

Government e-procurement as a type of modern information technology

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Abstract

The relevance of the subject stated in this study is due to the substantial importance of the issues of introducing electronic processes into the public procurement system, which will ensure optimal implementation of all their stages. The purpose of this study is to examine the processes of building a system of public electronic procurement as one of the key varieties of modern information technologies. In the course of the study, a combination of theoretical methods of analysis, synthesis, and generalisation of information was used. The results were obtained, indicating the existence of mandatory procedural requirements for the implementation of public electronic procurement, compliance with which guarantees the effectiveness of the operations conducted. In addition, it was established that the practical application of the public electronic procurement system has a number of advantages, among which the following should be noted: full transparency and high availability of such operations, greater cost-effectiveness compared with procedures involving the use of paper media, and the possibility of more efficient administration of operations performed. It was also noted that it is necessary to comply with the intermediate stages of the electronic public procurement process, which are mandatory in terms of achieving the ultimate efficiency of the operations performed. The real prerequisites for the development of the electronic public procurement system in the Republic of Kosovo are highlighted, considering the established political realities and the developed regulatory framework.

Keywords: relationship between suppliers and buyers, bidding organisation, dynamic supply chain, digital transformation processes, sustainability.

First submission: 24 March 2025; *accepted:* 16 April 2025

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Rivista di Studi sulla Sostenibilità - Open access (ISSNe 2239-7221), 2025, 1

Doi: 10.3280/riss2025oa19823

1. Introduction

In general, the e-procurement process in the public procurement system involves the use of electronic means when performing transactions of this kind in relation to various goods and services. This is especially relevant in the context of the current pace of development of information and digital technologies around the world in general and in Albania in particular. In contrast to the classical type of procurement, e-procurement is characterised by a high degree of transparency of transactions, stimulates competition, and strengthens relationships with entities involved in the process. Therewith, the transfer of the public procurement system to an electronic format provides substantial advantages over the use of paper media, which are expressed in ensuring a high level of data protection and safety, increasing the efficiency and reliability of document management.

Sustainable procurement practices integrated into e-procurement systems enable governments to prioritise environmentally friendly products and services, fostering a more responsible use of resources (Novakovska et al., 2025). The difficulties arising in the organisation of the e-procurement system, and methods of their effective resolution have not been sufficiently investigated. Some advantages of the public electronic procurement system are presented to solve this problem, including their key stages, the maintenance of which is necessary to ensure the efficiency of the entire cycle of technological operations. The integration of sustainability criteria within public e-procurement not only enhances operational efficiency but also aligns with global efforts to promote green policies and sustainable development goals (Dmytriiev et al., 2019; Rysin and Sukh, 2024).

Researchers Caloghirou et al. (2020), who reviewed the prospects for introducing a public e-procurement system in local authorities in Greece, noted that, to date, there is still insufficient data on the effectiveness of introducing technological innovations of this kind. In turn, Kalaitzi and Tsolakis (2022), in a study on the general principles of the organisation of electronic supply chains, came to the conclusion that the electronic public procurement system can be implemented differently in different countries. The subject was developed in a study by Ozbilqin and Imamoglu (2021). It is noted that conventional procurement processes require the introduction of a number of modern information technologies to reduce the time of workflow. This will allow optimising costs, achieving their transparency and increasing the efficiency of all operations.

The Albanian researcher Hashami (2016), in his guide on the implementation of public electronic procurement, notes that the process of organising electronic public procurement in the Republic of Kosovo is still

far from perfect since the relationship between bidders is not clearly regulated. Nevertheless, the study does not provide an exhaustive answer to questions about the effective regulation of relations between all participants in the electronic public procurement process. A similar subject is raised in the study by Patrucco et al. (2019), devoted to the examination of the issues of choosing the optimal form of design and implementation of the organisational form of local public procurement. According to the authors, it is necessary to develop and implement a conceptual framework for the organisational design of public procurement while distinguishing between the dimensions of the macro, micro, and process levels. However, a number of problematic aspects of the interaction of the mentioned levels were not considered by the authors.

The main purpose of this study is to consider the principles of management of the electronic public procurement system as one of the types of modern information technology solutions.

2. Materials and Methods

In this scientific study, a combination of theoretical methods of analysis, synthesis and generalisation of information obtained in the examination of a wide range of problematic aspects included in the stated subject was used. The theoretical basis of this study is an analysis of the research of a number of researchers who have considered the organisation of public procurement processes as a type of modern information technology, and analysing their role and importance in various spheres of life of modern society. The use of the analysis method provided an opportunity to assess the prospects for the development and implementation of a system that provides for the possibility of submitting applications for participation in electronic auctions, which is most noted in the markets of a number of developed countries, such as the USA, Canada, Japan, Australia. In addition, a theoretical assessment of the prospects for the introduction of an electronic public procurement system is given, in particular, on the example of the prospects for the future development of the public electronic procurement system in the Republic of Kosovo.

The use of the synthesis method made it possible to identify a number of key advantages of the introduction of a public electronic procurement system in comparison with the classical procurement system, which involves placing all processed information on paper. The study also considers how integrating sustainability criteria into the e-procurement system can enhance resource efficiency, reduce environmental impact, and support long-term economic

resilience. The application of the generalisation method made it possible to establish the intermediate stages of the e-procurement process as factors ensuring higher final efficiency of the entire process in general. The role of preparatory measures involving the participation of both parties involved in the process (the client and the customer) is assessed, and the relationship of all stages of e-procurement in a single process is presented, in which these stages are differentiated by the degree of focus and complexity of all operations performed.

The combination of the presented methods of this study made it possible to clearly formulate the prospects for the introduction of an electronic public procurement system in the Republic of Kosovo at this stage, based on the existing legal and regulatory framework. This made it possible to analyse the real difficulties that have arisen in the implementation of this system in the country today and the practical results that have been achieved at the stage of its direct implementation. In addition, an assessment is given of the relationship between the practical implementation processes of the public electronic procurement system on the example of a single state (the Republic of Kosovo) and the currently existing legal framework governing the procedure for monitoring compliance with the legality of transactions. Separately, the role of government agencies in ensuring control over compliance with the legality of operations and the continuous monitoring of their final effectiveness is assessed.

3. Results

Public electronic procurement (hereinafter: e-procurement) is a set of procedures used instead of paper procedures, i.e. the use of IT procedures and electronic communication and data processing at all stages of public procurement. E-procurement includes the implementation of electronic processes that support various stages of the procurement process – publication of information on public procurement (tender), provision of tender documentation, submission of applications, expert evaluation of applications, conclusion of contracts, ordering of goods/services, invoicing, and payment. Therewith, billing and payment procedures are typical not only for public procurement processes – they, being typical for broader markets, can also be applied to the e-procurement system. The most difficult stages are the submission of applications for participation in the tender and their consideration due to the fact that in such cases, it is required to prepare a sufficiently large number of documents covering various aspects of the interaction of the parties directly involved in the transaction. In several

European countries, there has been progress in the evaluation of tenders and the execution of electronic orders. All countries belonging to the European Union have developed and implemented a system providing for the possibility of submitting bids in electronic form, the same is noted in the markets of other developed countries, such as the USA, Canada, Japan, and Australia (Hysi et al., 2024; Ketners, 2024; Krasivskyy, 2024).

The use of an e-procurement system has a number of advantages. Through the introduction of automation systems and the centralisation of information flows for individual purchases (tenders), electronic procurement can improve the access of business entities (potential bidders) to public procurement (Spytska, 2023). Furthermore, e-procurement supports sustainability by minimising paper waste and reducing the carbon footprint associated with traditional procurement methods (Shahini, 2024). Procuring entities and other bidders receive assistance by reducing administrative costs and speeding up individual procurement procedures. By integrating sustainability principles, e-procurement enables the selection of environmentally friendly suppliers and products, fostering responsible consumption and production (Galkin et al., 2019; Burmistrov et al., 2024; Nakonechna and Samsonova, 2021). The transition to electronic procurement opens up wider opportunities for optimising and reorganising the procurement process, while the transition to electronic procurement will not and should not mean copying and converting previous paper procedures into electronic format. In addition, e-procurement can be integrated into other (electronic) organisation activities (for example, inventory, contract management, and auditing).

Sustainable e-procurement practices also contribute to long-term economic resilience by ensuring resource efficiency and reducing environmental impact. Authors are talking about such stages as: electronic search (eSourcing), electronic advertising (eNoticing), electronic information (eInforming), electronic access (eAccess), electronic submission of applications (eSubmission), electronic implementation of the procedure (eTendering), including the stages of eAccess and eSubmission, opening and evaluation of applications received electronically (eAwarding), electronic complaint-statement of protection of rights (Electronic complaint), conclusion and maintenance of contracts by electronic means (Electronic contract), preparation and issuance of electronic orders (eOrders), preparation and transfer for payment of an electronic invoice (eInvoicing), electronic payment for ordered goods, services provided, or work performed (ePayment). Electronic research (eSourcing) includes preparatory activities conducted by the customer to collect and use information for planning public

procurement, preparing more frequent calls and tender documentation (Delmonico et al., 2018; Liu et al., 2019).

Electronic information (eInforming) is a set of tools through which a potential bidder receives information about purchases in which initial interest has been expressed (Aviv et al., 2008). Electronic information can occur at several stages: planning, initiation, and the final stage of the procedure. At the planning stage, the bidder, who was initially interested in individual objects of public procurement (by zones, groups, codes from the general procurement dictionary), receives information about all purchases (or purchases by an agency from one geographical area or a duly determined purchasing authority) of public procurement items in which they are interested. Next, the information system sends a message to this subject when an invitation to participate in the specified public procurement appears, after which it can register as a person interested in this purchase and receive all information about it (changes in the tender documentation, questions and answers, explanations). Electronic advertising (eNoticing) – the advertising of tenders and their publication in the right place (at the moment, it is mainly a portal, the applicant's page and the portal of the government print edition of the Republic of Kosovo, and a database of regulations). The tender documentation is also stored in electronic form and, therefore, can be transferred to all interested parties. The parties are invited to participate in the specified public procurement procedure. Electronic implementation of procedures (eTendering) includes electronic access to tender documents and submission of applications in electronic format. Electronic access to tender documents (eAccess) provides the interested party with the opportunity to access the tender announcement and documentation and also a kind of support in preparing for the tender (for example, clarifications, questions, and answers). Submission of applications in electronic format (eSubmission) is a mandatory element for taking part in electronic bidding. This allows the interested party to simply, efficiently, and economically submit applications to the customer, who, using electronic services, can receive, accept, and process the application according to the requirements of current legislation.

In Kosovo, public procurement, as a very specific area for the new state, appeared immediately after the end of the war in 1999, so it has a short history dating back almost two decades. The international community laid the foundations for the implementation of the public procurement system in Kosovo through the UN Mission in Kosovo, UNMIK. As Kosovo develops its e-procurement infrastructure, incorporating sustainability considerations can enhance efficiency while aligning with EU environmental policies. Later, after the institutions of Kosovo were established and strengthened, the Assembly of Kosovo regulated this area with a special law that entered into

force on June 9, 2004, and is known as the “Law on Public Procurement in Kosovo” (Adjei-Bamfo et al., 2019; Padhi and Mahapatra, 2011). On June 6, 2007, several amendments were made to this law, bringing it closer to European legislation on public procurement, obstacles to Kosovo’s integration into European mechanisms. This law was also amended in 2009, 2010 and 2011. These amendments and additions allowed the residents of the Republic of Kosovo to obtain a law that is even better harmonised with the legislation and rules of the European Union on public procurement. Legislative acts and modern laws, and the entire legal infrastructure in the field of public procurement regulating these activities in Kosovo, are a good basis for the development of the public e-procurement system in the country (Choi et al., 2016; Zhang et al., 2018). At first, public procurement in Kosovo, as in other countries with economies in transition, faced various difficulties since the officials involved in this system had little or no experience, and there was no real competition in the local market. Even in this area, Kosovo was a special case, as it emerged from a war that caused great damage to its economy. The State Administration has not recognised the tradition of public procurement. However, over time, after the development of a public procurement policy and the completion of relevant legislation, the definition of rules and remedies, public institutions and public administration entered into implementing a public procurement system. It can be said that a number of results have been achieved in the field of public procurement in Kosovo in a short period of time. The results were also achieved thanks to the work of international. The procedural requirements for electronic procurement they include certain provisions presented in Table 1.

The result of the implementation of the e-procurement system is that buyers and suppliers of business solutions for e-procurement receive a number of advantages: elimination of administrative costs, reduction of the purchase cycle period, better stock management, increased company-wide productivity, reduced internal and supplier errors, and the ability to strategically manage purchases in line with broader business goals.

Table 1 – General procedural requirements for electronic procurement

<i>Requirements</i>	<i>Provisions</i>
A higher level of operations performed compared to typical purchases	The implementation and acceptance of e-procurement should exceed the same level as manual procurement.
Ensuring the phased implementation of procurement plans	The departments undertake to use the e-procurement system according to a phased plan.
The impossibility of parallel trading	It is recommended not to allow parallel bidding (using manual and electronic forms) beyond a short time period.
Changes in the terms of the tender documentation	The terms of the tender documentation can be changed, if necessary, to adapt to electronic procurement.
The possibility of organising electronic trading	Online procurement methods such as electronic bidding can be adopted.
The obligation to register via the Internet to participate in the auction	Registration of suppliers via the Internet is established as a prerequisite for participation in public procurement through the electronic procurement system, and it is also mandatory to submit responses to applications through the electronic procurement system.

Source: compiled by the authors.

4. Discussion

In the presented scientific study, the issues of the organisation of the public electronic procurement system, as one of the varieties of modern information technologies, were considered. Therewith, it was established that this system has a number of advantages over conventional purchases, in addition to standard procedural requirements for the implementation of operations of this kind, which ensures the achievement of high efficiency of operations. The results were discussed in the context of their analytical comparison with the results of the study on a number of related subjects.

Researchers Hung and Zhan (2023) examined a number of problematic aspects of public e-procurement in the context of irrational resource allocation. According to researchers, the government performs the function of the main buyer in the country's economy precisely through public procurement. Therewith, the process of building a public electronic procurement system as one of the varieties of modern information technologies is quite complex and requires additional research to form a holistic picture of its understanding. This is fully consistent with the results obtained in the framework of this study because conclusions of this kind

emphasise the complexity of the organisation of the public procurement system as a type of modern information technology.

In turn, Zou et al. (2023) conducted a joint examination of the real prospects for the formation of e-government to improve the management of numerous technological processes and electronic supply chains. Researchers note that the internal mechanism for developing electronic public procurement as a type of information technology in the context of the development of e-government to improve all management aspects represents a common vision of processes in government structures in the era of the spread of digital technologies. The opinion of the researchers is fully confirmed by the results obtained during this study since it raises issues of the relationship between a wide range of aspects of the development of the electronic public procurement system and processes that are the responsibility of state authorities.

Therewith, Yevu et al. (2021) jointly examined a number of general principles for implementing digitalisation processes of construction supply chains in a single e-procurement system in a single context of the application of new technologies and opportunities for sustainable development. Researchers have concluded that in modern conditions of rapid progress in the field of digitalisation, the introduction of digital technologies into the procurement management system is widely promoted to promote revolutionary innovations in the artificial environment. Research in the field of examining the principles of supply chain formation and e-procurement at all levels, including public procurement, has created a substantial theoretical basis for assessing the role and place of public e-procurement in a unified system of modern information technologies. The conclusions of the researchers seem to be largely controversial since the results of the study conducted in the field of public electronic procurement are largely subjective and depend on the position of a particular researcher on a wide range of issues taken by him for consideration.

Xu et al. (2022) developed the subject of e-procurement system management. According to the authors, the number of papers on e-procurement in the closed-loop economy has increased substantially in the last few years, and substantial attention has also been paid to e-government procurement in this context. The researchers conclude that the closed-loop economy is an industrial economy, while public procurement as a type of modern information technology occupies one of the key places in it. The researchers' conclusions are fully confirmed by the results obtained in this study since they emphasise the importance of public electronic procurement in a closed-loop economy and assess their role and place in modern information technologies.

The research group consisting of Yan and Lyu (2023) considered a range of problematic aspects of the role of e-government in reducing the financial deficit of authorities at various levels in the organisation of e-procurement processes. According to the research team members, the centralisation of financial leverage management in unitary states does not contribute to the promotion of e-government by electronic authorities, which negatively affects the organisation of the public e-procurement process. Ensuring sustainability in e-procurement can also mitigate financial risks by promoting cost-effective and environmentally conscious decision-making (Abbasova et al., 2023; Kerimkhulle et al., 2023). Such operations, one of the varieties of modern information technologies, are associated with high risk and must be controlled using the most advanced technical means (Lutsenko et al., 2019). The researchers' conclusions seem to be largely controversial since, with proper organisation and effective management, electronic public procurement, as a type of information technology, is not affected by risk factors.

The raised subject is being developed by Concha et al. (2012), examining the processes of public e-procurement and noted that purchases of this kind are rapidly becoming an integral part of national e-government programmes since they provide active transparency and promote effective relationships with suppliers of goods and services. Therewith, as a result of the conducted study, it is concluded that it is necessary to pay more attention to determining the performance of e-government procurement portals and assessing the achievement of set goals in the organisation of supply chains, assessing the final effectiveness of operations of this kind. The opinion of researchers is fully confirmed by the results of this study since they emphasise the importance of e-government procurement portals in ensuring the effectiveness of supply chain organisation.

Therewith, Panayiotou et al. (2004) investigated the general principles of organising an electronic procurement system to optimise public procurement. Researchers draw attention to the fact that many developed and implemented e-procurement models pursue the goal of introducing new information technologies, particularly e-business. The authors concluded that similar models have been actively developed in recent years for organisations operating in the public sector throughout Europe, and their activities should be managed through the use of the most modern information technology solutions. The conclusions of the researchers are fully confirmed by the results of this study since they reflect the role and importance of the public electronic procurement management system for the development of electronic business in general.

In turn, Singh and Chan (2022) considered a number of issues of the impact of the public electronic procurement system as one of the varieties of modern information technologies on the sustainable efficiency of product supplies. The researchers note that in recent years, e-procurement has become firmly established in everyday life and has substantially transformed the previously formed procurement system. A sustainable approach to e-procurement ensures not only economic efficiency but also compliance with environmental and social responsibility standards (Miliienko, 2023; Nurtazina et al., 2015). In this context, public e-procurement has substantial prospects, especially considering the need to build effective supply chain management in a modern business environment using information and communication technologies (Lis et al., 2024; Sheryazdanova et al., 2020; Ismayilov et al., 2024). This is consistent with the results of the study, as the prospects for improving the public procurement system are highlighted.

Jiang et al. (2023) examined the general principles of the introduction of digital technologies into the management system of public procurement processes. The researchers note that in the modern era of digitalisation, digital technologies find their application in various spheres of modern society, including developing the public electronic procurement system. Therewith, the formation of supply chains in the implementation of electronic procurement in various spheres of life of modern society involves the use of a number of information technologies that are also applicable in the system of public electronic procurement. This conclusion is consistent with the results obtained, as it highlights the close relationship between government supply chains and information technologies currently operating.

Thus, the discussion of the results obtained during the implementation of this study, in the context of their comparison with the results and conclusions of other researchers on a wide range of problematic issues of the implementation of public electronic procurement as one of the varieties of modern information technologies, demonstrated their fundamental correspondence in a number of key parameters.

Conclusions

During the implementation of this study, it was possible to establish that the basic concept of public e-procurement, the same attitude towards economic operators on the part of state authorities responsible for conducting such events should be considered, and this applies to absolutely all stages of the public e-procurement procedure without exception. It is also necessary to ensure full transparency of all actions performed within the framework of

public electronic procurement procedures. Compliance with the principle of procurement transparency is inextricably linked to the need to provide all parties involved in the process with full information about all actions performed.

All information about electronic public procurement presented in government information publications is also available via the Internet up to the date of the start of electronic bidding. It is necessary to reduce to the minimum possible values the deadlines that should be observed at certain stages of these procedures to provide all bidders, without exception, with sufficient time to develop proposals for participation in the auction. In addition, special professional and technical knowledge and skills are required to participate in the bidding itself. Among the main factors reducing the effectiveness of public procurement are political interference, opacity, corruption, lack of skills for implementing legislation and contract management, and lack of knowledge. Such a conclusion can be made based on an analysis of those factors that have a greater impact on the level of efficiency of public procurement in Kosovo. That is, raising awareness of the possible risks and consequences of illegal activities, ensuring continuous training of procurement department employees, introducing specific control methods, and implementing sanctions and other regulations aimed at combating illegal and corrupt activities. In general, achieving these goals requires strictly regulated procurement. This requires costs and sometimes slight success in preventing corruption. Incorporating sustainability principles into public e-procurement can enhance long-term economic efficiency, reduce environmental impact, and promote responsible resource management.

The prospects for further study within the framework of this subject are conditioned by the need to improve the processes of electronic public procurement as one of the varieties of information technologies to create optimal conditions for their effective implementation.

Funding

None.

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