DIGITAL TECHNOLOGIES AND THE INTEGRATION OF A GREEN ECONOMY: LEGAL PECULIARITIES AND ELECTRONIC TRANSACTIONS

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Abstract

Digital and electronic transactions enable to facilitate e–commerce and, based on the use of a green economy, eliminate obstacles to environmental pollution.
The study shows that there are the leaders of the countries which use the institutional and legal norms of the "green economy" in the process of electronic agreements, such as Germany, Great Britain, Hong Kong, Singapore, while at the legislative level these countries determine the norms that regulate digital signature, the use of asymmetric cryptosystem technology, two–factor authentication, storing information in the form of electronic records, while the potential for digitalization is more typical for the finance and insurance industry.
Is important to use legal instruments of using the electronic transactions in the terms of the greening process and the development of state policy at the national and territorial levels. Digital technology and ecology are proved to be two cross–cutting issues that relate to public actions. The participation of all stakeholders in public policy development, transparency and accountability are of great importance.

Keywords: digitalization, digital transactions, electronic transactions, ecosystem, digital signature, digital transformation

I. Introduction

Ensuring the use of this system is predetermined by a long–term impact on the development and creation of a competitive digital economic environment, a positive impact on the efficiency and transparency of agreements (Abramova et al., 2023), (Zverkova et al., 2023).

So, the following foreign scientists considered in the works (Davitadze et al., 2023). The Growth and Development of E–Commerce. (Gorbacheva et al., 2021), Harmonisation of the rules on electronic commerce and Serbian law. The Digital Currency Challenge for the Regulatory Regime.

II. Literature Review

The economic literature analyzes various scientific issues of using digital transactions, identifies theoretical and methodological approaches related to green technologies. Among the scientists who have made a significant contribution to these studies are: who focuses on innovations and knowledge which have an impact on the development of economy digitalization.

Cartwright study agreements, conclusion of contracts, release of liability and unfair conditions, deals with the characteristics of an offer or acceptance, the identification of the moment of concluding an agreement and risks.

Elliot focus on the conclusion of an agreement after the proposal is accepted without further negotiations, to the interconnection of the digital economy, the modernization of relations between a human and the environment, the transformation of the business model, focuses on the state regulation of e–commerce and tools for the formation of a single Eurasian economic space, etc.

III. Methods

The general scientific and special methods, such as deduction and induction, statistical analysis were used to solve the set goals. A two–part methodology was used in the study on digital transactions and the impact on a green economy. Firstly, a systematic approach was applied in a general form, when digital transactions were considered taking into account feedback, the impact on the ecosystem, etc.

IV. Results

In addition to a wide range of problems, from collecting detailed digital information online to processing data, it is important to focus on the improvement of ecosystems condition.

Table 1*: Leaders of countries using institutional and legal norms of the "green economy": electronic transactions and digital signatures*

Countries	Name of law	Key features and peculiarities
Leader in cryptography		
1. Great Britain (leader in cryptography)	Electronic Transactions Law	1.1. Supports the use of asymmetric cryptosystem technology 1.2. Regulates the provision of cryptographic services 1.3. Defines and provides confirmation, legal status of an electronic signature
leader in digital transactions, processes and the creation of a paperless economy		
2. Germany (leader in digital transactions, processes and the creation of a paperless economy)	Law on Digital Signature	2.1. Use of electronic signiture: SES–*standard electronic signiture*; QES – *qualified electronic signature*; AES – *authentic electronic signature*. 2.2. Most agreements only require a simple electronic signature 2.3. *Electronic signatures including seals, time stamps, delivery service registrations and certificates to authenticate websites* are used
Leader in two–factor authentication		
3. Singapore (leader in two–factor authentication)	Electronic Transactions Law	3.1. Electronic records can be used to express an offer or acceptance in conclusion of a contract 3.2. A method to identify the person who signs two–factor authentication is used

		3.3. The availability of an electronic signature panel for capturing signatures 3.4. Use of distributed ledger technology, smart contracts and biometrics
Leader in the preservation and recognition of electronic records		
4. Hong Kong (China) (leader in the preservation and recognition of electronic records)	Electronic Transactions Law	4.1. Provides a legal basis for the recognition of electronic records and signatures, giving them the same legal status as on paper 4.2. Signature requirement, according to the law, can be done by any form of electronic signature and submission or storage of information in the form of electronic records
5. Saudi Arabia	Electronic Transactions Law	5.1 Electronic transactions: transactions which are carried out by electronic means. 5.2 Transactions: a procedure or group of procedures that is performed between two or more parties to create obligations for one party or mutual obligations. 5.3 The clauses of the law are applied to transactions in which the parties agree to carry out their transactions by electronic means 5.4 Authentication procedures are considered commercially acceptable if they take into account the commercial terms of the parties to the transaction.
6. Australia	Electronic Transactions Law	6. Duration of electronic transactions For the purposes of Commonwealth law, a transaction is not invalid because it was carried out fully or partially through one or more electronic messages.
7. Canada	Electronic Transactions Law	7. Errors that may occur when working with electronic agents An electronic record created by an individual using an electronic agent of another person's is not valid and unenforceable if the individual has made a material error in the record
8. Singapore	Electronic Transactions Law	8.1 Electronic Transactions Act (ETA) (Cap 88) was first adopted in July 1998 to provide a legal basis for electronic signatures and to give predictability and certainty to contracts concluded electronically. 8.2. In July 2010, the ETA was canceled and re–enacted to ensure the permanent security and use of electronic transactions. 8.3. Commercial Code for Electronic Commerce Transactions: ETA was adopted to create a predictable legal environment for electronic commerce. It clearly defines the rights and obligations of the parties to the transaction.

Source: it was developed by the authors based on materials
https://www.legislation.gov.au/Details/C2011C00445
https://www.iclc–law.com/ar/
https://www.bclaws.ca/civix/document/id/complete/statreg/01010_01
https://www.imda.gov.sg/regulations–and–licensing–listing/electronic–transactions–act–and–regulations
https://www.scielo.br/scielo.php?pid=S0103–40142012000100024&script=sci_arttext

The analysis of the leading countries which use the institutional and legal norms of «green economy» increasingly shows a significant gap between countries with weak market economy and leading countries (Table 1). Germany is the leader in digital transactions, creating paperless economy. Along with this country, the active participants in this process of electronic agreements are: Great Britain, Singapore, Hong Kong, which are developing a rather effective model of electronic transactions in the terms of using green technologies.

Despite the inequality in the digital economy, the enterprises in the countries have opportunities to get benefit from the digitalization of electronic transactions. Such opportunities can arise from the productive use of global digital platforms.

The present and future shifts and changes, that lead to the need for faster use of digital transactions, can be caused by several reasons, often simultaneously, at the level of customer

behavior and expectations, new economic realities, social shifts, ecosystem/industry disruption and (accelerating implementation and innovation) emerging or existing digital technologies.

Wassily Leontief proposed a theory of general equilibrium that can be implemented empirically, and proved that the so–called partial analysis cannot provide a sufficiently broad basis for a fundamental understanding of the structure and functioning of economic systems. He began using the large–scale mechanical computing machine in 1935 and the electronic computing machine in 1943 while compiling the first input–output tables for the American economy. In recent years, he has focused on the analysis of environmental disruption and economic growth, while maintaining an active interest in the broader issues of scientific methodology for social and economic policy, as well as evolutionary and revolutionary changes.

Jean Tirol, French Nobel laureate, noted that "as innovation is deeply rooted, the age of knowledge will open up many opportunities ... universities or highly educated people on their own cannot define the era of innovation, as some of the startups started from humble beginning to succeed). This potential starts to be implemented in the age of information, digital and telecommunication technologies.

Emmanuelle Benicourt, quoting such an authoritative scientist, stated: «information is the basis for the allocation of resources based on the action of the market mechanism».

The electronic transactions in the legislation of some countries of the world are determined primarily by key parameters using any type of modern technical tools, i.e. they represent any act or contract concluded or subject to the partial or full execution by electronic communications using electrical, digital, magnetic, wireless, optical, electromagnetic, or any other equivalent tools.

It must be noted that such types of agreements began to appear to a greater extent due to the development of the Internet and computer technologies. The academician S.Glazyev notes that «ubiquitous computerization and a large–scale expansion of the scope of computer systems have initiated the emergence of the current topic of the digital revolution» (Glazyev, 2020). Due to the strengthening of these trends and the automation process for many industries, this will lead to the creation of new jobs (more than 2 million all over the world) for such professions as analysts, software developers, engineers and other highly qualified experts. However, this will lead to the reduction of 7 million jobs requiring the involvement of mid–level personnel, whose work will be performed by robots in future.

The electronic contracts, that today enterprises exchange and propose the possibility to dynamically, automatically create and apply behaviorally related services, are designed to achieve business goals. In cases when there are many contracts within a particular application, it can be difficult to determine whether the system can reliably perform all of them, but electronic contracts with computer analysis can automate the verification process.

And nowadays, we are becoming the participants of the fourth revolution – the digital one, which led to a large–scale transformation of all sectors of the economy.

The smartphone has become a point for receiving and providing services, a key link for making transactions. At the same time, «the gross value of goods in the cross–border e–commerce market ... will grow by about 25% annually till 2020 ... New 'micro–jobs' platforms, such as Upwork and Freelancer also provide entrepreneurs and enterprises with the ability to sell services online».

The fact that people will become entrepreneurs can significantly reduce the expected unemployment rate due to workplace automation.

Changing to another profession in the framework of paid employment will create preconditions for additional costs, for example, connected with acquiring a new qualification (Fossen & Sorgner, 2018). That is, the part of the employees will gradually be released from their jobs and may become interpreters who will be able to use environmental standards in a new way.

It should be taken into consideration that at the same time many Western and Northern European companies developed their main IT systems in the 1970s and 80s. These systems functioned properly until the last decade. However, in recent years, the IT environment has changed dramatically with the emergence of web communications, network computing and plug–

and–play systems. Having joined the digitization race quite late, the digital competitors are often less attached to such legacy systems because they do not have to discount the large investments of the previous generation. Consequently, it is easier for them to master new technologies, which allows them to jump over intermediate technologies. An example is the banking sector. In Central and Eastern Europe, financial transactions based on the payment cards were made without using checks. Today, the countries of the region can be proud of one of the highest rates of adopting contactless payment in the world. Thus, while digital competitors may find it difficult to compete in the traditional economy, they use them easily in the digital economy.

Potential for automation and digitalization in industry (Figure 1)& Digitalization index (Figure 2).

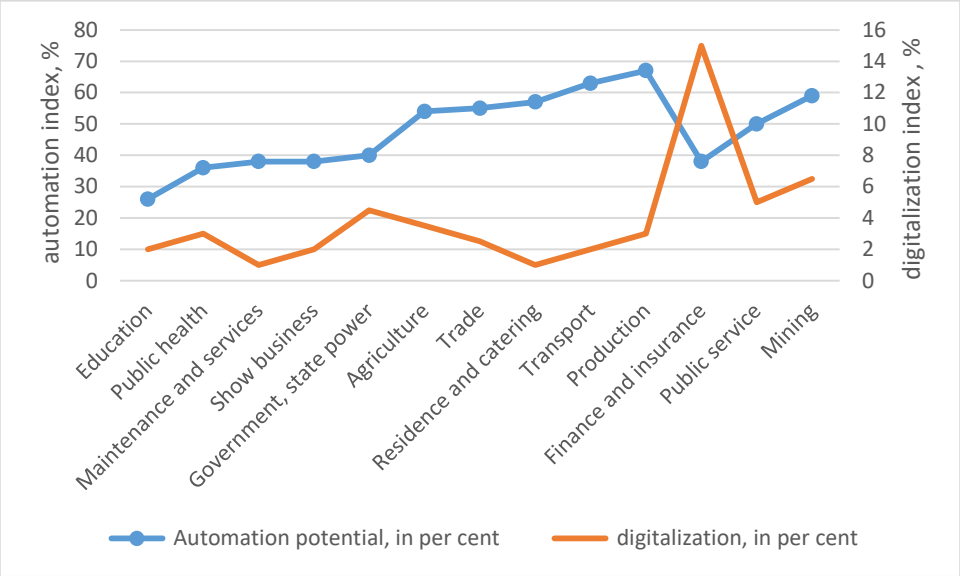

Figure 1: *Potential for automation and digitalization in industry*

Source: it was compiled by the authors based on data, Eurostat; McKinsey Global Institute; McKinsey analysis

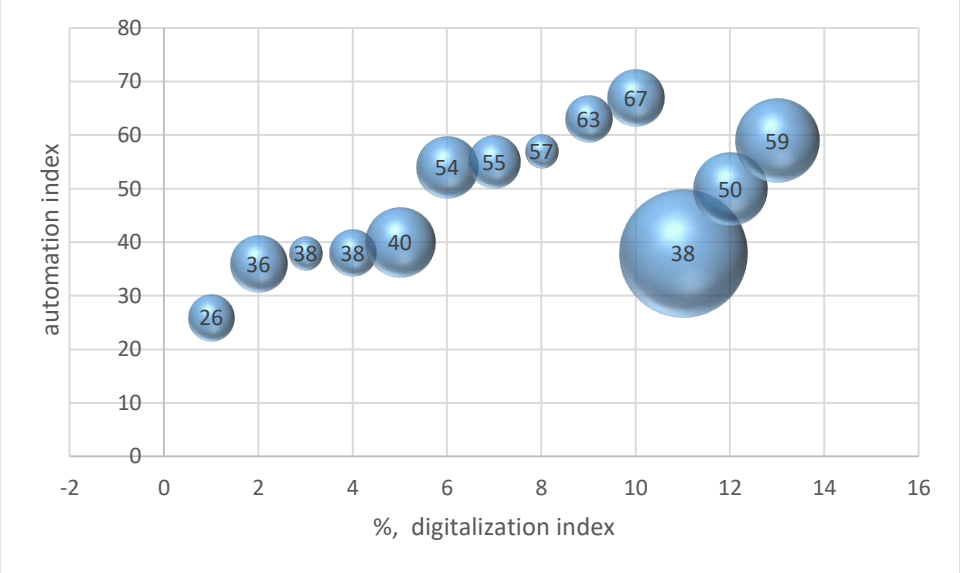

Figure 2: *Digitalization index*

Source: it was compiled by the authors based on data, Eurostat; McKinsey Global Institute; McKinsey analysis

As Figure 2 and Figure 3 shows, the potential for digitalization is more common in the finance and insurance industry than in the education and health sector.

Therefore, e–commerce can be classified according to the criterion of participants in virtual transactions (Table 2).

Table 2: *E–commerce and classification according to the criterion of participants in virtual transactions*

No.	Classification	Meaning
1.	B2G (Business–to–Government)	implies the implementation of transactions between economic entities (legal entities)
2.	B2B (Business–to–Business)	implies the implementation of transactions between economic entities of the market. Technically, such interaction is usually based on specialized open Internet platforms with a standard set of tools and rules. Interactive databases enable not only to provide a large volume of proposals, but also to track the process of order execution. B2B transactions often include organizing wholesale supplies of goods and placing orders at manufacturing enterprises
3.	B2C (Business–to–Consumer)	a type of e-commerce, which implies the transactions between legal entities and individuals. Most often it is retail via Internet. These can be specialized seller portals, electronic trading sites or direct mailings.
4.	C2C (Consumer–to–Consumer)	a type of e-commerce, which implies the transactions between individuals. This is usually trading through electronic bulletin boards (Slando, Avito, etc.) or on electronic trading sites (Molotok, Meshok, eBay, Delcampe, etc.)

Such virtual transactions can be considered as «green technologies, creating hybrid physical–digital solutions, increasing the efficiency of business processes through which eco–innovation is developed, and providing new functional opportunities».

The indicators of green growth in the Republic of Kazakhstan are given in Table 3.

Table 3: *Green Growth Indicators*

		1990	2010	2013	2016
All technologies (total patents)		1039	2384,15	2639,43	2695,71
Selected environment–related technologies		93,08	322,64	278,48	246,92
Environmental management		63,42	145,83	114,25	121,33
Environmental management	Air pollution abatement	15	40,42	36,58	19,5
	Water pollution abatement	34,33	71,17	44,67	50,17
	Waste management	14,08	32,75	33	47,67
	Soil remediation	0	0	0	3
	Environmental monitoring	0	1,5	0	1
Water–related adaptation technologies		8	25,5	30,83	17,5
Water–related adaptation technologies	Demand–side technologies (water conservation)	7	15,5	20	11,5
	Supply–side technologies (water availability)	1	10	10,83	6
Climate change mitigation		52,58	227,31	208,15	169,08
Climate change mitigation	Climate change mitigation in information and communication technologies (ICT)	0	4,17	14,03	6,5
	Climate change mitigation	11,5	128,95	100,95	65,83

	technologies related to energy generation, transmission or distribution				
	Climate change mitigation technologies related to wastewater treatment or waste management	16,83	27,42	27,33	30,67
	Capture, storage, sequestration or disposal of greenhouse gases	1	16,5	10,5	6,5
	Climate change mitigation technologies related to buildings	4	23,83	45,25	25
	Climate change mitigation technologies in the production or processing of goods	19,58	71,98	62,33	69,67

Source: https://stats.oecd.org/Index.aspx?DataSetCode=GREEN_GROWTH

The developed regulatory legal acts in the field of electronic transactions in Kazakhstan are presented in Table 4.

Table 4: *Regulatory legal acts in the field of electronic transactions*

№	Name
1	Civil Code of the Republic of Kazakhstan (general part) № 268–XII dated December 27, 1994 (as *amended* on 10.01.2020)
2	Letter of the territorial Tax code No.1839 "Regarding the accounting and taxation of electronic accounting units of the Webmoney payment system, intended for making payments on the Internet"
3	The order of the acting Minister for Investment and Development of the Republic of Kazakhstan No.74 On approval of requirements for the content, maintenance and information filling with electronic information resources of the e–government web–site dated January 26, 2016

Source: developed by the authors

From Table 1 it can be seen that electronic transactions are very relevant in Kazakhstan, in connection with this, various legal documents are being developed related to the regulation of electronic transactions.

Therefore, the interaction between the parties should be focused in electronic transactions. In fact, a satisfactory emulation of the concepts associated with the definition of who are the specific parties involved in the offer and acceptance on the basis of which the transaction is carried out, must be ensured in order to achieve the necessary functional equivalence of the electronic transaction system. Therefore, today it is important to take into consideration the fact that individuals can create automated electronic agents with which the other party interacts when concluding a contract.

Although the potential of Internet for saving material and energy resouces cannot be denied, it is still too early to say about positive impact of the emerging digital economy on the environment. We do not believe that our society has fully reached the stage when our science and engineering are ready to reconcile our economy and our environment in order to bring about a Copernican pivot which is characterized by saving hydrogen fuel, landless agriculture and an industrial ecosystem in which waste virtually disappears. The growth of e–commerce further stimulated business expansion.

However, in the Republic of Kazakhstan it is important to use sufficiently powerful legal tools of using electronic transactions in the terms of the greening process and the development of

state policy. Since at the national and territorial levels, the digital technologies and the environment are two cross–cutting issues that relate to public actions.

Digital technologies provide new tools to support these efforts. In addition to participation of citizen, digital technologies also facilitate the increase and interaction of persons who can contribute through their initiatives to the achievement of common environmental goals: citizens and groups, start–ups, large global operators, etc. Digital technologies should also have a profound impact on the content of state environmental policy. They create new tools for actions of government bodies: behavioral incentives, collaborative mobility systems, common work and production spaces, and «zero carbon society» projects.

V. Discussions

A sharp increase in digital technologies is predicted in the world and the Republic of Kazakhstan, and in this case, many enterprises will accept significant changes in the structure of the business model in the terms of digital transactions, taking into account the state of the ecosystem. The enterprises will need new collaborative technologies. At the same time, e–commerce and sales practice will have to adapt to a new digital format of interaction, which is likely to entail a significant change in legislation and programs for the digitalization of the economy (Antonenko, (2021), Archimandritova & Suptelo, (2022), Bunevich & Gorbacheva, (2022), Burykin, (2020), Gavrilova, (2020), Gavrilova & Demjanjuk,(2023), Davydovsky, (2019), Davitadze & Marakov,(2023), Dzyuba, (2021), Kamyshnikov, (2023), Kozunova, (2021), Koryakov, (2016), Koryakov et al., (2016), Kubova et al. ,(2018), Kuksin, (2020), Makovetsky & Rudakov, (2021). Panshin & Serebryakov, (2020), Suptelo & Dolgikh, (2021),Salikhov & Semenov, (2019), Slabospitsky & Slabospitskaya, (2022), Zhiltsov S. et.al.,(2018), Zonn & Orlovsky, (2019), Tebekin, (2023), Tyunyakova, (2017), Zagorov,(2022), Zubets, (2019), Zueva, 2017, Zhuravleva & Shlyakhin, (2018), Gorda, (2022) [1-18].

VI. Conclusion

In the process of development of the digital economy, the electronic transactions must contain electronic records, or data messages, electronic signatures, which are subsequently created, transmitted and stored in electronic form. Taking into account data analysis and forecast, certain types of economic activities will be expanded and have great forecasting potential. There are the leaders of the countries which use the institutional and legal norms of the "green economy" in the process of electronic agreements, while at the legislative level these countries determine the norms that regulate digital signature, the use of asymmetric cryptosystem technology, two–factor authentication, storing information in the form of electronic records, while the potential for digitalization is more typical for the finance and insurance industry. The leaders of the countries that use the institutional and legal norms of the "green economy" in the process of electronic agreements are highlighted, while at the legislative level in these countries the norms are defined that regulate the digital signature, the use of asymmetric cryptosystem technology, two–factor authentication, storing information in the form of electronic records, while the potential for digitalization is more characteristic of the finance and insurance industry.

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