OPPORTUNITIES FOR COOPERATION BETWEEN BUSINESSES AND THE GOVERNMENT IN THE DEVELOPMENT OF ENVIRONMENTAL SUSTAINABILITY IN UKRAINE, BASED ON BUSINESS INTELLIGENCE

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Abstract. *Together, government agencies and businesses could utilize business intelligence solutions to promote the development of environmental sustainability. It is of the utmost importance that all stakeholders, including business, government, and society, participate in such cooperation, which will pave the way for non-regulatory cooperation in environmental sustainability development. Utilizing business intelligence for cooperation between government authorities, businesses, and society could pave the way for the next phase of environmental sustainability development in Ukraine, which will be one of the most crucial steppingstones in Ukraine's integration into the European Union. The purpose of the article is to study the possibilities of cooperation between business and government in the development of environmental sustainability in ukraine on the basis of business interview. In the research process, general scientific methods of analysis and synthesis, as well as methods of generalization and systematization were used to develop the submitted proposals. In a paper uncovered importance of environmental sustainability development facilitation for Ukrainian economy, discovered benefits business intelligence solutions could bring to this process. In a paper proposed opportunities and uncovered benefits of cooperation between government, public and private business utilizing business intelligence.*

Keywords: *business intelligence (BI), environmental sustainability, cooperation between businesses and government*

JEL Classification: D73, H40, O18

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Introduction. In the nations of the European Union, issues of environmental sustainability are becoming an integral part of enterprise competitiveness. Considering the need to integrate the Ukrainian economy into the economy of the European Union, these issues should also become an integral part of the strategy for the development of domestic businesses and the overall economy. In the modern world, effective management of most processes is impossible without the effective use and analysis of data, especially in complex systems with numerous participants and influencing factors such as environmental sustainability development. Consequently, an increasing number of companies are utilizing business intelligence systems to manage environmental sustainability development abroad. Unfortunately, most Ukrainian companies are unable to independently implement effective sustainable development management systems based on business intelligence systems. Businesses, governments, and international organizations should collaborate to solve this problem. The article focuses primarily on the potential for cooperation between private business, the government, and international organizations in the field of managing environmental aspects of sustainable development with the aid of business intelligence systems, which should increase the competitiveness of the Ukrainian economy in comparison to the economies of the European Union.

Literature review. In IBM Institute for Business Value's article "The power of analytics for the public sector" [1], Izabela Wowczko's article "Business Intelligence in a Government-Driven Environment" [2] and the works of numerous other authors, the issue of business intelligence (BI) usage in the public and government sectors has been thoroughly investigated. Despite the obvious benefits recognized by private businesses, government and public organizations are still behind in implementing business intelligence into their processes, according to the findings of those studies. Despite this, there are numerous instances of successful business intelligence implementation in government and the public sector. From other side several studies have elucidated the utility of business intelligence in sustainability projects, and such authors as M. Petrini, M. Pozzebon have proposed well-developed tools for business intelligence-based management of sustainability development [3], [4]. Despite the well-researched nature of the problem's components, their intersection necessitates additional research and the incorporation of Ukraine's realities.

In this study, we aim to shed some light on how private businesses and the government in Ukraine could use business intelligence to achieve effective cooperation in developing environmental sustainability. This study's objective lies at the intersection of using business intelligence for sustainable development and government, public, and private business cooperation in Ukraine. This study illuminates a topic that is poorly illuminated by other research, and its further development could bring considerable advantages to Ukraine's future sustainable development.

Aims. The purpose of the article is to study the possibilities of cooperation between business and government in the development of environmental sustainability in ukraine on the basis of business interview.

Methods. In the research process, general scientific methods of analysis and synthesis, as well as methods of generalization and systematization were used to develop the submitted proposals.

Results. On the basis of the conducted research, we offer to study the possibilities of cooperation between business and government in the development of environmental sustainability in Ukraine on the basis of business intelligence.

Importance of environmental sustainability development for Ukraine. According to the Resolution adopted by the General Assembly on September 25, 2015, "Transforming our world: the 2030 Agenda for Sustainable Development," there are 17 Sustainable Development Goals set up. Among them are some goals that are directly connected to business, government, and social cooperation:

"Goal 12. Ensure sustainable consumption and production patterns

12.2 By 2030, achieve the sustainable management and efficient use of natural resources.

12.5 By 2030, substantially reduce waste generation through prevention, reduction, recycling and reuse.

12.6 Encourage companies, especially large and transnational companies, to adopt sustainable practices and to integrate sustainability information into their reporting cycle.

12.7 Promote public procurement practices that are sustainable, in accordance with national policies and priorities.

12.8 By 2030, ensure that people everywhere have the relevant information and awareness for sustainable development and lifestyles in harmony with nature" [5].

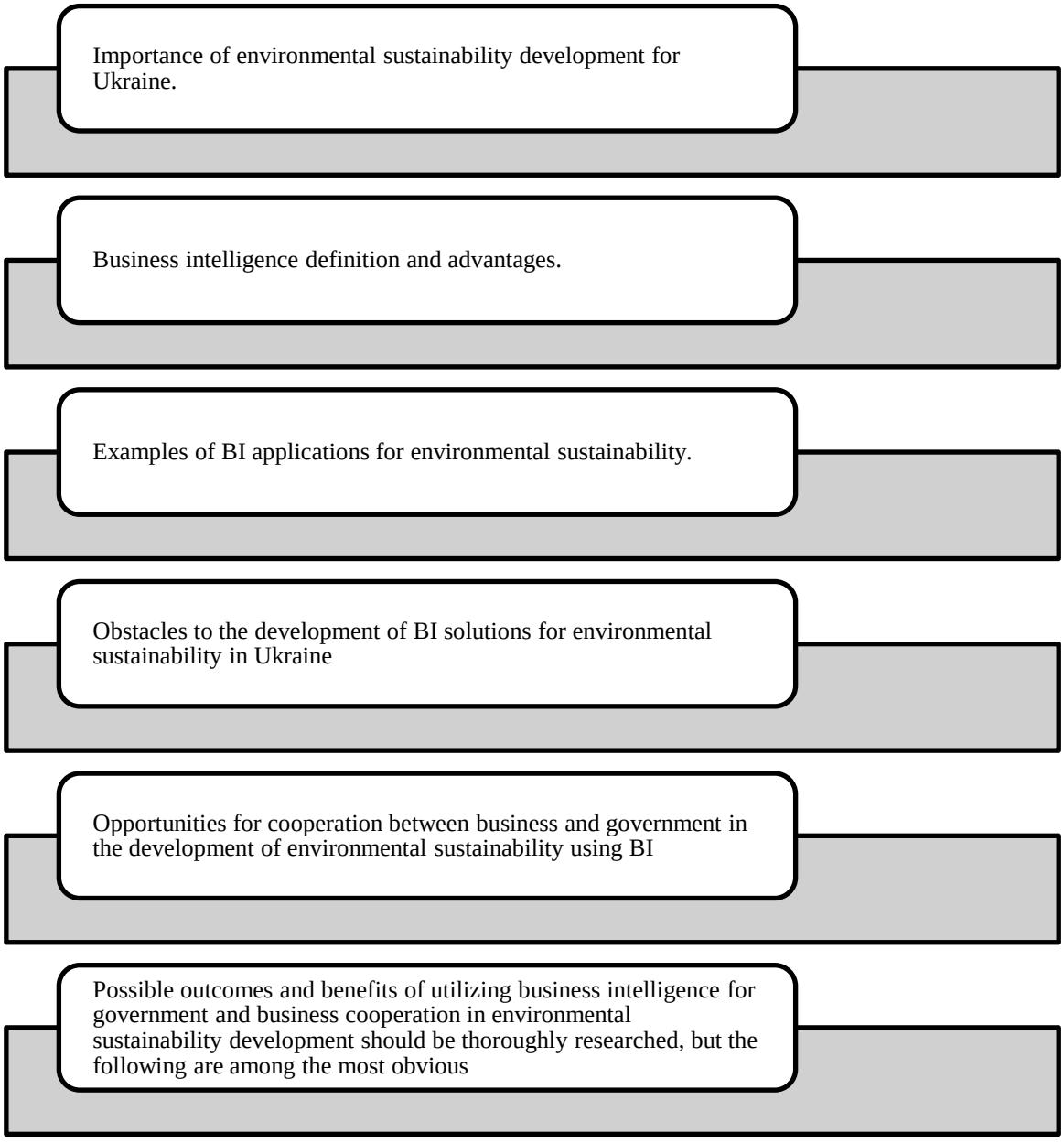

Figure 1. The main stages of study the possibilities of cooperation between business and government in the development of environmental sustainability in Ukraine on the basis of business intelligence

Sourse: develop by author

The European Union is harmonizing its legislation system according to United Nations sustainability goals constantly. As said on the European Commission website in the Strategy section: "The EU and the United Nations are natural partners in the efforts to shape a safer and better world for all. To that end, the EU supports effective

multilateralism and a rules-based international order with the UN at its core. As a major negotiating success of the EU, the SDGs are a useful vehicle to project globally the EU's values and objectives, and provide a shared framework, useful for international partnerships. Consequently, it is in the EU's interest to play a leading role in the implementation of the 2030 Agenda globally through its external action" [6].

The European Union is constantly developing sustainability legislation and implementing new tools like emissions trading systems (ETS), carbon taxes, and eventually a Carbon Border Adjustment Mechanism proposed by the European Commission in July 2021.

As said in the article "Carbon leakage: prevent firms from avoiding emissions rules": "As European industry struggles to recover from the Covid-19 crisis and the impact of the war in Ukraine, the EU is trying to honour its climate commitments, whilst keeping jobs and production chains at home" [7].

The European Commission proposed a Carbon Border Adjustment Mechanism in July 2021 as a part of the "Fit for 55" package, implementing the 2019 European Green Deal, which states the EU's ambition to reduce greenhouse gases by 55% compared to the level of 1990 by 2030 [8].

The mechanism would apply a carbon levy on imports of certain goods from outside the EU. If products come from countries with less ambitious rules than the EU, the levy is applied, ensuring imports are not cheaper than the equivalent EU product. MEPs want the mechanism to be implemented from 1 January 2023, with a transitional period until the end of 2026. It should be fully implemented by 2032. By 2032, the Carbon Border Adjustment Mechanism should cover power and energy-intensive industrial sectors [7].

Businesses from third countries oriented on export to the European Union need to immediately start to harmonize their environmental sustainability strategy according to European Union legislation and practices to stay competitive in the European market. The common trend in the European Union for environmental sustainability development is not just about legal requirements but also about society's demands for more environmental responsibility from businesses.

At the European Council on June 23, 2022, EU leaders granted EU candidate status to Ukraine. This step means the need for Ukrainian legislation and businesses to deep and fast integrate into the EU's sustainability management standards. To be competitive in the European market, it is critical to focus not only on harmonizing legislation but also on promoting an environmental sustainability culture across businesses and the population, and for Ukrainian businesses, this could be a critical factor in survival.

With time going by, EU sustainability regulations will become more and more strict, and even medium and small businesses will be affected. For Ukrainian businesses, it is necessary to start closing the gap in sustainability management and benchmark best practices from EU companies even before Russian aggression has ended.

Link between data and sustainability development. The SAP Insights research center conducted a survey of 7423 (5621 usable) business professionals to determine

the difficulties businesses face in halting and reversing environmental deterioration, as well as when they anticipate that environmental issues will have an impact on their operating performance or financial situation. The authors of the study assert that data influences sustainability choices as follows:

"Companies with more data tend to have a more holistic view of their business, which gives them more granular insights into the trade-offs they can make to deliver better overall outcomes. Data about sustainability is part of this broader picture".

"The consumer products industry offers an example of how a data-supported approach to sustainability might play out. Many consumer products are packaged the same way, whether they're sold in Stockholm or Shanghai. However, as governments begin to regulate single-use packaging for environmental reasons, a packaging design may generate different costs and benefits depending on where it's used.

With good data, a company can explore the financial effects of creating unique packaging for individual markets to attract more customers, pursue zero waste aspirations, or lower the costs of following local environmental regulations. The company would even be able to predict the most cost-efficient timeframe for developing new packaging rather than letting regulations force the issue.

However, even the most comprehensive data sets aren't perfect. Among all respondents, 79% report being dissatisfied with the quality of the data they collect about environmental sustainability".

According to the report, all respondents cite data-dependent uncertainty as the most significant obstacles to addressing environmental challenges. In addition, most respondents cited uncertainty on how to integrate sustainability into corporate processes and IT systems as the greatest barrier to sustainability action [9].

To comprehend the complexity of the data issue in environmental sustainability development, let's examine the packaging solution market presence of a single organization. UPM Raflatac is an example of a company that has integrated its sustainable strategy with the European Green Deal, launched the "The positive climate impact of -30 by 30" program, and aims to reduce the CO2 emissions of its supply chain by 30% by 2030.

Complexity of managing CO_2 impact and importance of data management is described in article "UPM requests emissions data from its over 20,000 suppliers" published by UPM Raflatac company. According to the article calculating the carbon footprint of a UPM product can take anywhere from a couple of weeks to several months and it is directly connected to complexity of the product. The more complex the product the more data is needed to understand all its environmental impacts which is often are indirect.

According to statistics compiled by UPM Raflatac, up to 70% of a company's carbon footprint is generated during the value chain. This is the case for many of UPM's businesses, so reducing emissions along the value chain in collaboration with our suppliers and partners is essential to achieving UPM's goal of zero net emissions.

Requesting and collecting carbon footprint data from its suppliers will give UPM a solid foundation for monitoring and reducing emissions in its value chain. The means

for reducing emissions are many, and the low-hanging fruit include energy and operational efficiency as well as technology-related improvements [10].

As demonstrated by the resources listed above, environmental sustainability management is crucial for organizations' future competitiveness. Adopting best practices and assuming a leadership role in a sustainable development is unquestionably required for the present and future economic success of Ukraine. To establish effective environmental sustainability management, organizations must collect, analyze, monitor, and share vast quantities of data from a variety of sources in collaboration with a large number of government and society partners. In this case, business intelligence (BI) comes into play. BI is a technology that facilitates data-driven decision making in a variety of industries and domains. There are already numerous instances in which business intelligence is used for environmental sustainability development.

Business intelligence definition and advantages. TABLEAU SOFTWARE, LLC determines business intelligence (BI) as combination of business analytics, data mining, data visualization, data tools and infrastructure, and best practices to help organizations make more data-driven decisions. Modern business intelligence is when you have an all-encompassing view of your organization's data and use it to drive change, eliminate inefficiencies, and quickly adapt to market and supply changes. Modern BI solutions prioritize adaptable self-service analysis, governed data on trusted platforms, empowered business users, and rapid insight delivery [11].

There are many providers of business intelligence platforms such as Microsoft (Power BI), IBM, Tableau, Oracle. The common trend is cloud-based business intelligence platforms.

The business intelligence platform is merely the system's programming component. In addition, performance metrics, descriptive analytics, statistical analysis, data visualization, visual analysis, and data management are essential components. A business intelligence solution is a very complex system that requires the work of numerous IT, business, and analytics professionals.

Existing companies offer pre-built business intelligence solutions that can be adapted to the needs of a specific customer or service utilized by numerous organizations, as well as the option to conduct one's own analysis and reporting within a pre-built business intelligence environment. Several of these instances associated with sustainability topics will be discussed below. Also, organizations may develop their own business intelligence solutions on existing platforms, but this requires a significant investment of time, money, and resources.

Examples of BI applications for environmental sustainability. There are already numerous instances in which business intelligence is used for environmental sustainability development.

IBM, for instance, provides Environmental Intelligence Suite, a business intelligence service that enables businesses to monitor, predict, gain insights, measure, and report their performance in environmental sustainability development [12].

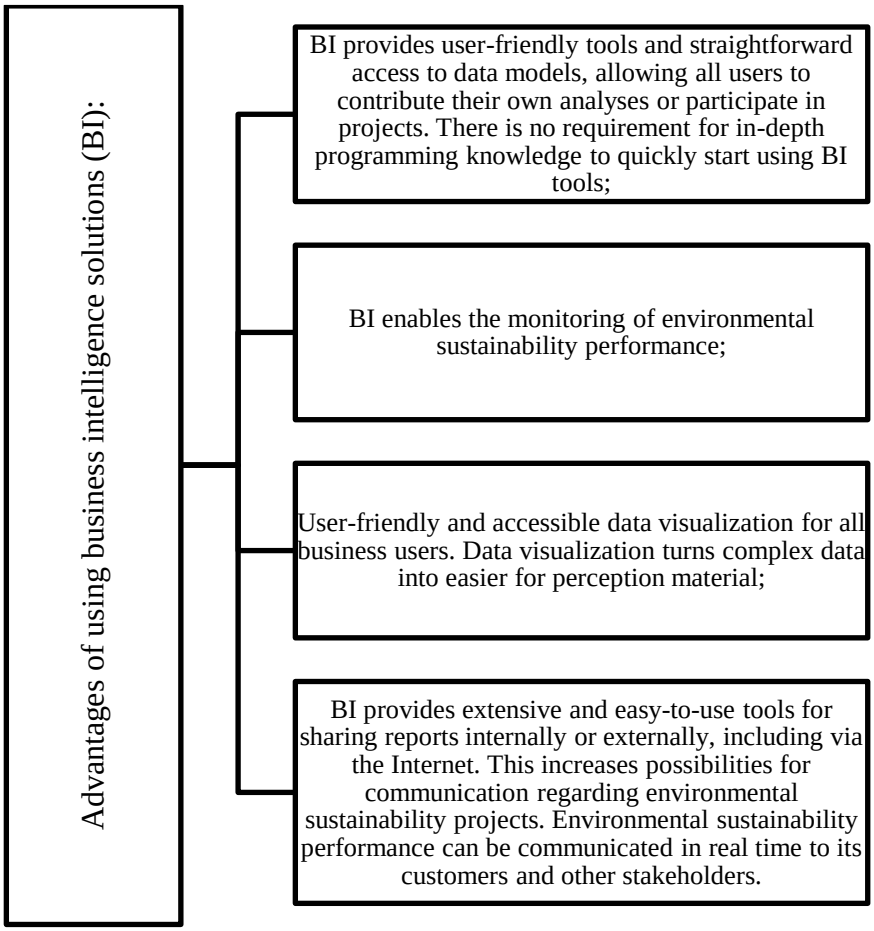

Figure 1. Advantages of using business intelligence solutions (BI)

Veolia Environnement S.A. (Veolia) is a French multinational environmental services firm that provides data-driven, sustainable solutions with Power BI and Azure. Water management, waste management, and energy services are the three principal service areas of the company. According to Veolia, its objective is to "resource the world" by assisting clients with their energy, water, and waste-related environmental and sustainability concerns. Veolia has been investing in Microsoft Power BI and Azure to centralize data in order to acquire insights that enable it to focus on client demands. Together with its clients, the company innovates and identifies chances to develop sustainable solutions with optimal reuse and low waste. Veolia has updated its presentation and its statistics in response to client input. The presentation uses the most recent Power BI capabilities, such as report tooltips to illustrate how customers' investments lessen their carbon impact, questions to assist users in exploring their data, and a bespoke "natural language infographic" to emphasize significant discoveries [13].

Saviant Energy Analytics Platform – SEAP, a real-time and predictive business intelligence platform for Water, Gas, and Electricity Utilities, is an additional intriguing example of the use of business intelligence in energy distribution. Using Azure Platform and the Cortana Analytics suite, the solution is the first and only analytics platform of its kind for utilities. The Saviant Energy Analytics Platform (SEAP) system assists businesses in energy conservation and consumer awareness. It

provides intelligent actions and insights based on existing data regarding energy distribution and consumption. According to the solution owner, it reduces Energy Distribution expenses by up to 20% over the following three to five years [14].

In a blog post, Isabel Gomez-Pineda Puebla (Agricultural Engineer) and Alvaro Adam (Environmental Engineer) from the Inter-American Development Bank (IDB) stated that the IDB made a commitment in 2015 to increase the number of projects aimed at mitigating climate change, which accounted for 16 percent of its portfolio in that year. By 2019, they accounted for thirty percent of the Bank's funding. Business intelligence provides a key opportunity for adequate project development and the efficient use of resources by utilizing data as a source for fostering knowledge-based technological solutions to problems such as climate change, biodiversity loss, water scarcity, resilient infrastructure, and urban overpopulation. In Latin America, for instance, a number of precision agricultural projects using the internet of things, artificial intelligence, and business intelligence are being studied with the goal of transforming agriculture into a science based on real-time data. These choices concentrate on collecting, processing, and analyzing vast quantities of environmental and crop data and combining them with farming techniques to produce solutions that support sustainable production [15].

Covered scenarios provide extensive opportunities for businesses and governments to apply business intelligence solutions to enhance the competitiveness of their economies, create environmental sustainability management, and collaborate with the progressive global community for the greater good.

Unfortunately, this topic has not yet been adequately developed in Ukraine, and in order to integrate into the progressive global community, Ukraine must rapidly embrace best practices in environmental sustainability development using business intelligence.

The following obstacles prevent Ukrainian businesses from implementing the most advanced business intelligence solutions for sustainable development (Figure 2):

- **Financial barriers.** During times of Russian aggression, investing in sustainability business intelligence solutions or subscribing to and implementing an existing solution, such as IBM's Environmental Intelligence Suite, is expensive for Ukrainian businesses.

- **Data barriers.** The accessibility of environmental sustainability data may also pose a problem, as data are frequently dispersed across a value chain, unstructured, represented in different formats, and unavailable in open sources. Absence of structured data not only reduces consumer awareness of environmental impact, but also impedes cooperation in business environments and between business and government in the development of environmental sustainability.

- **Environmental impact measurement.** Absence of environmental impact measurement and certification methodologies that are complex. The open certification system for goods and services will allow consumers (both individuals and businesses) to make environmentally responsible decisions based on data. Business intelligence could be used to evaluate the environmental impact of a product/service or company in a complex manner.

- **Return of investments.** Businesses in the middle of the value chain (mostly B2B businesses) have trouble communicating their environmental sustainability achievements to consumers and obtaining a satisfactory return on their investments in environmental sustainability development. Businesses will be motivated to implement environmental sustainability solutions if consumers are able to make decisions based on transparent and unbiased information about the environmental impact of products throughout the entire value chain.

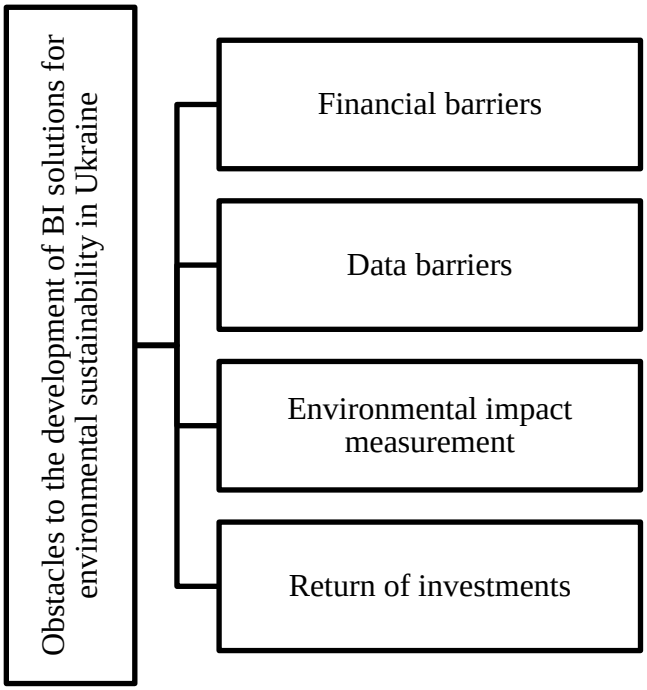

Figure 2. Obstacles to the development of BI solutions for environmental sustainability in Ukraine

Sourse: develop by author

Opportunities for cooperation between business and government in the development of environmental sustainability using BI. Listed below opportunities should be evaluated and expended in further studies. Among most important opportunities in using business intelligence for cooperation between business and government in the development of environmental sustainability we could name following:

- The government could provide businesses with a cloud-based software environment and a prebuilt framework for the development of a business intelligence system in the area of environmental sustainability, allowing businesses to monitor, predict, gain insights, measure, and report their performance in environmental sustainability development. This cloud-based business intelligence system could be free or partially free for most businesses that will be able to overcome financial obstacles. Government investment and leadership could help businesses take their first steps in environmental sustainability management. Government could apply for grants from international, European Union, and American institutions to cover initial expenditures.

- Creating a digital environmental passport for the company and product. Digital environmental product passports could include information regarding the environmental impact of the product (water consumption, CO2 emissions, energy consumption, percentage of recycled raw materials used, etc.), demonstrate the environmental impact of the product across the value chain, and include comparisons to similar products. This digital environmental passport could be accessible to the public and even via QR code on packaging. Using business intelligence systems, the consumer (population or business) will be able to compare different products based on important environmental metrics and find the most environmentally sustainable product. Digital environmental company passport could provide the public with a transparent view of a company's environmental impact and legally influence business decisions.

- Companies could publish and make publicly available reports on environmental sustainability development. It could aid environmentally responsible businesses in gaining market share, and such information from numerous businesses will be accessible through a single portal.

- Businesses may have the opportunity to analyze alternative raw materials/services on the market based on environmental metrics and reduce the environmental impact of their own products by employing more environmentally friendly materials/services.

- Country/local governments could publish interactive online maps and reports of air/water/land pollutions, indicating the main contributors to negative environmental impact. This would not only make environmental information accessible to the public, but it would also increase public pressure on businesses to develop environmental sustainability strategies. Using cloud-based business intelligence platforms will make real-time monitoring and reporting accessible to a broad audience.

- Cloud-based business intelligence platforms enable the creation of interactive maps that enable consumers (population and businesses) to obtain real-time information regarding locations/partners where they can recycle their waste. For households it could be specific waste such as old electronics, clothing, and batteries, and for businesses it could be the opportunity to find a recycling partner for production waste.

Discussion. Possible outcomes and benefits of utilizing business intelligence for government and business cooperation in environmental sustainability development should be thoroughly researched, but the following are among the most obvious:

- Boost environmental sustainability development within Ukrainian business.
- Society will have relevant information and awareness about environmentally sustainable development at local region, city, region, and country levels.
- Consumers will be able to make decisions based on real environmental impact data and not just marketing data supplied by businesses.
- Businesses will be able to communicate their environmental sustainability development to consumers and other businesses, thereby enhancing their competitive positions considering such developments.

- Enhance business-society collaboration on environmental sustainability development - Integrate environmental sustainability development practices into public procurement.

Conclusion. Currently, businesses and society in Ukraine are preoccupied with short-term survival strategies, a characteristic typical of wartime existence. However, for Ukraine's continuing development and integration into the European Union, it must pursue reform and implement sustainable development management across all sectors. Without employing effective methods of sustainable development management, it will be difficult for Ukrainian enterprises to succeed on the European market. The implementation of such a transformation requires a substantial amount of time, and the groundwork for it must be laid now so that the Ukrainian economy can be competitive with European economies within the next 5 to 10 years, especially given that European businesses are already several steps ahead in terms of sustainable development. To make up for this shortcoming, enterprises and government organizations in Ukraine should implement cutting-edge business intelligence innovations to manage sustainable development. State and foreign institutions should take the lead in this process and provide comprehensive support for the initiatives, as society and business in Ukraine typically lack the resources and strategic foresight to implement such innovations. Key factor of success in this field will be cooperation of government, international organizations and private business in Ukraine in building effective business intelligence environment for environmental sustainability development.

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