

Review Paper

The Impact of Open Data on Economic Growth and Development in Ukraine

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ABSTRACT

Over time, information and knowledge industries are becoming increasingly important for the country's effective economic development. Therefore, to ensure the quality functioning of most internal processes in countries moving towards a post-industrial economic model, it is essential to increase data openness. Thus, the purpose of this research is to evaluate the impact of information accessibility on the development and economic growth of Ukraine. The main research methods used in the study were analysis, comparison, deduction, induction. The study provides a general overview of the development of open data in Ukraine. It was demonstrated that although the country has a legal framework, it is still not sufficient to ensure the sustainable development of this component. In addition, the general benefits that can be obtained by the state and its economic relations in the event of a further increase in data openness were considered. Thus, the main sectors and their opportunities for using open data in their activities were described. In addition, a positive impact has been demonstrated regarding the components of activities for which the state is responsible, such as healthcare, public transport, education. In addition, the author mentions the role of artificial intelligence in the further development of Ukraine and the possibility of using it to analyse open data. This study provides new knowledge for analysing the impact of public data on economic growth and allows for a better assessment of some of the specifics of Ukraine's development in general.

HIGHLIGHTS

- The article aims to evaluate the impact of information accessibility on the development and economic growth of Ukraine by analyzing the country's progress in open data implementation, highlighting the benefits and opportunities for various sectors, and considering the role of artificial intelligence in further development.

Keywords: Artificial Intelligence, Commercial Purposes, Innovation, Public Administration, Statistics

In general, open data is publicly available information that can be freely used and disseminated by anyone without restrictions (Open Data for Sustainable Development, 2015). With the development of the Internet and the latest technologies, the processes of selecting various types of information and disseminating it have improved significantly around the world. It allowed for easier access to data for individuals (students or researchers) and organisations (Banovic, 2020). All of this has made the dissemination of open data relevant, including at the international level: for example, under

Directive (EU) 2019/1024 of the European Parliament and of the Council (2019), which provides for improved access to data to encourage its use for both commercial and non-commercial purposes. The main responsibility for implementing the data dissemination policy belongs to the state. Therefore, some principles of functioning of state institutions and bodies have changed, making some data that

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was previously intended exclusively for use in administrative procedures public and reusable (Gao *et al.* 2021; Wirtz *et al.* 2022).

However, due to the spread of this phenomenon, there is a need for scientific justification and explanation of the positive or adverse effects it causes (Ramachandran *et al.* 2021). In general, researchers conclude that this method of disseminating data and making it available to organisations brings many benefits for improving their efficiency; moreover, it benefits ordinary citizens who require specific data for learning or making their calculations (Huston *et al.* 2019; Jamieson *et al.* 2019). However, it remains important to consider how the spread of open data affects the development of a country. Thus, this research examines the development and use of open data in Ukraine, including the benefits and challenges, and provides some suggestions for improving the national policy in this area.

A significant number of scholars have explored the impact of open data on economic development in general. For example, M. C. Catone (2023) considered current trends related to the study of the role of open data. Meanwhile, N. Petrovic *et al.* (2022) assessed how value and welfare are established through the dissemination of open data. However, they provide a rather superficial overview, which requires additional research and clarification. The specific features of the general development of data openness in the world and, in particular, within the European Union are explored in the work of C. Pascu and J. C. Burgelman (2022). However, this research is rather general and superficial.

The same impact of free access to literature and data in developing countries was explored by F. Mueller-Langer *et al.* (2020). They demonstrated that data accessibility improves the efficiency of most organisations, which suggests the overall benefit of this approach to information provision. Therewith, the current state of open data in Ukraine was explored by V. Shevchenko *et al.* (2020). They note that the further implementation of such a concept could significantly increase the efficiency of many internal processes in Ukraine, in particular: it would allow checking future business partners, better preparation for various training projects, use by journalists. However, the researchers pay little attention to the problems that exist in the country

and do not allow for the effective implementation of this concept. Thus, the purpose of this research was to describe the main problems and prospects for using and developing open data in Ukraine. It will allow the government to improve the existing national policy in this area.

MATERIALS AND METHODS

The research partially used data from the Ukrainian legislative framework, in particular, the Law of Ukraine “On access to public information” (2011) and Resolution of the Cabinet of Ministers of Ukraine “On approval of the Regulation on data sets that are subject to publication in the form of open data” (2023). In addition, some documents of international associations were used, in particular, Directive (EU) 2019/1024 of the European Parliament and of the council (2019). In addition, data from some other Ukrainian statistical sources were also used, in particular – Anti-corruption and social impact of open data in the road construction, renovation, repairs, and maintenance industry of Ukraine (2021). Furthermore, information from the studies of some international organisations was used, in particular – Open Data for Sustainable Development (2015), GDP (current US\$) (2022).

In conducting the research, the author actively used an analytical approach, which allowed considering quite significant amounts of information and finding patterns among them that could characterise the development of open data in Ukraine. In addition, a systematic approach was used to distribute the impact of open data on different areas of activity in separate processes in their interaction with each other and the development of a single system of interaction. Thus, in the course of the research, the author used a large number of different methods of scientific research methods. One of them is the analysis, which allowed considering a large number of different types of data and making basic research on the role of open data in general and in Ukraine in particular. In addition, the deduction method was important, as it allowed concluding the problems in the development of open data in the country based on the general state of this component.

Through induction, the author was able to assess how effective using artificial intelligence to analyse open data would be, given the theoretical benefits it could

bring. In addition, the author used comparisons to conclude by using various methods to increase data openness. The modelling method was used to establish a system that justifies the benefits that a country can obtain if it develops free access to information. Thus, the method of formalisation was essential, as some components of the model were simplified for better understanding. The system itself was designed using the graphical method. In addition, forecasting proved to be important, as it helped to substantiate scenarios of Ukraine's development and the specific factors of each of them in the case of development or ignoring open data.

RESULTS

In recent years, the development of open data in Ukraine has been quite rapid. In particular, the country has been actively developing its legislative framework in this area. Thus, in 2011, the Law of Ukraine "On access to public information" (2011) was adopted, which established a legal framework for open data. The next step was that the country became a member of the International Open Data Charter (2015), in the same year, the Resolution of the Cabinet of Ministers of Ukraine "On approval of the Regulation on data sets that are subject to publication in the form of open data" (2023) was adopted, which provided access to various data sets, such as data on public procurement, budget expenditures, and population statistics. The platform provided tools for data analysis, visualisation and downloading. However, due to the beginning of Russia's full-scale invasion, access to it was blocked. Notably, a huge number of different Ukrainian government agencies generally publish various statistics on their activities.

As part of the research, it is advisable to consider the special project "Vkursi Pro", which provides access to various datasets, such as data on public procurement, budget expenditures, and population statistics. It is designed to increase the transparency of government activities and promote innovation and entrepreneurship in Ukraine. The service provides users with data analysis tools, making it a valuable resource for researchers, companies and civil society organisations, and offers data training and consulting services, helping users to improve their data literacy and use data effectively. Nevertheless, it will be most useful for businesses

starting, as the company provides an opportunity to analyse Ukrainian markets and the entire Ukrainian business by more than a hundred different criteria: they will help assess the state of the banking sector, marketing, legal aspects. Although to receive the full range of assistance from this organisation, you need to order a consultation, some information is provided free of charge, and a short news report with interesting information relevant to the current realities of the country's functioning is published approximately once every ten days. A stronger initiative on the part of the state to increase the number of such services could significantly improve the functioning of many enterprises.

In Ukraine, open data is used for various purposes, including research, business and civil society. For example, researchers have used open data to identify corruption in public procurement and analyse the impact of government policy on the economy (Anti-corruption and social impact..., 2021). Companies can use open data to identify market opportunities, monitor competitors, and develop new products and services (Enders *et al.* 2022). Civil society organisations used free access to information to monitor the activities of state institutions and to advocate for transparency and accountability. Thus, increasing the openness of data in the country will increase transparency in the activities of companies and government agencies, improve decision-making through greater access to the necessary information, and enhance economic growth, job establishment. In addition, using open data brings numerous benefits to the overall development of Ukraine's economy.

The benefits that can be gained from the perspective of social and public spheres are worth discussing separately. For example, open data will have a significant impact on urban planning and development. By integrating open data on population demographics, transport, and the environment, urban planners will be able to make more informed decisions about how to develop and manage cities in Ukraine. It can result in more sustainable and liveable cities with improved transport, housing and public spaces. Another area where open data is expected to have an impact in the future – healthcare. By using available information about health outcomes and medical treatment, healthcare providers will be better able to make decisions about how to deliver high-quality care

to patients. In addition, open data can be used to improve health outcomes by enabling researchers to identify trends and patterns in health data that can form the foundation for developing new treatments. Thus, open data will have a positive impact on the education sector. Using the information on the performance of individual students, educational institutions will be able to improve the quality of education and individualise it, which will both enhance the learning experience and increase its efficiency. Considering all the information analysed above, it is possible to establish a single model of the functioning and impact of open data on the Ukrainian economy, as presented in Fig. 1.

As can be observed from Fig. 1, the main initiator of open databases is the state, which influences various government organisations to contribute to the availability of data in the country. Non-governmental organisations, such as private or voluntary organisations, can be involved in this process. They can conduct some research on their initiatives and publish it on their services for public access. From the totality of data generated by these organisations, a specific list of databases is developed (or a single database on a separate platform, which can be accessed by companies, citizens of the country (including students, scientists, teachers, journalists) and other entities (foreign investors, international organisations). It allows for establishing more added value and improves

the efficiency of the economy in general. However, it should be remembered that data openness has a positive impact on government agencies as such, as it allows them to make more effective management decisions in various areas of their activities, as described in more detail below. Thus, the model in Figure 1 once again demonstrates the role of open data development and its impact on the economic and social development of a country.

The development of open data in various countries is different. For example, while in Ukraine the adoption of regulations that provided a foundation for the legislative framework for this phenomenon began in 2011, in the USA this process began in the mid-20th century and continues to be improved to this day. Although this understanding began even before the invention of the Internet, it clearly outlines the key principles of information exchange even in modern conditions (Heather, 2016). If comparing the general access to various types of data on economic activity in the United States, it is much more open. For example, on various services such as Trade Map, information on a country's exports can be found monthly with a very low time lag (several months), while for Ukraine it will be much longer (note that this phenomenon was common before the war). Moreover, the United States often has more detailed information on specific phenomena, which allows for exploring and analysing them more effectively. In addition, they provide more convenient access to

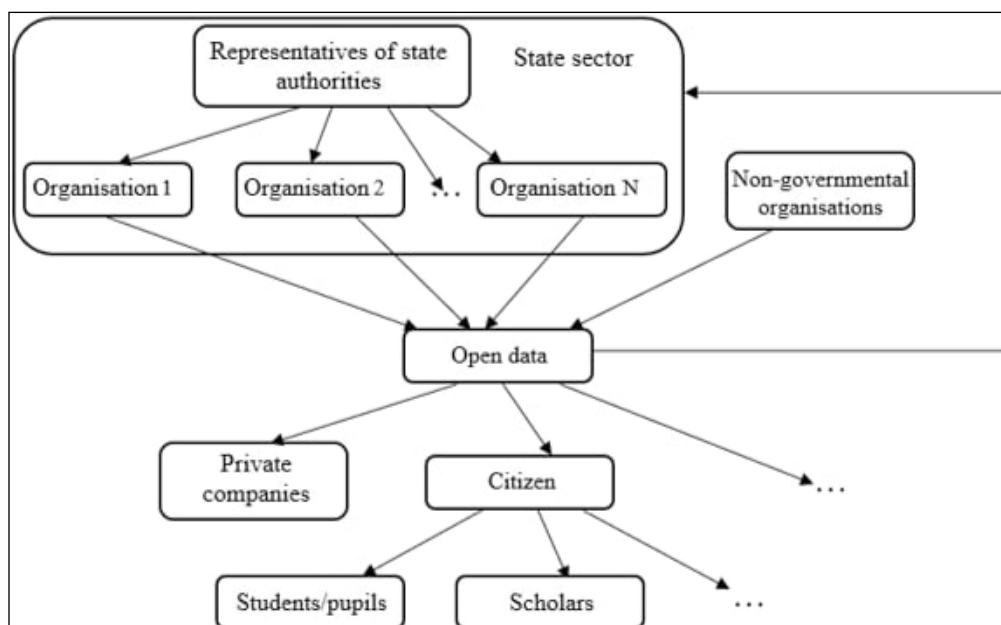


Fig. 1: Model of impact and functioning of open data in Ukraine

such information. Notably, not all data in a country can be free, as some of it is available through private research. Nevertheless, their number is, in any case, higher than in Ukraine. In general, access to data in the United States is more open than in any other country in the world, which makes it relevant to analyse this country's experience in this area. Using open data may become more relevant if artificial intelligence (AI) is used to process it (Brinkhaus *et al.* 2023).

Today, in Ukraine, this technology has become a powerful tool for working with freely available data, allowing organisations to analyse and make sense of huge amounts of data in real-time. The integration of AI with open data has opened up new opportunities for organisations in Ukraine, helping them to make data-driven decisions, automate processes and improve overall efficiency. One of the most promising areas for using artificial intelligence in the country is public procurement, as the author has already partially mentioned above: by analysing open data on procurement contracts and related processes, AI systems can identify inefficiencies and cost-saving opportunities, helping the government to optimise its operations. In addition, AI can be used to monitor procurement processes in real-time, reducing the risk of corruption and increasing the transparency of all internal processes. There are other opportunities for using this technology in the public sector. For example, identifying opportunities for monitoring government activities and identifying budget savings. Another promising area is credit risk assessment and automation of the loan processing process. By integrating open data into their models, Ukrainian banks can improve the accuracy of their credit assessment, reducing the risk of loan defaults and increasing overall efficiency.

Nevertheless, there are risks associated with using artificial intelligence. As already mentioned, it is frequently difficult to ensure that the data on the respective portals is complete and up-to-date, which adversely affects the accuracy of AI systems. In addition, there could be concerns about the ethical and legal implications of using AI for open data, including data privacy and security. Therefore, these problems must be solved at the highest level, i.e. using the state to develop specific rules and

principles for working with this technology and establishing the appropriate infrastructure for it.

DISCUSSION

A general assessment of the open data concept was made by Y. Zhang *et al.* (2017). They note that the applications of this concept are promising, but there are still many problems with data ownership and lack of research funding in some disciplines. Thus, it is very important to ensure state funding for this area at least at the level of its establishment. Research on some features of the development of open data in their work is conducted by F. Huber *et al.* (2022). Scholars have written that it is virtually impossible to achieve high efficiency by increasing data availability without a sufficiently high level of institutions. Without this, the impact of open data on the economic activity of enterprises or government actions will be much less noticeable. For Ukraine, this issue is particularly important due to problems in terms of institutional development, widespread corruption.

An interesting study was conducted by M.K. Natvig *et al.* (2021). In it, researchers explored the impact of open data but focused on the innovation sector. Thus, they came to the following conclusions: the availability of open data affects the innovation potential; the way data is published affects the usability of data and, therefore, the innovation potential. The first statement suggests that increased openness of information in the country improves the situation in the field of science development, which was partially mentioned by the author above regarding the benefits that the development of this component can bring to Ukraine. The second conclusion suggests that one should pay attention both to the amount of data and its relevance and to the form used to present it. For example, on various websites that provide access to data in one way or another, it is easy to find and extract information in the format you need: for example, individual countries and their GDP (gross domestic product) (2022) or exports of a particular product to a particular country on Trade Map's "List of exported products for the selected product" (2022). Therefore, it is frequently necessary to download quite a large number of files and try to find exactly the information needed, which can be time-consuming

and reduce the effectiveness of the impact of open data. It suggests that it is very important for Ukraine to start working in this area to improve the service of information provided by such structures.

The research devotes a significant place to artificial intelligence as one of the most rapidly developing tools for analysing large data sets. The assessment of the state of AI in Ukraine and, in particular, in its enterprises was conducted by B.I. Logvinenko (2022). The author concludes that Ukrainian entrepreneurs and scientists have done a lot of work in terms of implementing artificial intelligence technologies in their enterprises. However, they are still not perfect and have some problems and shortcomings in their work. All of this points to the necessity of further development and improvement of these technologies, and their wider dissemination among Ukrainian enterprises. Notably, this will have a positive impact on data openness, considering the current role of artificial intelligence in analysing large amounts of data.

Thus, the development of open data in Ukraine is a very promising area for the state, which can significantly improve the efficiency of the country's economy through a large number of levers of influence. However, it is still very important to address emerging issues and challenges: in particular, to work on institutional issues and to ensure the timely and convenient publication of the necessary information. In addition, it is important to improve access to data and ensure that it can be easily exported. These relatively simple actions can significantly increase the effectiveness of the impact of open data on the country's development.

CONCLUSION

The research analysed the impact of open data on Ukraine's economic development. The author concludes that increasing access to information will improve the economic situation in the country. Thus, the expansion of data openness will significantly improve the efficiency of banks, telecom operators and the public sector, which will have a positive impact on Ukraine's economic development. In addition, the impact will be noticeable through the development of the scientific sector and more effective training.

The author has demonstrated that the country has made significant progress in the development and use of open data. It can be observed in the establishment of separate websites where researchers or businesses can find information on the issue of interest and in the development of the legislative framework in this area (which, however, is still in its infancy). Nevertheless, the country still has a long way to go in ensuring free access to data. By addressing the challenges posed by data openness, Ukraine can achieve its full potential for increased transparency, accountability and economic growth. Among them, the most important is the timely posting of relevant information on the websites designated for this purpose, ensuring that it remains relevant and truly useful. It is essential to ensure that this data is better accessed, as this will allow for more efficient use of the data. In addition, representatives of the country's state authorities should pay attention to the problems from an institutional standpoint, in particular, regarding the solution to corruption problems.

Thus, further research into the possibilities of developing and disseminating open data in Ukraine remains relevant. Particular attention should be devoted to the specifics of national policy development in times of war and using the latest technologies to disseminate free data. In addition, it is crucial to pay attention to the possibilities of overcoming the problems in the context of institutional development.

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