E-GOVERNMENT IN DIGITAL AGE AND ORGANIZATION OF INTERNET ECONOMY AND E-BUSINESS

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Abstract: The contemporary digital age is characterized by the globalization of communications and the growing role of technology in social processes, including economic relations and business organization. Cyberspace with its digital technologies and resource virtualization have expanded the use of the global network and helped to consolidate the Internet economy, the development of e-government and e-business. Reflecting these trends in society, the article summarizes the features of the digital economy and the technological organization of e-business in the digital world, focusing on key aspects and opportunities for specific application. Business relationship models and main categories are summarized, as well as the features of the electronic market and electronic payments.

Key words: digital world, e-globalization, internet economy, e-business, privacy, digital technology.

1. INTRODUCTION

The continuous informatization of society and the growing role of technology in the digital age globalizes social processes, economic relations and business organization [1]. A summary of this development is the modern Fourth and Fifth Industrial Revolutions, and their socio-political consequences are presented in [2]. Their impact on the digital society and the defining role of Society 4.0 for global informatization is confirmed by the introduction of "a*rtificial intelligence, Internet of Things (IoT), robotics, machine learning, smart automation, metaverse, and big data in society*" [2]. The role of the global network in the general process of informatization is obvious, which led to the launch of the term "internetalization", reflecting the use of the global network in technological, socio-economic and cultural processes supported by government structures, private organizations, civil societies, educational institutions and technical and scientific communities [3]. It should be noted that an important requirement for organizing processes in the network space and accessing various resources, including personal ones, is the need for complex literacy to understand not only the technological network features, but also to comply with the requirements for the protection of personal data and user privacy [4].

Various initiatives and programs related to the digital industry transformation [5] pay due attention to economic relations and policy [6], identifying e-business as an important component of the digital age due to the active use of modern information and communication technologies (ICT). This determines the important role of business systems in the field of e-governance but also requires a serious study of the reliability of the use of information resources and ensuring secure access to them [7].

To the new aspects of digital economic relations must be added the implementation of an adequate strategy for data security [8] and correct information security policy [9]. No less important is the development of a comprehensive and unified approach to the use of electronic documents and electronic signatures. In this respect, a study related to electronic document management is presented in [10], indicating the main features, functionalities and working methods. All this actively influences the development of the so-called network economy [11], where any economic unit can easily and at minimal cost communicate and work together with any other economic system, regardless of its location. The application of modern technologies requires good digital literacy, which, in addition to coping with the requirements of digital technologies, maintaining an important level of information security, but also maintaining the requirements for the protection of personal data and the privacy of users [4]. This requires building correct technological structures for personal data protection [12].

The informatization of society and in particular the expansion of digital economy technologies creates cybersecurity risks. In [13], a study is presented on the possible threats and the impact of digital technologies on cybersecurity in the digital economy, highlighting the need to develop a long-term plan to counter risk situations.

The purpose of the article is to systematize the main aspects and features of the technological organization of electronic business and to present their main components. According to Gartner's definition[1] "*E-Business is any process that a business organization conducts over a computer-mediated network. ... Their processes include production-, customer-, and internal- or management-focused business processes.*". Assessing this concept, the article presents important aspects in building an electronic business environment, the characteristics of the Internet economy and the Internet industry, the main models of business relationships, the main categories of electronic business, as well as the organization of the electronic market and electronic payments.

2. INTERNET ECONOMY AND E-BUSINESS

The ***Internet Economy*** is a flexible and dynamically developing technology for creating and distributing knowledge and opportunities in the digital world, aiming to transform traditional industries and transition them to the global network using information and communication technologies, which will create higher productivity. [14]. Example of the possibilities for organizing design processes in electronics is presented in [15].

A common understanding of the advantages of the Internet economy is its connection with social development and the possibilities of online shopping, which is one of the ideas of e-business. In summary, the Internet economy encompasses areas of

[1] https://www.gartner.com/en/information-technology/glossary/e-business

economic activity based on the means of production and maintenance of the global network, building an infrastructure for providing fast, secure, cheap, and high-quality Internet services. The main advantages of the Internet economy are related to reducing personnel, office, and communication costs, increasing the speed of basic business operations and improving the quality of customer service.

Based on various scientific studies, the following features of the Internet economy can be summarized:

✓ Creating a virtual space with minimization transaction costs;

✓ Interactive nature of the work and the availability of the relevant infrastructure based on the developed system for online payments and the Internet navigation system;

✓ Ensuring a direct producer-consumer relationship and achieving an optimal supply and demand ratio in the sectoral markets;

✓ Immediate access to information necessary for the performance of official duties and decision-making;

✓ Extensive use of multimedia tools to perform the work;

✓ Opportunity to create new goods and services that best meet customer requirements;

✓ Active participation of the economic system in the process of international globalization and integration, taking place in the world economy;

✓ Internationalization of economic activities and a high share of international business activity in the structure of entrepreneurship.

The behaviour of companies participating in the modern economic structure can be assessed using the following four-layer model of the Internet economy.

Layer (1): Infrastructure. Includes companies that offer goods and services for creating an IP-based network infrastructure, for example Internet service providers, hardware companies, companies that offer products and systems in the field of computer and network security and specialized manufacturers of computer equipment.

Layer (2): Applications. Participants in the Internet economy that provide the environment for the development of business relationships and the implementation of business operations (Internet consultants; development of applications for commercial Internet transactions; creators of multimedia applications; software for search engines and creating websites; database management systems and Internet/Intranet applications).

Layer (3): Intermediaries. Their key role is to help increase the efficiency of electronic markets and facilitate the interaction between the two parties - the merchant and the customer. They function as catalysts for the processes in which investments in layer (1) and layer (2) ensure the successful implementation of business transactions. Typically, these are Internet search engines and portals; providers of information and specialized brokerage services; online advertising agencies, etc.

Layer (4): Electronic business. The layer includes all participants who provide sales of goods or services on the Internet or implement any of the other categories of electronic business. Their task is to help expand the scope and influence of established Internet models of market relations.

The implementation and maintenance of the processes of the Internet economy form an industry called the "Internet industry", which ensures the functioning of the network

information space. Traditionally, six sectors can be identified in it: hardware, software, access, information content (iContent), services, consulting.

The concept of ***Electronic Business (e-Business)*** was introduced by IBM to describe basic business processes and their implementation using modern information and communication technologies (ICT). This has led to significant changes in the business model, as business relationships (planning and management, marketing, sales, financial analysis, payments, employee search, customer and partner relationships, etc.) are transferred to the Internet. The main elements of this business model have existed for a long time: ✓ Electronic data exchange tools; ✓ Electronic funds transfer (EFT); ✓ Enterprise resource planning (ERP).

The development of the digital world has allowed modern e-business to combine the expanding capabilities of individual business information systems through their integration and joint management of business processes in the global web space. This allows for increased business efficiency and a new type of interaction between business partners. E-business includes electronic commerce, but also encompasses internal processes such as production, asset management, product development, risk management, finance, human resources, and others.

3. BASIC MODELS OF BUSINESS RELATIONS

The main business models (Table 1) are determined by the relationships between the participants in the processes, which are: B (Business); C (Customer); A (Administration); G (Government); P (Program Application). Combining pairs of participants defines the basic models presented in Table 1, as the B2B model is directly related to e-business.

Table 1. Description of basic business models

Models	***Comments***
B2B	*Business to Business:* basic model in e-business, presenting the relations between manufacturers and companies in the field of industry, their relationship with banks, insurers, brokers and other financial institutions, as well as with commercial enterprises, intermediaries and suppliers of goods and services.
B2C	*Business to Customer:* the equivalent of retail trade, in which various independent individuals (customers, buyers) interact with the store (seller). This is the model supported in e-commerce.
B2A	*Business to Administration:* reflects the relationships that cover all types of transactions between corporations and government administrations.
B2G	*Business to Government:* type of business relationship for the sale of products from commercial structures to government agencies and is usually associated with the logistics of government structures.
C2A	*Customer to Administration:* covers citizens' payments to the administration (taxes, social and health insurance, etc.).
C2B	*Customer to Business:* relationships related to the sale of goods and services by private individuals to corporations (consulting, transportation, etc.).
C2C	*Customer to Customer:* serves commercial transactions between individuals.
P2P	*Program Application to Program Application:* ensuring the integration of applications between trading partners by directly transmitting data from one software product to another software product.

B2B is the main model directly related to the technological organization of e-business processes, placing high demands on the means used to implement and protect data and transactions. In addition to implementing the right business scenarios, the model also requires the right choice of ICT in the implementation of the main activities (processing of requests for goods, invoicing and payment through network transactions, organization of deliveries, marketing, coordination of contracts and plans, etc.). The implementation of the model requires the creation and maintenance of a portal in the Internet space (Figure 1), integrating two relatively independent systems: Front-office system for ensuring information connection with users and maintaining basic functions for this purpose; Back-office system for maintaining internal executive activities for analyzing requests and their overall processing.

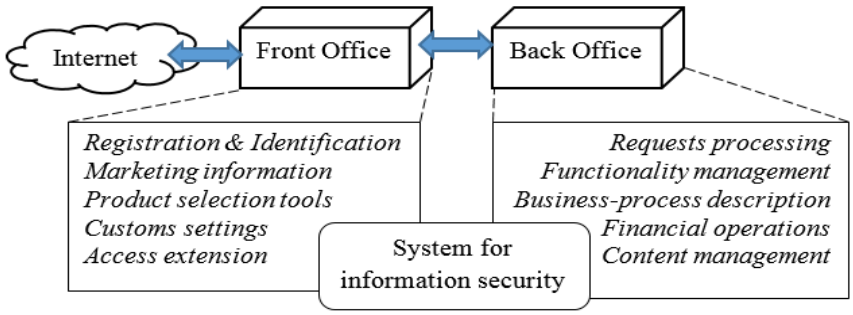

Figure 1. Portal for the B2B model technological organization

Maintaining processes for accessing and using information resources, including personal data profiles, requires the inclusion of an information security system that ensures reliable authentication and authorization of users without unduly hindering or delaying work. An example structure of such system is shown in Figure 2.

Some basic functionalities can be specified to adequately support business processes in the B2B model.

✓ Initial identification of the received application and, if necessary, registration of a new user by creating his profile with personal data. The latter requires strict compliance with the rules for processing personal data, which must be consistent with the specific purpose and have the user's consent.

✓ Successful completion of the function allows management to be provided to the information security system, which applies approved protocols and standards for network and corporate information security and personal data protection. Additional features and requirements for data protection are discussed in [7, 16].

✓ Content management checks and processes incoming information to extract the necessary metadata. It can be displayed to different users only after their personalization and filtering of data depending on the user's requirements, according to the established rules for access to the system.

✓ Customs settings – in-depth study of user requirements and implementation of services tailored to the characteristics of individual user groups. This personalization of services complements the description of business processes to optimize them and is carried out when business relationships are required.

✓ Access expansion is a function for creating appropriate conditions for the use of all electronic devices and equipment. In addition to the traditional requirements for high speed, operational reliability and security, business users are increasingly adding requirements for minimizing restrictions on access to electronic services in terms of time, place and price.

✓ Functionality management performs a correct description of the portal parameters and the conditions for its use, determines the requirements for user devices, equipment and technologies. Possible options are envisaged with a possible restructuring of the portal, but without serious changes in the structure of business processes.

✓The description of business processes is related to the collection, processing and aggregation of data necessary for a detailed description of all business processes in the B2B model. An analysis of the transactions that will implement the core functions and services for the business partners is prepared. This analysis is based on their recommendations, but also includes the specifications prepared for this purpose.

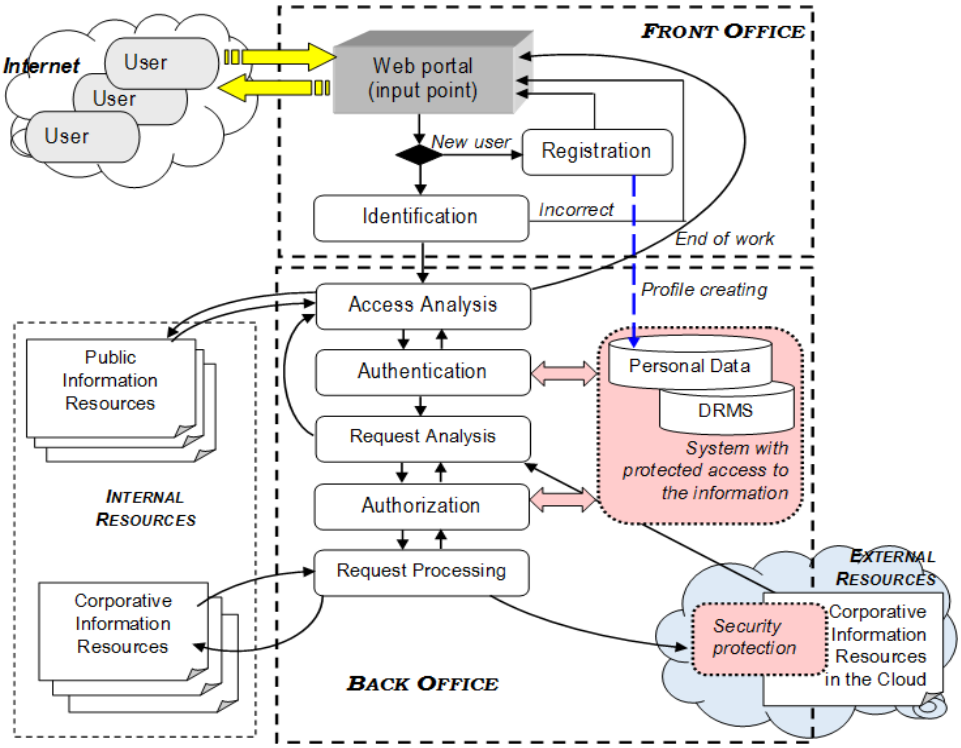

Figure 2. Technological structure of the system for information security

4. ORGANIZATON OF DIGITAL ECONOMIC AND BUSINESS PROCESSES

The organization of economic and e-business processes in the digital age is related to the main categories presented in Table 2, and the first three are important for business relations and processes organization.

Table 2. Basic categories of business organization

Category	*Comment*
E-marketing	An activity to research a specific market for the sale of a product, including four basic elements, known as the "four *p*": **p**roduct, **p**rice, **p**lace, **p**romotion. The object of the study is electronic markets and mainly the processes in them, aimed at potential consumers.
E-banking	It is associated with the use of systems for supporting remote banking customer service and remote execution of banking operations, which expands the scope of services and their functional capabilities.
E-delivery	Includes representatives of all groups of participants (manufacturer, trader, financial intermediary, customer), with the possibility of changing the composition over time. The main requirement is the presence of prior coordination of the partners and maintenance of the basic requirements for e-delivery (implementation time, final price; warranty period; persons responsible for the operations).
E-invoice	To issue a valid invoice, business partner registration and an agreement with a bank providing the service are required.
E-catalogue	A software system to ensure effective interactions between participants in the business model, with the main requirements being the presence of modules for search optimization, analysis of user requirements, analysis of processed and fulfilled requests, and to be in close connection with the supported processes.

The organization of the Internet economy and correct business relationships in the digital era requires the implementation of adequate activities in exemplary areas: ✓ periodic promotion, advertising of supported activities and direct marketing; ✓ regular maintenance of useful commercial relationships; ✓ analysis of the effectiveness of economic relationships and the effectiveness of the e-market; ✓ additional after-sales service; ✓ periodic assessment of the financial condition and introduction of new organizational methods.

When organizing digital e-business processes, it is necessary to pay special attention to the security of operations, optimization of banking activities and implementation of reliable protection systems. Minimum requirements in this regard are the following: ✓ unique identification of the client (most often through a password and personal identification code - PIN); ✓ two-way identification based on the cryptographic protocol Secure Socket Layer (SSL); ✓ encryption of transmitted financial data; ✓ protection of information stored on various external media.

4.1. Organization of e-market

The electronic market (e-market) is a generalized concept of commercial relationships implemented in the global network, which include suppliers of goods or services, manufacturers, customers and auxiliary units, united under the general name market participants. In addition to traditional commercial operations, the concept also includes various services implemented on the Internet, some of which are offered free of charge. Among the most common market services are e-mail, electronic auctions, games, participation in interest clubs, payment of bills via the Internet and many others.

A market participant can be anyone who makes a purchase or sale through the global network, and the following groups can be formed.

1. Suppliers – they are at the beginning of the chain and are decisive for the existence of the other units. In the electronic market, their main task is to provide a hardware and software environment for the implementation of operations in the following aspects: ✓ selection of equipment for creating and maintaining an electronic store (servers, routers, renting high-speed lines, etc.); ✓ provision of software for managing the electronic store and implementing transactions; ✓ creation of a database for visitors to the Web site.

2. Producers of goods and services – this category of market participants can be divided into two: ✓ traditional goods and services, including producers of real products with established nomenclatures, as well as services for the daily needs of consumers; ✓ services offered on the network, representing companies for maintaining Web sites on the Internet and usually oriented towards e-models of the C2B and B2B type.

3. Customers – usually these are network users visiting various Web sites, and from the point of view of representatives of the "producers" category, they are divided into two main groups: ✓ end users using the Internet to search for information for personal needs and entertainment, rarely visiting a limited range of Web sites (included in the C2B model); ✓ business users, which include specialists using the Internet to create and maintain their business (entrepreneurs, managers, system administrators who make transactions on the network, transmit company documents and participate in B2B-type relationships).

4. Auxiliary units – the group includes supporting traders in the retail chain, highly specialized e-stores (e.g. Amazon.com), intermediaries in concluding transactions, as well as consultants in various fields. Auxiliary units can also be defined as tools for indexing, addressing and searching for information on the Internet, such as search engines, directories, portal sites.

5. Financial institutions – market participants that ensure the processing of transactions in the financial sphere, applying methods and means for the implementation of: ✓ authentication of the financial institution and the client; ✓ verification of the integrity of the message; ✓ protection of the content of the message through encryption; ✓ protection against loss, damage or errors in delivery; ✓ protection against errors in the transmission and storage of messages.

4.2. Electronic payment (e-payment)

Electronic Payment Systems are a complex of hardware and software tools for performing payment transactions electronically (e-payment). They are characterized by fast authorization, increased security of operations and reliability of the means used to protect information. The processes organization on the Internet uses electronic analogues of traditional payment instruments and payment methods (Figure 4).

Electronic money (e-cash) has an ensured uniqueness of each banknote and can be transmitted over the Internet even using ordinary telephone lines. It can be stored in the workstation itself or on a smart card. However, the transmission of electronic money over publicly available communication channels hides the potential for tracking the

relevant financial transactions, which requires the implementation of information security measures and the anonymity of the source through cryptographic means.

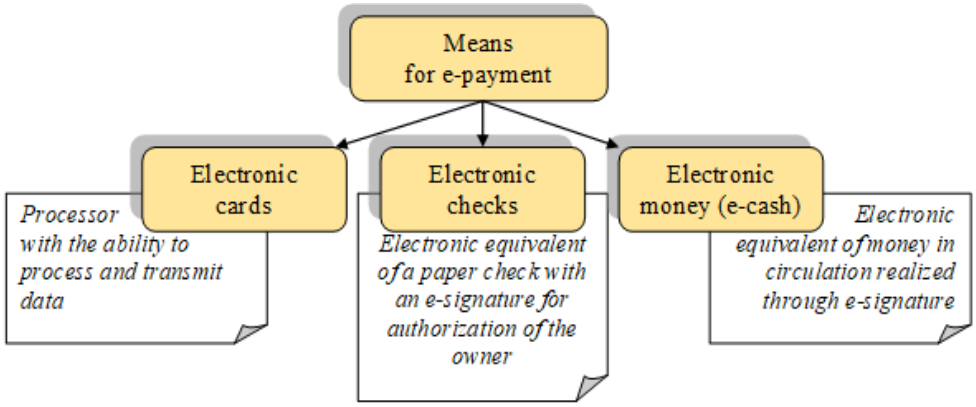

Figure 4. Opportunities for electronic payments in e-business

Smart card provides processing and storage of the necessary information, as well as control of access to it, and not all cards carry electronic money. Protection from illegitimate access can be carried out by authentication of the smart card itself using appropriate cryptographic protocols or by authentication of the owner using an individual code (a secret parameter processed with cryptographic algorithms).

Depending on the means used, electronic payment systems can be classified into five groups (Figure 5).

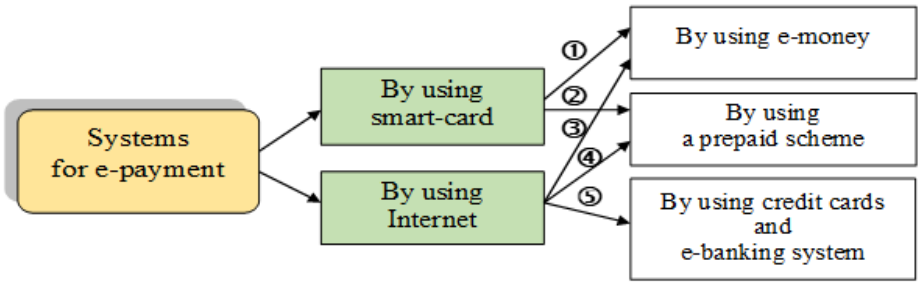

Figure 5. Classification of e-payment systems

1. *E-payment systems using smart cards and e-money.* Bank payments are made using a client smart card with an amount entered by special bank devices. Operations are performed with electronic banknotes from the funds available on the card, issued by a specialized organizational centre.

2. *E-payment systems using smart-card and prepayment* (Figure 6). A certain amount is deposited in advance in the bank, which is entered into the smart card, and when purchasing goods or paying for services, the necessary part is transferred from it to the accounts of the relevant supplier. The information enters the financial network, and a transfer is made between banks.

3. *E-payment systems using the Internet and electronic money*. For the implementation, two types of accounts of users (buyer and supplier) with available funds or with e-money processed by one bank are used. Payments are made with e-money, but valid only in the specific system and are transmitted between users via the Internet. If necessary, the available funds are converted into e-money, and the relevant accounts in the bank are processed.

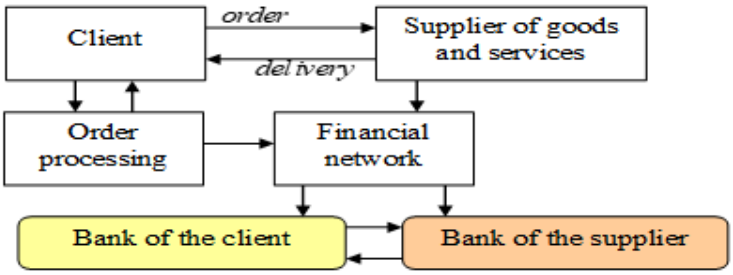

Figure 6. Organization of e-payment system by using smart-card and prepayment

4. *E-payment systems using the Internet and prepayment*. An account is opened for each user, becoming a subscriber to a subsystem for payments on the Internet and having access to the e-money used in it. The process starts with the selection of goods or services on the relevant website and entering the buyer's credit card data. Then a request is submitted to the specialized software system, which ensures the processing and transmission of e-money, encrypts the financial information received from the buyer, provides an e-signature and transmits it to the provider, which performs the necessary checks with the help of server machines.

5. *E-payment systems using the Internet, credit cards and e-banking*. The group includes systems that make payments with checks or credit cards, but the operations are carried out on the Internet. In addition, users are provided with the opportunity to carry out financial transactions on the network from their home or office, without having to visit the bank.

4. CONCLUSION

The development of network communications since the 1990s has allowed for continuous improvement of e-governance and the efficiency of the digital economy [17]. This is also confirmed by research conducted in various areas of the Internet economy and e-business with their adaptation to modern ICT in the last years [18]. One conclusion is the need for organizational policies to ensure efficiency in implementing their processes.

A basic requirement for the development of e-governance processes and components is the availability of a well-designed ICT infrastructure that meets modern requirements. This requires maintaining the necessary organizational literacy regarding the application of digital technologies. It should not be forgotten that the modern digital world is based on mass informatization of society and its globalization, which is associated with the continuous development of digital technologies, including social and cloud computing, Internet of Things (IoT) and Internet of Everything, smart society, big

data analysis, etc. This requires the implementation of adequate procedures to counter the challenges of these technologies by granting information security and protection of personal data in electronic processes and banking transactions [16].

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