1 regarding the developments carried out by the Government of Kosovo to integrate ICT in the food and agriculture sector.

Q1. What developments have been made by the Government of Kosovo to integrate ICT in the food and agriculture sectors?

It can be observed that there has been engagement in all relevant institutions.

These institutions have developed systems and registries to cover their respective services. However, the integration of these registries has not reached the desired level, and the lack of connection between these systems has resulted in an unsatisfactory level of interoperability.

However, the specific systems used in the involved institutions will gradually be integrated into the e-Kosova platform, a government portal for electronic services. Since 2017, the Information Society Agency has developed the "Government Gateway (GG)" platform, which is the main integration solution in terms of back-end infrastructure. This step aims to improve the connection and interaction of systems used by government institutions in the food and agriculture sector.

Opportunities and Challenges of e-Governance in Kosovo's Food and Agriculture Sectors

The primary data has been collected through an open-ended questionnaire. A part of the respondents who were not interviewed face-to-face were asked to complete the questionnaire themselves.

The analysis process unfolded as follows: Firstly, we analyzed the content of the responses from all the questionnaires. After that, we categorized and coded the identified challenges and opportunities. The relevant respondents' answers were labeled with the code of the respective category. Subsequently, we conducted a general analysis of the relationships by examining the responses for each category to identify overall connections and trends among them. Finally, we created quantitative and comparative analysis graphs regarding the challenges encountered in the food and agriculture sector.

Opportunities: Regarding the opportunities and benefits of e-government systems in the food and agriculture sector, respondents are convinced that these developments have brought noticeable improvements in various aspects and in different ways, such as:

Simplification of administrative procedures and increased efficiency: According to the respondents, the digitization of services has simplified internal operations and increased institutional efficiency. An administrative service in electronic form is carried out quickly and with fewer errors, thanks to predefined steps in the computer system. Real-time access to the right information helps perform work better. Data is stored uniquely in the database and can be easily shared with other units and institutions without the need for additional actions. Being well-informed in a timely, accurate, and relevant manner assists in monitoring, controlling, assessing, and reporting based on knowledge.

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By using the KaVeKo system, authorities and operators in the wine sector can manage and monitor vineyards more easily and utilize the system's data to make informed decisions and develop strategies.

Kosovo Forest Information System (KFIS) assists forest institutions in monitoring, evaluating, and managing their forests. This helps in the planning of appropriate policies and measures for the management and development of forest areas.

Electronic systems also help the institution to be more effective in preparing and implementing the national plan for rural and agricultural development, ensuring food security, managing payments and overall control, as well as facilitating easier information sharing among institutions.

Improvement of communication, collaboration, and provision of better services

The digitization of services has influenced the improvement of communication, collaboration, and the provision of better services in the food and agriculture sector. Information is shared quickly and accurately, and services can be accessed from these sectors at any time through the Internet, reducing administrative burdens.

Online applications for grants and subsidies have greatly facilitated the process of document submission and application submission by the applicant. The entire process can be conducted online. This electronic form of application has also greatly eased the administrative work in managing the process electronically and in a transparent manner.

Effective communication with the food and agriculture sector enables better coordination in implementing policies and strategies to improve food production and rural development.

Cost reduction and time savings: Digitized processes have reduced the time it takes to receive a service, as there is no need to visit administrative offices and wait in line, as well as the necessary costs to access the service. These facilitations have allowed these sectors to focus more on their production and development without wasting time on bureaucratic procedures.

Transparency has changed positively: Digitization enables the transparent handling of information. Digital systems provide clear information, controls, and assessments of administrative processes and procedures in the respective sectors.

Enhanced monitoring and control of food safety: The use of electronic systems for food control and traceability has enabled institutions to identify sources of food safety breaches, intervene quickly, and take appropriate measures to prevent risks to consumer health. This contributes to ensuring food safety.

Quality improvement: The digitization of the application process facilitates the access of the food and agriculture sector to financial aid and other development funds. On the other hand, the online market enables these sectors to expose themselves to wide competition. This created an opportunity for online financing and the market undoubtedly encourages these sectors to improve the quality of the products they offer.

Farmers in the Republic of Kosovo now have access to an online market where they can easily sell their agricultural products. The AgromarketKS platform is the newest digital project, supporting farmers and operating as a green online market.

Challenges: After analyzing the content of the responses from all the questionnaires regarding the challenges, we identified a total of 10 categories of challenges (Figure 5). Based on the approach adopted by Samsor (2021), we grouped the identified challenges into three main groups: Organizational Challenges, Social Challenges, and ICT Infrastructure challenges (Figure 4) [5].

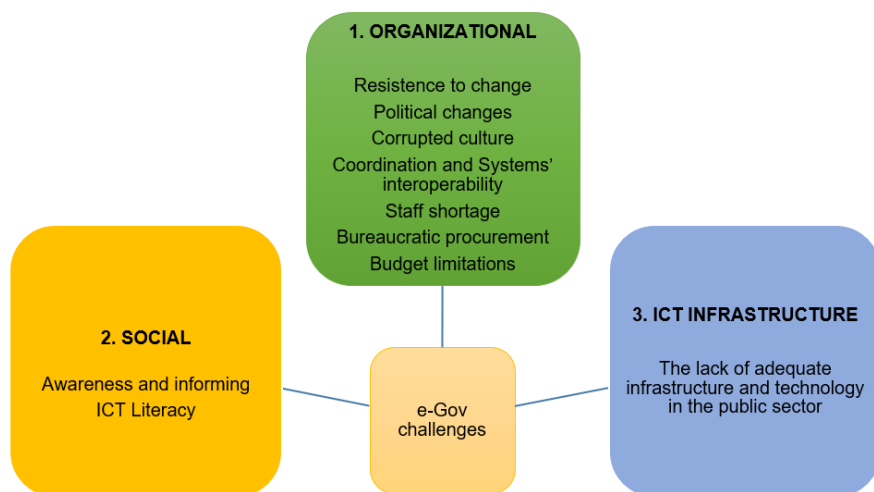


Figure 4: Challenges in Implementing e-Government in Kosovo's Food and Agriculture Sectors

Awareness and informing (87.5%): One of the most concerning issues for most respondents is the lack of sufficient information and awareness between institutions and citizens regarding the new developments in integrating ICT into services for the food and agriculture sector. Strong awareness and extensive information are needed; otherwise, the effort to digitalize these sectors will face significant difficulties.

Resistance to change (75%): Resistance from government officials to the implementation of new forms of task execution is another challenge. This resistance primarily occurs due to a lack of knowledge about the capabilities and values of the new system and due to preconceptions, that it may lead to errors in their work due to a lack of sufficient knowledge in the field of ICT. The lack of information and awareness is an additional factor that can increase this resistance.

Political changes (75%): Political issues are considered to play an important role in the continuous implementation of e-governance projects. Frequent political changes often disrupt the implementation flow of systems until the formation of a new government, as political decision-makers are the main forces influencing the implementation and use of electronic systems.

Staff shortage (75%): The lack of specialized staff is considered a major challenge in the implementation of new IT systems. In recent years, there has been an increasing movement of qualified personnel toward the local private sector or Western countries. The shortage of suitable staff can lead to delays in implementation, maintenance issues, and inappropriate use of new systems.

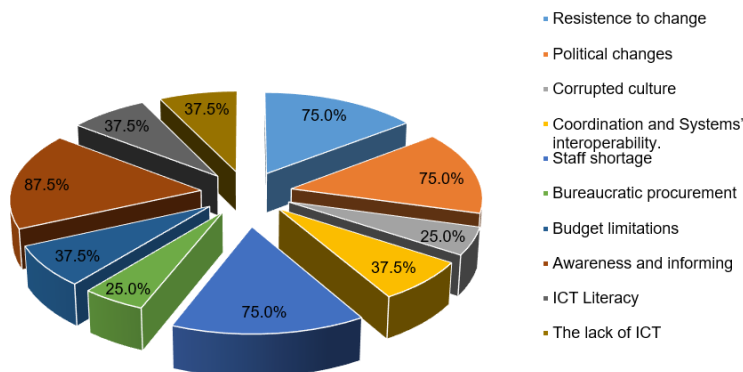


Figure 5: Graphical representation (%) of responses in ten categories of challenges

Coordination and Systems' interoperability (37.5%): Respondents view coordination and interoperability of systems as direct challenges to the success of e-governance. They believe that deeper inter-institutional coordination, the use of common standards, and system interoperability are necessary to prevent negative consequences such as information fragmentation, threats to data integrity and security, difficulties in data processing, and inappropriate use of resources. Smart coordination between parties will help the success of e-governance by enabling all possibilities to interact with new systems with existing ones.

ICT Literacy (37.5%): Respondents believe that government officials need continuous training in ICT fields to cope with development trends in this field. The lack of adequate knowledge leads to resistance and underutilization of the system. This also complicates the work of the implementation and system maintenance team.

The lack of adequate infrastructure and technology in the public sector (37.5%): Another concern is the lack of sufficient investments to ensure the infrastructure and resources needed to implement and maintain new IT systems. This hinders the full adaptation of institutions and creates obstacles to their efficient functioning.

Budget limitations (37.5%): Budget constraints can create deficiencies in financial resources for sufficient investments in staff and technology. This can create obstacles to the development and improvement of systems, affecting the quality and performance of e-governance.

Corrupted culture (25%): As for the corrupt culture, most respondents do not believe it is a challenge that frequently arises during the implementation of IT systems, but it should not be ignored. This is because, despite being a subtle risk, it can cause service sabotage, resistance, and a lack of cooperation to use and promote the success of new IT systems.

Bureaucratic procurement (25%): Respondents perceive the procurement process to acquire the necessary technology and services for e-governance as complex and bureaucratic. Lengthy procedures and excessive documentation requirements slow down the procurement process, thus also delaying the implementation of new systems.

The above answer serves to respond to the question: *Q2. What are the opportunities and challenges of e-Governance in the food and agriculture sector in Kosovo?*

E-Government services have brought numerous opportunities in the food and agriculture sectors. The efficiency and transparency of government processes for these respective sectors have positively changed, while government services for farmers and food processors have improved the quality of offerings. Food safety monitoring and control have been strengthened, and communication and collaboration between the government and relevant sectors have increased. These developments have resulted in cost reduction and time savings in service delivery. Similar possibilities have also been argued in the reviewed literature [10-14].

However, the respondents have identified several challenges in digitizing the food and agriculture sectors. Concerns arise regarding the lack of information and awareness about the government's e-Governance program among individuals involved in these activities, as well as resistance to change from officials. In addition to this, there is a lack of technical skills and competencies among officials in utilizing e-Government systems, inadequate infrastructure and information technology in the public sector, a culture of corruption and resistance to change, lack of integration and standardization of existing systems, staff shortages, political changes, bureaucratic procurement procedures, and budget limitations. These challenges have been argued in the reviewed literature as well [5], [11-13], [15], [17-21], [23].

4. Conclusion

E-Government has great potential to improve efficiency, transparency, and collaboration in the food and agriculture sector, both globally and in the Republic of Kosovo.

The Government of Kosovo has taken significant steps in utilizing Information and Communication Technology to provide accessible and efficient services to farmers and citizens, resulting in cost reduction, time savings, and improvement in the quality and safety of food.

However, there are significant challenges in implementing e-Government in the food and agriculture sector. Some of these challenges include a lack of awareness and resistance to change, political changes, movements and shortage of specialized IT staff, inadequate ICT infrastructure, and technical skills of personnel. To address these challenges, it is important for the Government of Kosovo to continue investing in the development of ICT infrastructure, personnel training, and awareness of change actors. Additionally, collaboration and coordination among different stakeholders are necessary to achieve the goals of e-Government in the food and agriculture sector.

The findings of this study contribute to improving policies and practices in the food and agriculture sector in Kosovo. At the same time, they can serve as guidelines for other countries that wish to enhance governance in the food and agriculture sector.

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