

PAPER • OPEN ACCESS

Models and methods of digital mechanisms in anti-corruption, their advantages and disadvantages, and applications

To cite this article: A Nurkey *et al* 2022 *IOP Conf. Ser.: Mater. Sci. Eng.* **1216** 012015

View the [article online](#) for updates and enhancements.

You may also like

- [Coal combustion emission and corruption in ASEAN: Does government integrity plays moderation role?](#)
Rafiq Azzam Al Afif, Ahmad Daerobi, Bhimo Rizky Samudro et al.
- [The Limits of Weberian on Anti-Corruption Approaches in the Indonesian Municipalities](#)
Muhammad Ichsan Kabullah
- [Transparency, ethical disaster and public sector corruption control in Indonesia](#)
M Asri and M Ali



ECS
The
Electrochemical
Society
Advancing solid state &
electrochemical science & technology

DISCOVER
how sustainability
intersects with
electrochemistry & solid
state science research

Models and methods of digital mechanisms in anti-corruption, their advantages and disadvantages, and applications

A Nurkey¹, A Mukasheva² and D Yedilkhan³

¹ Academy of the Public Administration under the President of the Republic of Kazakhstan, Nur-Sultan, 010000, Kazakhstan

² Almaty University of Power Engineering and Telecommunications, Almaty, 050013, Kazakhstan

³ Astana IT University, Nur-Sultan, 010000, Kazakhstan

E-mail: a.nurkey@gmail.com

Abstract. Corruption is one of the main problems in many developing countries. However, the complexity of measuring corruption and its consequences does not allow for its complete study and implementation of measures. The factors and indicators currently known worldwide cannot measure corruption on time scales and depend on a narrow circle of experts in this area. Thus, corruption is easily confused with institutional gaps. In modern society, where the technologies such as Data Science and Predictive Analytics play a huge role, corruption is still omnipresent. The article examines the priority areas of combating corruption using new digital technologies. The main direction of the article is defined as an analysis of the advantages and disadvantages of the digitalization in the areas of solving social conflicts. The article presents the comparative analysis of technologies of digital anti-corruption compliance in developing countries, on the example of Kazakhstan. At the same time, according to the results, the article discusses the disadvantages of using proposed models due to the peculiarities of the legislation.

1. Introduction

Information and communication technologies (ICT) in general play an essential role in many areas of management, including government, through the transparency of the business processes. It can be said, that ICT technologies provide more efficient and fair governance. This paper shows the attitude of civil society towards ICT as both an anti-corruption tool and a governance tool. The use of ICT in the fight against corruption is gaining more and more popularity worldwide. The desire to use modern approaches to counter corruption, fueled by the acceleration of ICT development, and has led to new exciting solutions.

Nowadays, ICT can be actively used to ensure integrity in the provision of public services, in strengthening the public reporting system, public procurement, and public financial management. The purpose of the paper is to study the impact of ICT in combating corruption and analyze the economic benefits of implementing modern technologies in the anti-corruption policy on a regional level. In addition, there will be points examining the relationship between factors related to technologies and corruption perceptions. From the technical side, we should define the government policy and vision related to technology, implementation of technological tools in legislative documents of corruption prevention, and its economic and social efficiency in the public sector.



Content from this work may be used under the terms of the [Creative Commons Attribution 3.0 licence](https://creativecommons.org/licenses/by/3.0/). Any further distribution of this work must maintain attribution to the author(s) and the title of the work, journal citation and DOI.

This research identifies the relationship of the above factors with corruption. Moreover, this paper examines the positive influences of the public policies and the capability of the digital legal system to digital maturity.

Hypothesis 1: Digitalization of public services positively influences anti-corruption policies. The free access to the technologies makes people combine their business and household with the internet, requiring high quality of connection and cell phone communications. Easy access to the internet, its low price, good quality of connection, and widespread popularity may lead to developing e-commerce. To make transactions through the internet, users need to upload customers' personal information like ID number of credit card, security codes, and others. However, the lack of security could negatively relate to the number of users online. One of the ways to avoid this is to implement high-quality IT and internet infrastructures.

Hypothesis 2: ICT positively influences the trust of citizens in the government. The paper also questions the SWOT analysis of using ICT that should have been chosen to fight corruption effectively.

The article consists of Introduction, Corruption, Corruption in Kazakhstan, where the article's literature review, aims, and hypothesis can be found. Then a Research method and Analysis section is provided, and after that, the research results are given in the section Discussion and conclusion.

2. Corruption in Kazakhstan

Since gaining independence, Kazakhstan has not ceased its fight against corruption, and during this relatively short period, conditional stages in the development of anti-corruption strategies and activities, in general, can be distinguished.

The first stage begins with implementing the Law of the Republic of Kazakhstan dated July 2, 1998, No. 267-I "On the fight against corruption" [3]. At this stage, the country was actively fighting the consequences and sources of everyday corruption since, after the collapse of the Soviet Union, all CIS countries faced this phenomenon. Citizens had to deal with the facts of corruption when receiving public services, whether in medical institutions or law enforcement agencies. At this stage, the state had to minimize the contact of civil servants with service recipients. Thus, adopting the advanced experience of developed countries such as Singapore, Great Britain, France, and others, one-stop shops appeared in the country, operating on the principle of a "single window".

The second stage of development began in 2010-2015 when the state introduced the Law of the Republic of Kazakhstan dated November 18, 2015, No. 410-V "On Combating Corruption" [3]. The work with the principle of "single window" is gaining momentum. Therefore, further steps are determined in business corruption and work with artificial barriers in the private sector. Some works defined that the private sector and corruption prevention are correlated [1]. Corruption in the quasi-public sector is suppressed, the criminal code is being hardened in the direction of receiving and giving bribes. The state has a comprehensive approach in the fight against corruption.

Some of the most critical corruption factors in Kazakhstan are: legal, organizational and managerial, economic, socio-cultural, and psychological [2].

From the point of view of the legal support of this issue in Kazakhstan, there is no targeted anti-corruption document regulating the work of government officials and civil society. Also, one cannot fail to consider that the legislative bodies are not entirely removed from bribery. There is still the possibility of active participants in this crime among the employees of state bodies. In this regard, it is necessary to ensure modern and working laws. It is fashionable to include supply and demand for bribery among economic factors. According to economic realities, where there is a demand for corruption, an offer will undoubtedly appear. Also, in some cases, a monopoly on corruption appears. The issuance of public service by one state body is monopolized, thereby creating conditions for the monopolization of this public service. Kazakhstan is one of the former CIS countries where the corruption level slightly differs from the others in 2019, which can be seen in figure 1[4].

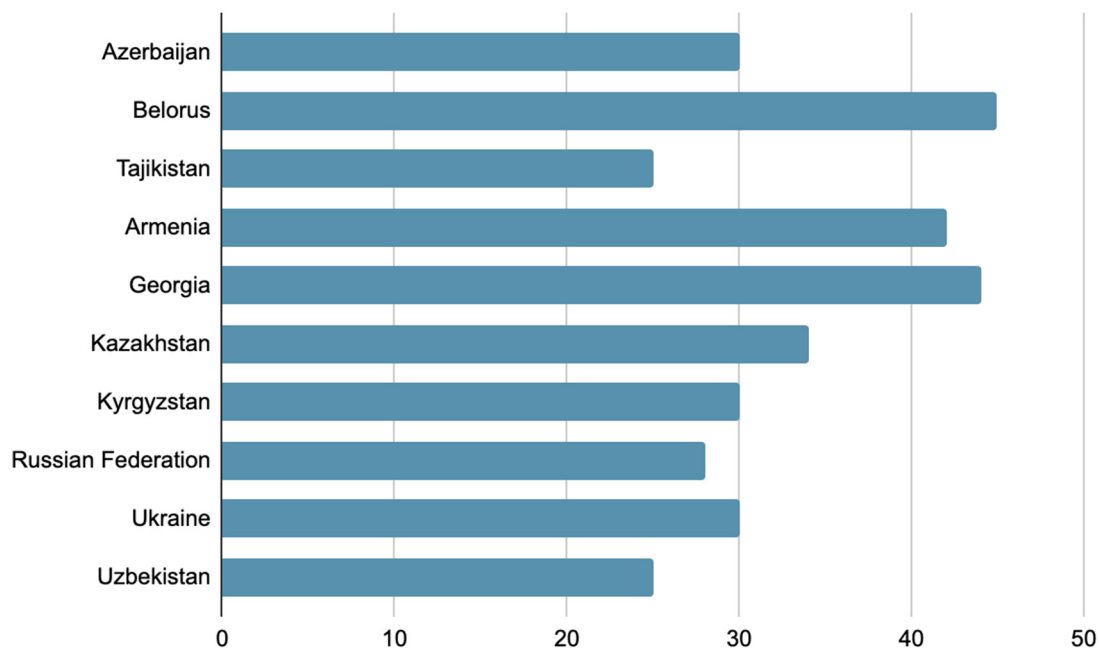


Figure 1. Corruption Perceptions Index of Post-Soviet Countries for 2019.

The Government has a clear vision of trade and commerce prosperity as well as citizens' wellbeing. Therefore, it has to implement new applications and technologies to achieve the purpose.

3. Corruption and ICT

New technologies are facilitating simplified work between the government and its citizens. The main advantages of ICTs are that they can be used to increase the transparency of processes, the level of accountability, and the quality of information dissemination [5]. Other scholars confirm this assumption [6] and believe that the use of ICTs contributes to the automation of main business processes, limits the actions of some unethical civil servants, and reduces red tape. However, they cannot fail to note the fears regarding using this technology as a tool for committing this crime. Open data and access to the rapid development of the Internet and technologies can contribute to hacking all kinds of sites and databases, distorting or hiding some information. Kossow and Dykes investigated the concept of the benefits and harms of ICT in countering corruption and concluded that this would depend on the impact on the demand or supply of certain information [7].

So, after analyzing literature review, we can identify eight main factors: automation, transparency, monitoring, informatization, accountability, prevention, encouragement, and training. Nowadays the popularity of using neural networks are expanding not only in science but also in private sectors [8]. These practice shows that the artificial intelligence could be successfully used in public sector. The corruption manifestations could be diminished by these tools.

Below table 1 can be seen, where the central area of using ICT in corruption prevention is constructed. In the table, we tried to show the main directions of where ICT can help to minimize corruption manifestation in any possible way.

Table 1. The types of using ICT in fighting corruption

Action type	Actions	Main goal	ICT
Automation	Eliminate human impact on the process	Fight with petty corruption	Automated solutions and information systems, Big data and predictive analytics, Blockchain, e-government
Transparency	Eliminating the possibility of hiding information	Mobilizing citizens, service recipients	User-friendly websites where all information is published, Blockchain, Big data, Open Data portals
Monitoring	Monitoring the subject of identifying preparation for committing corruption	Fight with large scale corruption, for example in public procurement and foreign trade	Social media tools and analysis, Big data, Blockchain, cross validation, Artificial intelligence
Informatization	Notifying Citizens of Government Rules and Procedures to Reduce Resistance to Covering Corruption	Fight with petty corruption	Any information systems, user friendly websites, cloud technologies, usage of QR codes
Accountability	Mobilize users and communities to disclose cases of corruption (Whistleblower)	Fight with petty corruption	Any information systems, social networks, e-government, blockchain, Artificial intelligence
Prevention	Publication on social media and other sources of information and a report on corruption	Fight with petty corruption	Social networks, double audit, Blockchain, Artificial intelligence
Encouragement	Organization of consultation meetings, conferences online	Changing the behavior of citizens	Social networks, blockchain, QR code (via gaining social encouragement)
Training	Train government officials in order to widespread knowledge about corruption prevention actions and mechanisms	Changing the behavior of citizens and civil servants, enhance trust of the citizens	Trainings, meetings, QR code, Cloud technologies, social networks

4. Research methods and analysis

The research consists of questionnaires of 118 respondents of the citizens of Nur-Sultan city in Kazakhstan in order to analyze the effectiveness of ICT and get their typical attitude and expectations toward the topic.

One of the questions was “Which of the parties, in your opinion, is more interested in committing the act of corruption?” (Figure 2), where respondents share opinions regarding the most exciting side in committing corruption. The results show that the most interested player is acceptors. That could illustrate that the ICT tools must be implemented in order to limit the ways of accepting corruption rather than giving it. For example, through Blockchain, Big data, and Cloud technologies, which can help to provide transparent business-processes.

Which of the parties, in your opinion, is more interested in committing the fact of corruption?

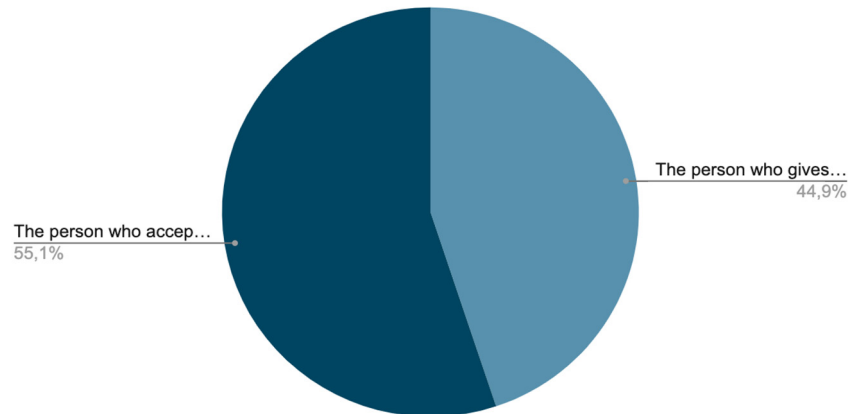


Figure 2. Analysis of question “Which of the parties, in your opinion, is more interested in committing the act of corruption?”.

Almost 87 percent of respondents have confidence that ICT benefits corruption prevention. However, there are still 7.6 percent skeptical citizens, who have negative thoughts about the initiative (figure 3). As we can see the vast proportion of the respondents have a strong believes in ICT and its benefits in the field of curbing bribery.

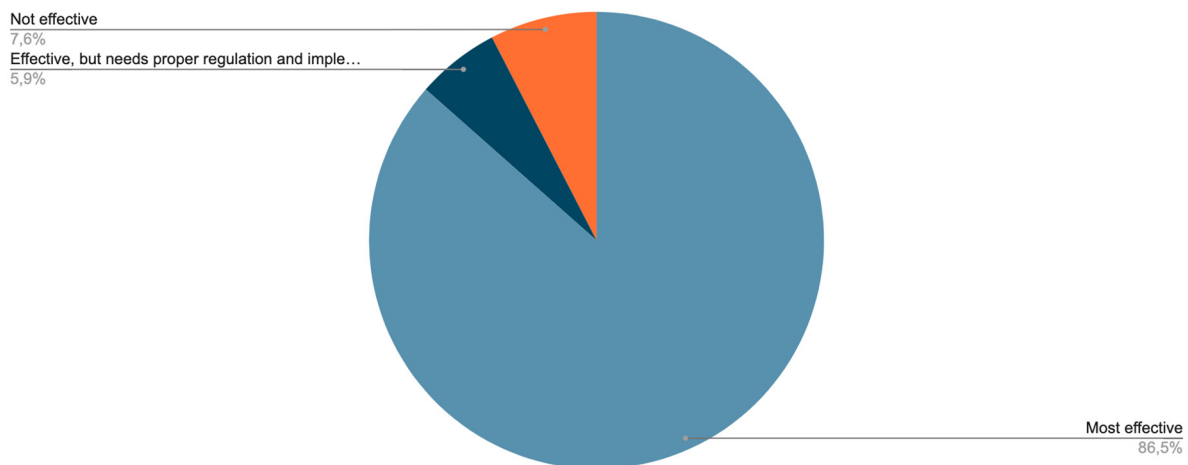


Figure 3. Analysis of question “How effective are new technologies such as artificial intelligence, distributed systems (Blockchain) and Big Data for fighting corruption?”.

Trust of the citizens to the government has a significant impact on corruption prevention because this will enhance the whistle-blowing mechanism in general and help distribute the information regarding it. In this case, corruption perception through the citizen’s trust in the government was assessed (figure 4). The survey shows that the degree of trust in the government’s anti-corruption policies in Kazakhstan is shallow. This can be because citizens do not have strict insurance, and they could have experienced or heard about the dishonest actions of government officials.

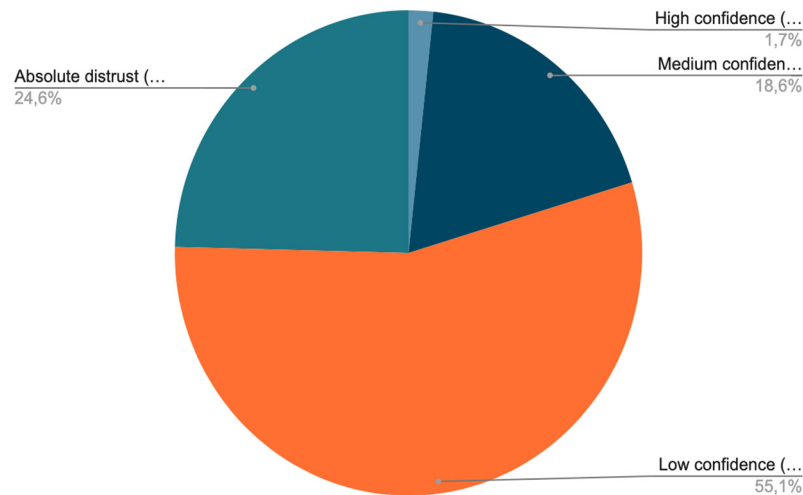


Figure 4. Analysis of question “The degree of your confidence in the state and government reforms in the field of detection of corruption?”.

The SWOT analysis of different types of ICT (Table 2) was performed, where implementation of some of ICT technologies (Blockchain, Cloud technologies) were analyzed and both the effectiveness and disadvantages were described. For example, Fauvel in his works describe the economically ineffective of blockchains, because of a huge energy consumption, however this can be the most useful tool in monitoring corruption and shadow economy [9]. Cloud Technology has a lot of advantages, although the security part is not so safe [10]. The main problem of QR codes is that they may be distorted which can lead to the distribution of damaged information [11]. This kind of obstacles are common for all types of Information Communication technologies [12, 13].

Table 2. SWOT analysis of different types of ICT in corruption perception.

Types of technology or tools	Strengths	Weaknesses	Opportunity	Threads
QR code (Quick response code)	Versatile User-friendly Fast scanning Economically effective Storage advantages Eco-friendly Business-friendly	Poor execution Not famous among elderly people Need a smartphone	Helps to fast inform a huge amount of people concerning corruption Helps to storage some necessary information and materials	Security aspect is not so strength Those, who don't have a smartphone could miss information
Blockchain	Process integrity Security Detectable	Not eco-friendly Economically ineffective Not power-consuming High costs of implementation and operation	Reduce potential corruption risks Provide strong accountability Reveals shadow economy and corruption in the system	Consume huge energy and money, and this could reduce the benefit itself Needs high qualified IT specialists

Cloud technology	Easy implementation Accessibility Economically effective High speed Mobility API Access availability	Bandwidth issues Technical problems Depends on Internet connection	Provide unlimited storage opportunity Web-based control	Security Threat Performance is not stable Economically not so effective (because of operational costs)
Big Data	The availability of data from different sources Accessibility Economically effective Forecast Open data opportunities	Data requires a lot of processing Data storage format requires unification	Provision of open data Ability to use API to connect third-party applications Possibility of forecasting	Data leakage threats Data processing problems
Artificial intelligence	Accurate prediction Simplified results interpretation Constant monitoring	Lack of data Limitation in performance	Development of novel techniques Continuous implementing of new data	Policy and legislation Personal data abuse Ethical questions

Some ICT technologies are not so safety as we can think, there could be some threats related to physical damage, loss of information and cyber security issues. These threats have a huge impact on the liquidity and capital in general [12]. The cost should be calculated before applying the ICT technologies.

5. Discussion and conclusion

New technology certainly brings a lot of advantages in life of ordinary people as well as in the work of government. The survey shows that trust of the citizens is low and they are not confident about corruption prevention mechanisms which are implemented in Kazakhstan. However, according the same survey they have a positive attitude to the issue of ICT in fighting corruption. Almost 9 out of 10 respondents have a believes in the ICT in public sector. The respondents have a slightly more opinion that bribe receivers are more motivated than givers. That is why, we can consider that the most effective for enhancing public trust may be a monitoring and prevention works with public officials. That could give us the positive results of hypothesis 2.

In the paper we also consider the SWOT analysis of the types of ICT that should have a precise attention of government officials. So, at the end we can see that some of the tools have absolutely advantages to use in public sector, like QR code and Artificial intelligence. However, some of them have a difficulties and effectiveness threads like, economic and security. These tools (Blockchain, Cloud technologies and Big Data) needs additional resources or updates to be effectively useful in public administration. As a result, the hypothesis 1 could not be absolutely right in our case.

As we can see from the analysis, the citizens of Kazakhstan are positively reacting to a new initiative which is concluded in implementing new technologies in the governmental sectors. Although currently, they are not sure about the effectiveness of the working policy and overall, to the government.

Government of Kazakhstan should implement the ICT tools in corruption prevention policies although the outcome should be calculated, because some of them might have huge operational costs. It is true that ICT generally used to automize the processes. While some of them are good in automation we need pay attention to other ones and wide the scope of understanding of ICT. We need involve this term not only in monitoring and automatization but also in other different fields like, HR, training and encouragement.

This fact is presumably making Kazakhstan remain in a lower position in the international ratings of fighting corruption. As a result of the paper, it is proposed to create and test an information and analytical system in the public authorities of Kazakhstan containing data in the following areas:

- Regulatory and legal support for combating corruption in the state and municipal service;
- Practical features of combating corruption;
- Memos and guidelines for combating corruption;
- Psychological tests (diagnostics of a tendency to corruption and other deviant deviations in behavior);
- Tests for knowledge of legal regulation of anti-corruption;
- Training.

6. References

- [1] Anokhin S and Schulze W 2009 Entrepreneurship, innovation, and corruption *Journal of Business Venturing* **24**(5) pp 465-476 <https://doi.org/10.1016/j.jbusvent.2008.06.001>
- [2] Zolotareva S and Mamonova I 2020 Anti-corruption in the civil service as a factor in increasing the efficiency of public administration *Social Integration and Development of Ethnocultures in the Eurasian Space* **1**(9) pp 132-137 <https://articlekz.com/article/11828> (date accessed: 1.06.2020)
- [3] Mukashev A 2020 How is the Fight Against Corruption in Kazakhstan Taken Place? *Central Asian Bureau for Analytical Reporting* <https://cabar.asia/en/how-is-the-fight-against-corruption-in-kazakhstan-taken-place>
- [4] Transparency International 2019 *Corruption Perception Index*, <https://www.transparency.org/en/cpi/2019/index/nzl>
- [5] Chene M 2012 Use of Mobile Phones to Detect and Deter Corruption Available from: <https://www.gov.uk/dfid-research-outputs/>
- [6] Grönlund Å *et al* 2010 Increasing transparency and fighting corruption through ICT empowering people and communities *The Swedish Program for ICT in Developing Regions*. Available from <https://spidercenter.org/files/2017/01/Spider-ICT4D-series-6-ICT-for-anticorruption.pdf>
- [7] Kossov N and Kukutschka R M 2017 Civil society and online connectivity: controlling corruption on the net? *Crime, Law, and Social Change* pp 1-18
- [8] Sokolov S, Iliev T B and Stoyanov I S 2019 Analysis of Cybersecurity Threats in Cloud Applications Using Deep Learning Techniques *42nd International Convention on Information and Communication Technology, Electronics and Microelectronics (MIPRO)* pp 441-446 doi: 10.23919/MIPRO.2019.8756755
- [9] Fauvel W 2021 Blockchain Advantages and Disadvantages Available from: <https://medium.com/nudjed/blockchain-advantage-and-disadvantages-e76dfde3bbc0>
- [10] Krutz R L and Vines R D 2010 *Cloud Security: A Comprehensive Guide to Secure Cloud Computing Indianapolis: Wiley Publishing*
- [11] Ansari Sh and Gaonkar R 2013 QR (Quick Response) Codes Application in Academic Libraries: Case study of KRRC (Central Library) *National Conference on "Changing trends in academic librarianship in electronic environment"*
- [12] Stoyanov I S, Iliev T B, Mihaylov G Y, Evstatiev B I and Sokolov S A 2018 Analysis of the Cybersecurity Threats in Smart Grid University of Telecommunications and Post, Sofia, Bulgaria *IEEE 24th SIITME* pp 90-93 doi: 10.1109/SIITME.2018.8599261
- [13] Otuoze A O, Mustafa M W and Larik R M 2018 Smart grids security challenges: Classification by sources of threats *Journal of Electrical Systems and Information Technology* **5**(3) pp 468-483 <https://doi.org/10.1016/j.jesit.2018.01.001>