ESG AND DIGITAL TECHNOLOGIES IN THE ORGANIZATION

A WORD OF INTRODUCTION

In this guide you will find issues related to ESG (Environmental, Social, Governance) and digital technologies in the context of SMEs. In today's world, where care for the environment, society and proper corporate governance are key priorities for many companies, combining these issues with modern technologies is becoming extremely important.

An integrated approach to ESG is one of the most important tasks for business. Environmental, social and governance elements are becoming an integral part of business strategies, and understanding their impact on long-term success is becoming a key task for every organization.

Meanwhile, digital technologies such as artificial intelligence, big data analytics and blockchain are playing an increasingly important role in the way companies manage their operations, communicate with customers and track their ESG metrics. These tools can not only streamline business processes, but also enable better monitoring and reporting of ESG-related activities.

In our guide, we look at how organizations can effectively integrate ESG principles using digital technologies. We will present practical tips, tools and best practices that will help you better understand how to leverage the potential of ESG and digital technologies in your organization.

We hope that our guide will inspire and guide you on your way to building more sustainable, innovative and effective organizations that contribute to both business, society and the environment.

Karolina Kornecka-Kupiec
Project manager "Green, sustainable and responsible business - the key to success"
Project leader - "Creative for Business" Association

CONTENTS

INTRODUCTION: EXPLAINING WHAT IS ESG (ENVIRONMENTAL, SOCIAL, AND CORPORATE SUSTAINABILITY RESPONSIBILITY)

Historical outline of ESG

The concept of ESG (Environmental, Social, and Governance) has been developing and shaping for decades and is based on responses to global challenges such as climate change, social inequalities and the need for more responsible corporate governance. In the 1960s and 1970s, when social issues such as civil rights were raised, the idea of responsible investing was born. Investors began to withdraw capital from companies producing weapons and ammunition, and in 1971 the Pax World Fund was established, one of the first funds investing with ethical issues in mind.

In the 1980s, investment activism focused on apartheid in South Africa. Investors around the world began to withdraw capital from companies operating in the country in protest against the actions of the South African government. This showed that investment can be a powerful tool for social change.

In the 1990s, the focus was on sustainability and climate change. The 1987 report "Our Common Future" introduced the concept of sustainable development, and the introduction of the Kyoto Protocol in 1997 drew investors' attention to climate change and the need to invest in environmentally friendly technologies.

The 2000s brought corporate scandals such as the Enron bankruptcy and the WorldCom fraud, highlighting the need for better governance and transparency in companies. At that time, the UN created the Principles for Responsible Investment (PRI, literally: principles for responsible investment), promoting responsible investing. In the 2000s, the concept of ESG began to be formalized, and the number of ESG-related tools, indicators and indices increased.

The concept of CSR (Corporate Social Responsibility), i.e. corporate social responsibility, is also considered a precursor of the current ESG standards. However, ESG factors not only cover a broader sphere of business than CSR, but also - at least ultimately - are intended to allow for a more substantive determination of the company's value in the sustainable approach expected by the market.

Since 2010, ESG has become popular. There has been increased interest in sustainable finance such as green bonds. The introduction of the Sustainable Development Goals (SDGs) by the UN in 2015 not only increased interest in this concept, but also gave investors additional tools.

In 2021, the European Union introduced the Corporate Sustainability Reporting Directive (CSRD). It was developed in response to global warming and changes within modern societies. It imposes an obligation to publish annual ESG reports on the entire company's activities, divided into individual departments: environment, society and corporate governance.

With each subsequent year, the reporting obligation will be expanded. The first to start reporting were the so-called public interest entities, i.e. banks, investment funds or insurance companies. From 2024, it will be mandatory for companies employing more than 500 employees or those with annual revenues of more than EUR 40 million. From 2025, all (public and private) companies employing more than 250 people will have to submit ESG reports. From 2026, it is planned that all listed organizations employing more than 10 people will also publish reports.

What is ESG?

The ESG strategy allows you to plan the company's development in the long term based on sustainable development goals - environmental (E-environmental), social (S-social) and corporate governance (G-governance) issues. The ESG strategy should be an integral element of the organization's business strategy.

ESG reporting enables companies to measure and present progress in these areas. The ESG report should therefore constitute an annual summary of the implementation of the assumed ESG strategy, allowing the organization's progress in the field of sustainable development to be assessed compared to previous years.

The name of the ESG strategy comes from the English words:
- Environmental;
- Social (social issues);
- Governance (corporate governance).

Environmental:
- Ecological goals: Includes goals related to environmental protection, greenhouse gas emission reduction, energy efficiency and limiting the use of natural resources.
- Waste management: Companies strive to minimize the amount of waste generated and promote recycling and resource recovery practices.
- Education and awareness: Implement educational activities and campaigns, both internally and externally, to increase environmental awareness.

Social (Social Issues):
- Workforce management: Covers workers' rights, occupational safety, equal pay, workers' health and well-being.
- Diversity and Inclusion: Promoting diversity in the workplace, eliminating discrimination and creating inclusive work environments.
- Social responsibility: Social activities such as supporting local communities, charitable activities and volunteer programs.

Governance (Corporate Governance):
- Governance structure: Includes the composition of the supervisory board, organizational structure and accountability mechanisms.
- Business ethics: Supporting the principles of business ethics, honesty in actions, preventing conflicts of interest.
- Transparency and reporting: Offering clear and transparent information about the company's activities, including ESG factors, in annual reports and investor communications.

ESG strategy is increasingly considered crucial to a company's long-term success because it helps identify and manage risks, build lasting relationships with stakeholders, increase operational efficiency and contribute to sustainable development. Investors are also more likely to consider ESG factors when making investment decisions, making ESG strategy an important element for listed companies.

All information contained in the document should be presented in a transparent, reliable and easy to interpret manner. ESG reports are intended to be, above all, useful and measurable - they are not declarations, but descriptions of actual activities that should be easy to verify by potential customers and business partners. A reliable approach to reporting will be a way to build long-term value and actually reduce the impact of the organization's operation on the natural environment.

THE IMPORTANCE OF DIGITAL TECHNOLOGIES IN THE CONTEXT OF ESG

In the past, companies created products aimed at consumers who had little or no knowledge of how the business operated and the resources needed to develop, produce, and ultimately dispose of those products. Currently, all over the world, consumers, employees, suppliers, business partners, community members, activists and society are becoming equal participants/stakeholders in direct dialogue about expectations towards various companies and their products.

For generations that were brought up with the belief that they must feel more responsible for their actions, expectations from companies and states are becoming greater. The results of the Deloitte Global 2021 Millennial and Gen Z Survey indicate that millennials want companies and governments to deliver on similar promises to society, putting people above profits and treating environmental protection as one of their top priorities.

In the current digital era, it can be said that nothing can be hidden anymore. Global information flows and digital platforms have largely helped and continue to help raise awareness of the ecological and social crisis around the world. Strikes in defense of the climate and other spectacular actions of groups such as Extinction Rebellion or the #MeToo campaign have attracted attention from around the world. The transparency of operations achieved through digitalization has been shaping the business landscape for some time now, which in turn is contributing to another milestone in the form of changing social expectations regarding the actions that companies should take in relation to environmental, social and governance issues.

Thanks to access to new technologies, the world is developing faster than ever before. Digitization and modern technologies are not only powerful business tools, but also a key element in shaping a sustainable and responsible approach to business, helping to better manage resources, collect detailed data, and conduct analyzes examining the effectiveness and effects of actions taken. Examples of using digitalization and new technologies to effectively implement ESG strategies are presented below.

Environmental aspects:

- Emissions Monitoring: IoT (Internet of Things) technologies and sensors can be used to monitor greenhouse gas emissions, energy consumption, waste management, optimization of waste segregation and recycling, and other aspects related to the impact of activities on the environment.
- Data Analysis: advanced data analyzes allow for an accurate assessment of the impact of the company's activities on the environment, which enables taking effective corrective actions.

Logistics:

- Supply Chain: digitalization enables tracking and assessment of the supply chain, including working conditions and compliance with labor rights by suppliers, GPS monitoring and analyzing information, allowing for effective planning of drivers' routes and their changes in unforeseen situations.
- Communication: digital platforms facilitate communication with stakeholders and the use of warehouse management programs such as Saas or WMS.

Corporate Management:

- Risk Management Systems: Technologies support the implementation of effective risk management systems that take into account ESG-related aspects. Solutions such as advanced encryption systems, multi-factor authentication and regular security audits are becoming a standard in ensuring data protection.
- Transparency and Reporting: Thanks to digital tools, organizations can more effectively report their ESG-related achievements, which in turn affects their reputation and relationships with investors.

Advanced analytics:

- Trend Prediction: Analysis algorithms can predict future ESG-related trends, allowing companies to adapt their strategies to changing societal and regulatory expectations. in retail, especially e-commerce, data analysis has long helped identify customer needs and preferences, analytics enable the detection of irregularities in IT systems.

Education and awareness:
- Educational Platforms: Using digital platforms to educate employees, customers and suppliers on sustainability and ESG practices.

Social responsibility:
- Social media and online platforms are used to communicate and engage communities in ESG-related activities.
- Analytical tools help monitor the community's opinion about the company's activities.

ESG digitalization contributes to more effective management, better analysis and more precise monitoring of sustainability, which in turn supports the social, environmental and governance goals of the organization. This is a key element for companies that seek to integrate sustainable practices into their business strategy. By taking into account ESG factors, contractors and the business environment gain a broader view of the company's activities, its products, services and the possibility of developing niches that have not been noticed by the competition. It is also a way to more effectively use funds for sustainable development and innovation from European Funds or national subsidies.

Source pages:
https://www.cbre.pl https://www.ursa.pl/
https://cyrekdigital.com/
https://www.pb.pl https://www2.deloitte.com/pl https://www.money.pl https://tlhub.pl

1.1. TECHNOLOGIES SUPPORTING ESG

An overview of digital tools and technologies that can help manage and monitor ESG activities in a company. Examples of specific solutions and platforms.

ESG (Environmental, Social, Governance) reporting is currently an integral element of the strategies of enterprises and financial institutions that aim to achieve sustainable development and want to make responsible investment decisions. However, the lack of data standardization and ambiguous ESG definitions pose a number of challenges. The main problems include the need to maintain consistency, reliability and validity of ESG data, as well as difficulties in comparing them due to different presentation methods. It should be emphasized that access to reliable ESG data is crucial to support enterprises in achieving their goals related to sustainable business. Companies are now assessed not only on the basis of financial results, but also on the basis of ESG indicators, which requires their accurate reporting to stakeholders. An important aspect related to the comprehensiveness and distribution of data in ESG reporting is the diversity of data that comes from both external sources (including financial reports, non-financial reports of contractors) and internal organizations (including distributed source systems). Consolidating and managing data for ESG reporting is often a challenge for an enterprise. In the near future, we can expect greater harmonization of the integration of data reporting standards, including: through initiatives such as the International Sustainability Standards Board (ISSB) and the Task Force on Climate-related Financial Disclosures (TCFD).

Technology will be a key tool to improve ESG management and reporting. In order to better measure, analyze and communicate their ESG-related activities and results, companies will use solutions such as:

- artificial intelligence,
- blockchain,
- Big Data,
- internet of things.

Selected digital tools and technologies that can help manage and monitor ESG activities in the company:

1. SASB SEVERITY MAP

The SASB Materiality Map is an interactive tool for identifying and comparing ESG disclosure topics across industries and sectors. The map identifies 26 sustainability issues, known as "general issue categories", which cover a range of disclosure topics and related accounting metrics and vary by industry.

The general categories are grouped into five main topics: environment, social capital, human capital, business model and innovation, and leadership and management. On this basis, mapping at the sector and industry level allows us to determine the likelihood that a given issue will be important for companies.

Companies can use the mapping tool to focus their sustainability initiatives on the most pressing issues and learn more about the metrics underlying each element disclosed. The map can be used by investors to assess their portfolio's exposure to sustainability risk and the opportunities each issue presents.

For example, property owners, developers and investment funds may find that energy, water and wastewater management are the most pressing environmental issues in their industry, while engineering and construction services may find that the most important issue of concern is their impact on biodiversity. While the SASB Materiality Map is the primary reference for understanding the SASB Standards, it may also be used for institutionalized investment research, product development, commercial activities, and publishing, reprinting or creating derivative works, which requires a licensing agreement with the SASB Foundation.

Using the SASB materiality map helps companies focus on key ESG areas, which contributes to better risk management, improved operational efficiency and increased company value from a sustainability perspective.

13

Screenshot of materiality map Source: https://sasb.ifrs.org/standards/materiality-map/
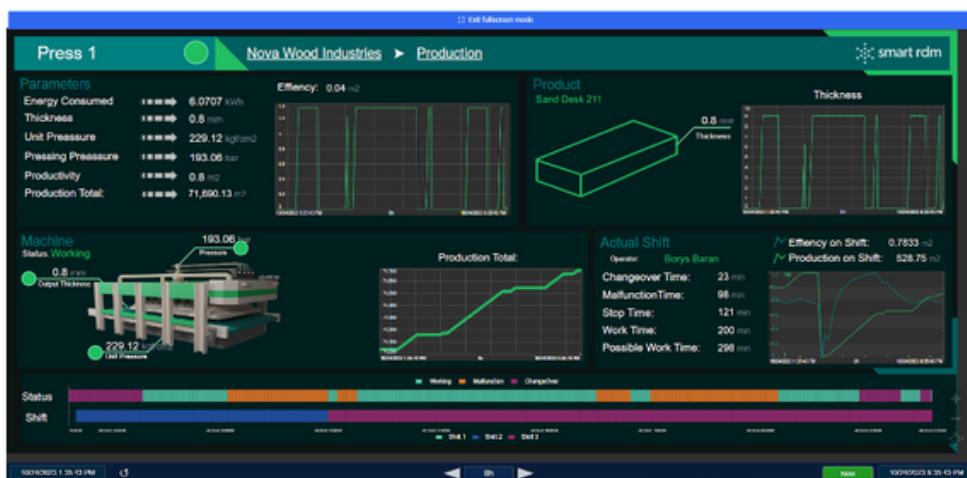
Selected digital tools and technologies that can help manage and monitor ESG activities in the company:

2. PLATFORMA SMART RDM

Smart RDM (the abbreviation RDM - it comes from the first letters of the words "reporting", "diagnostic", "monitoring") is a platform that supports the step-by-step process of enterprise digitization and automates ESG reporting. Integrating Smart RDM with a variety of systems and technologies, ranging from devices, OT systems and industrial automation to business applications such as enterprise resource planning, allows you to create a coherent system for analyzing and visualizing operational, environmental and management metrics. Thanks to Smart RDM, companies can use data obtained in real time and the endless possibilities of data science algorithms, thanks to which it is possible to view data and extract valuable information that constitutes the basis for making accurate business decisions. This information is visualized in the form of ESG dashboards, providing immediate insight into a company's performance and highlighting areas with the greatest potential to reduce carbon emissions. ESG reports delivered by Smart RDM can be generated as often as needed, meaning an organization can immediately see progress towards its goals.

Logo Source: https://smartrdm.com/

Monitoring the Smart RDM process Source: https://www.linkedin.com/products/connectpoint-smart-rdm/

Selected digital tools and technologies that can help manage and monitor ESG activities in the company:

3. IBM FOOD TRUST

IBM Food Trust is a cloud-based mechanism for tracking food's path through the supply chain. The system uses blockchain technology, thanks to which retailers, suppliers, agricultural producers and the food industry have access to complete data on the entire food supply chain.

IBM Food Trust consists of several modules:

1. Trace: The trace module allows users to easily track and monitor various aspects of their supply chain. It provides visibility both upstream and downstream, allowing users to view the location or status of their products. Additionally, it allows users to verify the reliability and security of their supply chain in a transparent and secure network.

2. Fresh Insights: The Fresh Insights module collects and aggregates food system-related data on the blockchain. This data is then analyzed to obtain valuable insights and information. Users can access connected data analytics that provide information on current inventory levels as well as any inventory that may be at risk. Moreover, users can gain insight into dwell times and inflow/outflow patterns, helping them make informed supply chain management decisions.

3. Certificates: The certification module helps organizations track and store all relevant certificates. This feature ensures that facilities have passed appropriate inspections, farm animals are treated legally, suppliers are legally permitted to operate, and farmers are adhering to industry standards. By certifying and storing these certificates securely, the platform simplifies compliance management and increases transparency throughout the supply chain.

4. Data Entry and Access : Data entry and access module streamlines the data entry and access process. Automates data import from existing data stores such as SAP, eliminating the need for manual data entry. This saves time and reduces the risk of human error. Additionally, the platform enables enterprise IT teams to efficiently transfer supply chain data from existing data warehouses to the IBM Trust network, ensuring seamless data integration and availability across the supply chain.

The world's largest food manufacturer, Nestle, and US retailer Walmart were the first to adopt IBM Food Trust.
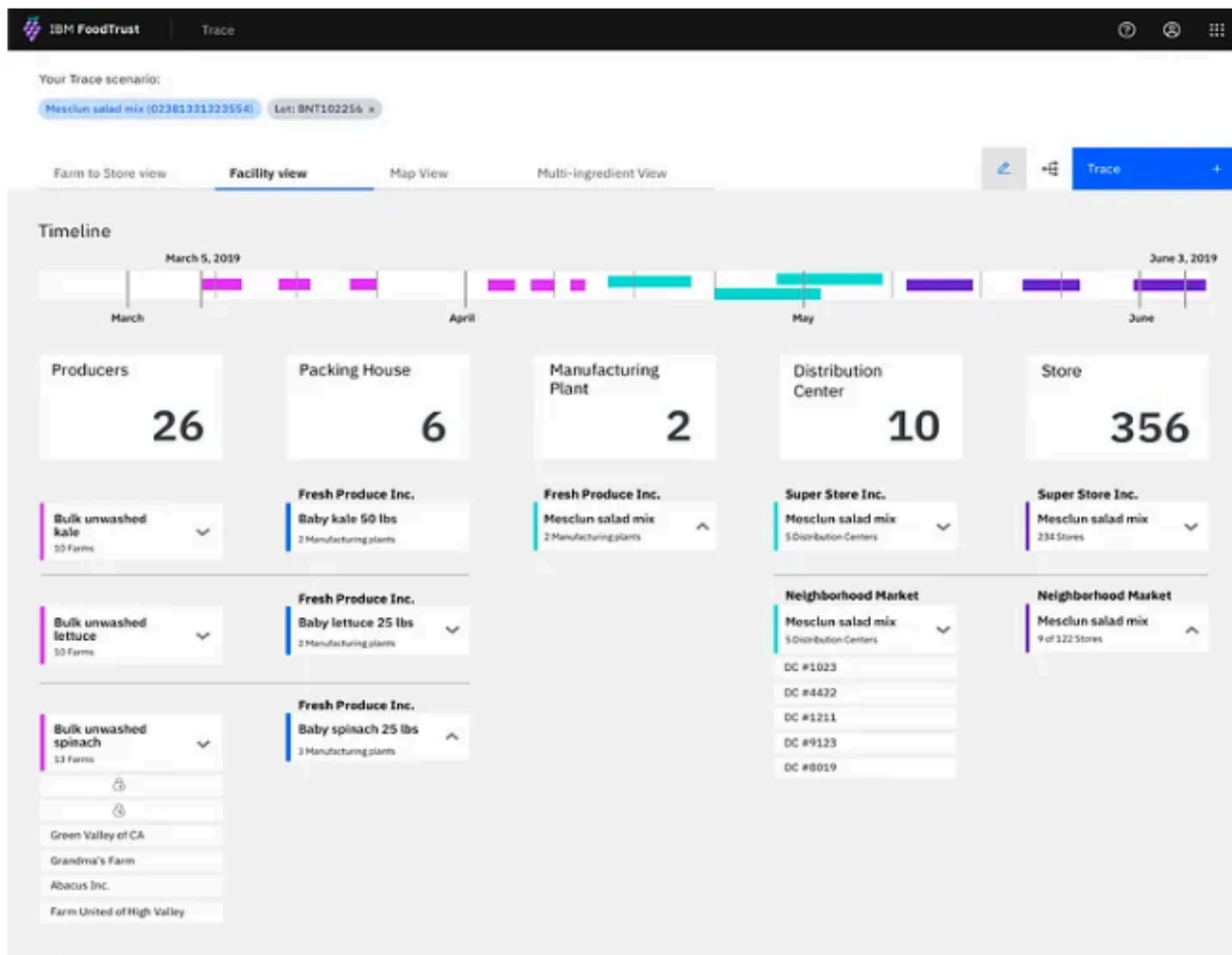

A farm-to-store supply chain view with traceability results dynamically created from data.
Source: https://www.ibm.com/products/supply-chain-intelligence-suite/food-trustmhsrc=ibmsearch_a&mhq=IBM%20trust%20food https://medium.com/design-ibm/ibm-food-trust-wins-a-platinum-spark-international-design-award-22b6244a1389

Selected digital tools and technologies that can help manage and monitor ESG activities in the company:

4. MICROSOFT CLOUD FOR SUSTAINABILITY

Microsoft Sustainability Manager is a comprehensive tool that automates manual processes and enables the collection of sustainable data. It also prepares reports, supports the reduction of environmental impact and emissions, increases operational efficiency and creates more sustainable value chains. It allows you to set KPIs and goals to track progress. This can be extended by leveraging Microsoft hardware such as Azure and Power Platform tools. With automated data connections and actionable insights, it helps companies capture, report and reduce the environmental impact of their operating systems and processes in near real time. Connects ESG capabilities across the Microsoft cloud portfolio, as well as from Microsoft partners. Helps organizations measure data center emissions related to the use of Microsoft 365 services, including Exchange Online, Outlook, SharePoint, OneDrive, Microsoft Teams, Microsoft Word, Excel and PowerPoint, using the Microsoft Cloud for Sustainability API.
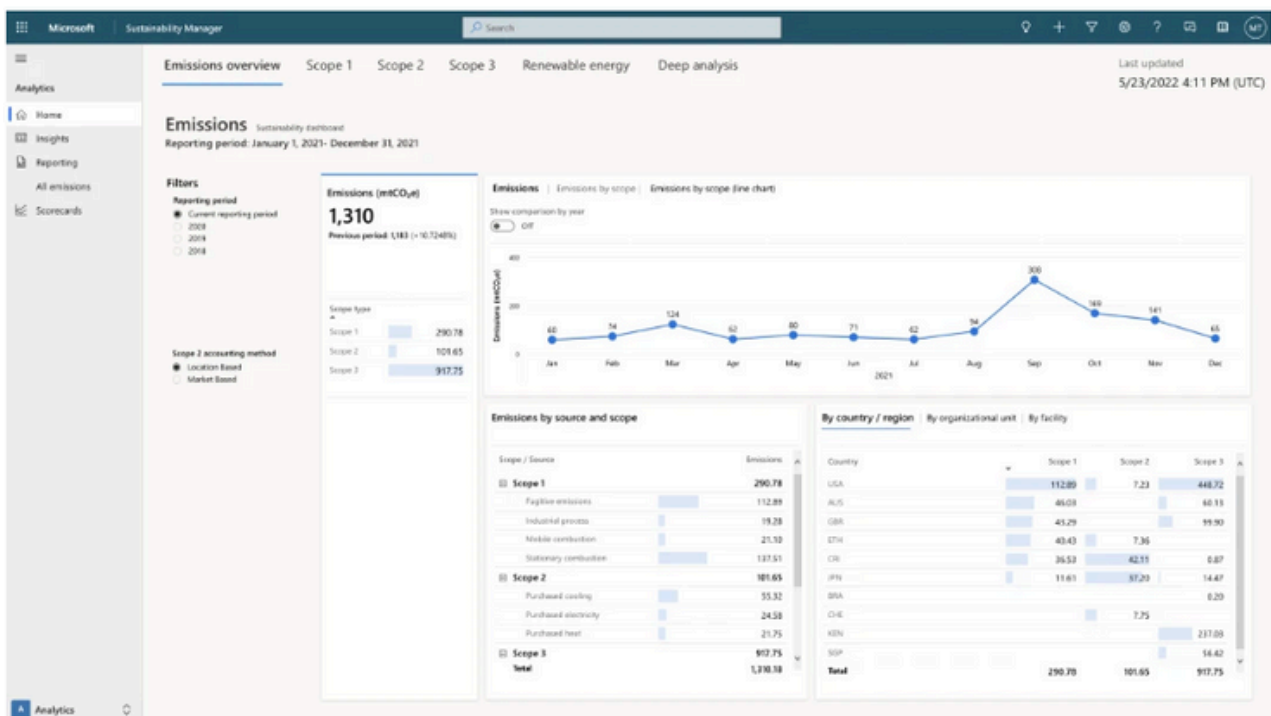
Microsoft Cloud for Sustainability integrates data and creates automated dashboards that enable a comprehensive overview of ESG indicators.
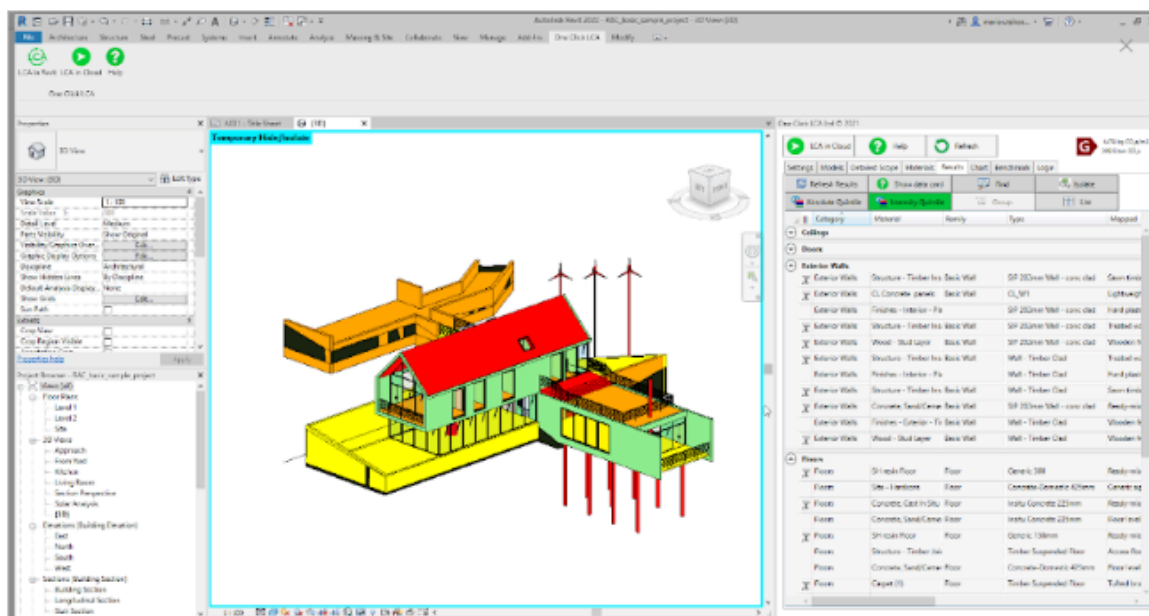*Source: https://learn.microsoft.com/en-us/industry/sustainability/overview*

Selected digital tools and technologies that can help manage and monitor ESG activities in the company:

5. ONE CLICK LCA

One Click LCA is the world's leading software for generating Life Cycle Assessment (LCA) and Environmental Product Declaration (EPD) for the construction industry. Its science-based metrics help businesses across the value chain decarbonize – from producers to investors – providing unique end-to-end support for the industry. One Click LCA product solutions enable manufacturers to calculate and reduce product impact and generate EPDs faster and cheaper, and provide a network to reach customers directly. It is used in over 100 countries, contains the world's largest construction sector database and supports over 40 standards and certifications.

One Click LCA is the only app on our list designed specifically for one industry: the construction sector. Thanks to this, it offers many functionalities especially needed in the construction industry. It has several modeling and reporting features that are well suited for companies producing building materials or building products. Additionally, you can analyze the impact of construction projects and buildings on the environment. Therefore, the solution from Finland well meets certificates such as LEED (USA), German DGNB and BREEAM (Great Britain).

*One Click LCA software screenshots Source: https://oneclicklca.com/software/design-construction/lca-for-construction?_gl=1*1jeu878*_up*MQ..&gclid=CjwKCAjw17qvBhBrEiwA1rU9w2w7NsGEUUzUuuumGzUeRHF5ZzwbhAB8D07ZHyo 8JjXS7OBljOyeXRoCLD8QAvD_BwE*

Selected digital tools and technologies that can help manage and monitor ESG activities in the company:

6. PLATFORM ESG BIK

The ESG BIK platform is a sector solution that responds to the challenge of the lack of one common standard developed in all banks and provides a standardized way of aggregating data from companies. It is also a centralized, quality, efficient tool that meets security requirements. It enables banks to collect ESG data, also from business entities that are their clients. This process will be carried out in a structured manner and in accordance with applicable regulations, in particular the taxonomy.

The solution is intended, on the one hand, to facilitate the work of banks and, on the other hand, of enterprises obtaining financing from them. The benefit for corporate bank clients will be to reduce their obligations by standardizing and using data that these companies have already made public.

Large companies most often have relationships with multiple banks. Therefore, some kind of work optimization is also important for them, so that they can provide information about themselves once, as part of their annual report, and so that this data is collected and aggregated in an appropriate manner for use by banks.

The answer to this is the solution of the Credit Information Bureau, which structures this data and standardizes it appropriately. In this way, they will constitute a valuable and safe source of high-quality information for banks.

Since the launch of the project in September 2023, 17 financial market organizations have been involved in the development of the ESG BIK Platform, and more entities are expressing their interest. In November 2023, the first banks signed agreements for access to the database collected on the ESG BIK Platform.

Selected digital tools and technologies that can help manage and monitor ESG activities in the company:

7. SYSTEM MES (MANUFACTURING EXECUTION SYSTEM)

MES system - is an extensive and advanced IT tool designed for production management. Its goal is to track production in real time. MES software also supports production implementation and downtime detection. The production management system supports and significantly shortens the time spent on each process.

Benefits of using the MES system:

- production management - the task of the MES system is to ensure comprehensive planning and supervision of production processes, including scheduling, control and coordination of activities at various stages of production,
- creating production technologies - the MES system allows you to create production technologies to which the operations needed to implement them are assigned. In turn, materials (raw materials or semi-finished products) are assigned to specific operations. Advanced MES systems also make it possible to create subsequent versions of the technology in the event of changes - so as not to disturb the history of previous operations,
- production tracking and analysis - the MES program allows you to track production performance indicators (KPIs), collect data from machines and production lines and perform analysis to identify areas for optimization of production processes,
- production quality control - the MES system allows you to control the quality of products by supervising production parameters, performing reviews and reporting production quality,
- downtime planning and management – the MES system enables quick response to production downtime, minimizing losses and ensuring smooth production processes,
- management of raw materials and semi-finished products – the MES system controls and monitors the availability of raw materials and the condition of semi-finished products to avoid production problems related to material shortages,
- analyzing production efficiency and reporting - the MES system is a source of detailed reports and analyzes that help make accurate decisions regarding production and identify opportunities for improvement,
- integration with ERP and WMS systems - the MES (Production Management System) system works closely with ERP (enterprise resource planning) and WMS (warehouse management systems, e.g. Kotrak WMS or Comarch WMS) systems, ensuring consistent data exchange between them. The cooperation of MES, ERP and WMS systems means that there is no need to manually enter the same information and, for example, you can synchronize production orders from the MES system to ERP, along with order dates,

- issuing documents and transmitting important information - thanks to integration with the ERP system, contractors' data can be synchronized with MES. Then, the MES software automatically creates transfer documents (MM), warehouse picks (RW) or finished product transfers (PW). Based on the documents sent by MES, the ERP system can, in turn, replenish inventory levels,
- integration with production machines – the MES system also works based on data collected from production machine controllers.
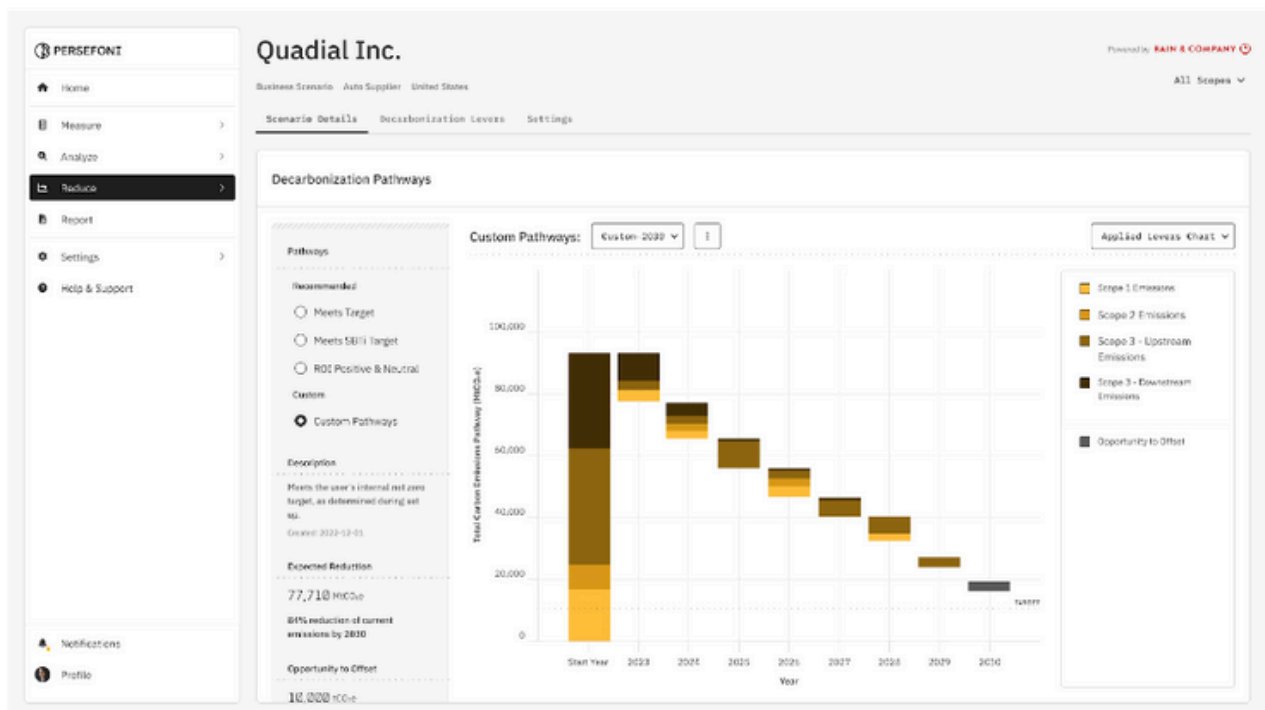

Visualization of andones in FEM Source: https://www.printsoftware.pl

Selected digital tools and technologies that can help manage and monitor ESG activities in the company:

7. PERSEFONI PLATFORM

- Persefoni describes itself as a "climate management platform." It offers streamlined carbon accounting and decarbonization planning. It enables companies to quickly meet stakeholder climate disclosure requirements and requests. Designed with ease of use in mind, the platform enables customers to track and measure emissions across all business lines and processes.

- Persefoni's Net Zero Navigator allows organizations to build and track decarbonization strategies tailored to their needs. The best solution for large international companies, asset managers and banks that require automation of greenhouse gas accounting and financial reporting. Net Zero Navigator simplifies the approach to decarbonization scenario planning and provides organizations with a roadmap that can be tailored to their unique business. With less time needed to analyze data, companies can focus on taking action and tracking progress towards meaningful decarbonization.

Source: https://www.persefoni.com/insight/introducing-net-zero-navigator

Source pages:

1. https://www.rp.pl/biznes
2. https://esg.conservice.com/
3. https://connectpoint.pl/blog/
4. https://www.wiadomoscihandlowe.pl
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15. https://www2.deloitte.com/pl
16. https://www.money.pl https://tlhub.pl

1.2. SUSTAINABLE PRODUCTION AND PROCESSES

**How digital technologies can help optimize production and processes to reduce environmental impact.
Energy efficiency and emissions monitoring.**

Modern technologies undoubtedly help enterprises in various areas of activity. The benefits of their use became even more visible during the difficult period of operation, such as the COVID-19 pandemic. Restrictions and limitations introduced to combat the pandemic have prevented many enterprises from operating normally. Companies began to compensate for the lack of direct interpersonal contacts with methods using modern technologies, remote communication or remote work. Direct reach to customers and direct sales were replaced by online sales and customer service channels. Electronic document circulation and IT systems for enterprise management were introduced to a greater extent.

Digitalization offers companies powerful tools to transform their operations in a more ecological and socially responsible way. By engaging in eco-innovation and focusing on sustainable business practices, organizations can not only contribute to protecting the environment, but also build a stronger, more resilient and future-proof position in the market. Digital data enables, for example, more precise control and flexible use of machines and devices. Thanks to this, the use of resources is precisely matched to demand.

The use of IT systems in manufacturing companies is standard. Production optimization using IT systems can significantly increase efficiency, reduce costs and streamline company processes. In an era where climate change, environmental degradation and social inequality are becoming increasingly pressing issues, companies around the world are looking for ways to address these challenges while striving to innovate and grow.

Effective energy management has become one of the key challenges facing companies. The dynamic increase in raw material prices, high climate taxes, as well as verification obligations related to supply chains mean that companies must not only monitor but also optimize the use of energy during their daily activities. Modern electronic devices can now be connected to the Internet to provide real-time data. This information makes it easier to understand the application and functions of the device and allows you to reduce energy consumption. Monitoring electricity, water and gas consumption using Industrial Internet of Things (IIoT) sensors allows you to analyze every phase of the production process, displays actual energy efficiency, indicates critical points and allows you to take actions to reduce energy consumption, CO_2 emissions and overall production costs. Such systems monitor and manage machines, equipment, processes and supply chains. Enterprises around the world are prepared to implement solutions that ensure zero industrial emissions.

The introduction of modern measurement technologies into the energy and greenhouse gas emissions management process allows for more accurate monitoring of consumption, identification of areas for improvement and implementation of effective energy saving strategies. Here are some examples of the applications of modern technologies and digitalization:

Internet of Things (IoT):
- Real-time monitoring of energy and resource consumption using IoT sensors.
- Automation of production processes to minimize waste of materials and energy.

Big Data Analysis:
- Using advanced algorithms to analyze production data to identify areas where improvements can be made to save resources.
- Demand forecasting and inventory management to avoid overconsumption of materials and overproduction.

Artificial intelligence (AI):
- Optimization of production processes through adaptive control and machine learning.
- Optimizing delivery routes and logistics to reduce carbon emissions by minimizing the distance traveled by vehicles.

Supply chain tracking technologies:
- Using blockchain to ensure transparency and traceability of products from producer to consumer, which can help eliminate inefficiencies and fraud.
- The use of e-commerce technologies and advanced logistics systems can reduce the negative impact of transport on the environment by optimizing delivery routes and reducing packaging consumption.

Clean energy technologies:

- Using digital technologies to monitor and optimize the performance of renewable energy installations such as solar panels and wind turbines.

Computer simulations:

- Conducting computer simulations of production processes to identify potential improvements and reduce resource consumption.

Environmental management platforms:

- Using environmental management platforms to monitor emissions, manage waste and track carbon footprints.

Robotics and automation:

- The use of robots to precisely process materials, which can reduce waste and improve the energy efficiency of production processes.

Energy efficiency and emission monitoring - selected tools for companies

Energy audit of the enterprise

Resulting from a statutory obligation required by Polish law, it is the best tool to start the process of improving energy efficiency within the company. A properly conducted audit should not only balance the consumption of energy carriers, but also provide a full view of the processes carried out within the company's operations. This will allow you to identify places with excessive energy consumption - the so-called sensitive nodes. Of course, at this point, as the Energy Efficiency Act says, special attention should be paid to ensuring that the data used as part of the audit are current and representative for the analyzed area. Such an audit should be performed by an entity independent of the entrepreneur, with knowledge and experience in conducting this type of audits, or by an expert of the audited entrepreneur, provided that he is not directly involved in the audited activity of that entrepreneur.

Electricity Management Systems (EMS – Energy Management)

Energy management systems enable not only the identification of devices that consume too much energy, but also the improvement of energy quality. As a result, they minimize the risk of interruptions in production. The optimization of production processes itself can take various forms, e.g.: autonomous activation of devices will reduce energy costs, consumption data is available in real time and allows you to react in a short time, increasing the useful life of equipment, improving production efficiency, possibility of integration with other management systems .

BMS (z ang. Building Management System)

It is a building automation system that allows you to monitor and manage all devices and systems located in the building and its surroundings. This solution works by integrating various functions and technical systems inside the building, which are managed by a data transmission bus. Thanks to controllers and sensors, it is possible to monitor and control the operation of central heating, radiators, air conditioning and lighting. In many buildings, the system is additionally integrated with solutions such as employee access control and an alarm system, although this scope can be much broader. The operation of BMS is therefore based on advanced IT systems, network connections, sensors, controllers and management programs. The entire system is designed to ensure efficient communication and coordination between various elements of the building, benefiting the process of managing its functionalities. This communication takes place, among others: via computers, panels and switches. It is important to take care of security issues in each of these areas so that access is fully controlled.

Sample screen of the energy management system. Source: Astor

Salesforce Net Zero Cloud

It's a complete sustainability management platform for your business, enabling you to track and analyze your carbon emissions and environmental impact in one place, manage your environmental impact and track how close your business is to achieving net zero emissions. It offers numerous tools and resources to measure and reduce energy consumption, emissions and waste. It integrates data from multiple sources, automates workflows, and offers reporting on key sustainability metrics to help companies reduce emissions and save money. Using global emission factors to calculate greenhouse gas emissions, the application helps you collect, categorize, analyze and report energy consumption data across your organization's business operations. With Net Zero Cloud, companies can determine their greenhouse gas emissions and manage third-party sustainability data. It is best suited for businesses that aim to achieve net zero emissions in the foreseeable future.
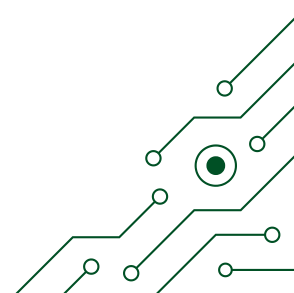
Smart electricity meters

These are devices that help measure electricity consumption and parameters, equipped with various additional functions - primarily allowing two-way communication with the electricity supplier or user (so-called remote reading) and analyzing energy consumption. A smart energy meter is the successor to standard electronic meters that appeared in Polish homes after induction meters. Precise determination and monitoring of energy consumption enables optimization of energy consumption by consumers, which ensures annual savings. At the same time, these technologies contribute to sustainable energy use, helping to save raw materials. Smart meters, in addition to basic functions such as energy consumption measurement, load profiles or energy consumption time, also offer more advanced options, e.g. disconnecting/connecting the consumer, time-zone tariffs, reading on demand, prepayment function, detecting attempts to break into the meter. or falsifying measurements, as well as analyzing even more than 50 electricity quality parameters.

KIO platform from Klemsan

Klemsan Internet Objects (KIO) is an online IoT platform for energy management developed by Klemsan. With advanced features such as real-time electricity, water and gas monitoring, reporting, invoicing, alarm management and much more for energy efficiency, KIO offers a single solution for all your energy management needs. Sensors connected to the system can detect unusual changes or differences between two measurement points and prevent losses and leaks (the number of communicating devices is infinite, and the load shared by a single server supports over 2,000 devices).

The advantage of the system is that it is compatible with all brands of automation devices. You don't need to make any infrastructure changes to start using it. In this case, we reduce costs already at the first stage - the stage of infrastructure construction. The KIO platform is also a scalable system and helps in the implementation of the ISO 50001 energy standard.

Envirly

It is a reporting system that allows you to calculate the company's carbon footprint based on data entered by users. The certified tool enables reporting in accordance with international standards and norms: GHG Protocol and ISO 14064-1. Any changes in regulations are immediately visible in the algorithms. Every company can calculate its carbon footprint in any scope (1st, 2nd and 3rd). Also measure changes in emission resulting from, for example, investments in energy efficiency or thermal modernization. The platform enables the aggregation of non-financial data and automation of reporting, supporting entrepreneurs in decarbonization and green transformation. Envirly creates personalized recommendations, generated based on identified heat points and industry benchmarks. In addition, Envirly allows you to set reduction goals and track their implementation over time, as well as model and verify CO_2 reduction plans and forecast the effects of their implementation. The platform allows for various forms of downloading data for emission counting: by filling out intuitive forms, downloading existing data from spreadsheets or by connecting to the company's internal CRM system.

The appearance of data presented on the platform.
Source: https://www.envirly.pl/slad-weglowy-organyzacji

Ecometrica sustainability reporting platform

It is a comprehensive, cloud-based solution for environmental accounting and sustainability management. It is used by the world's largest companies to collect diverse, geographic datasets that go beyond traditional sustainability reporting and include streams of actionable information on other key corporate indicators such as water, forests and biodiversity. It integrates data from various sources such as field measurements, satellite data, public databases and company data to provide a comprehensive picture of the environmental impact of your business. This allows users to analyze diverse data from different areas, which enables better decision-making. The Ecometrica platform is adapted to various economic sectors, including energy, transport, agriculture, industry and the public sector.
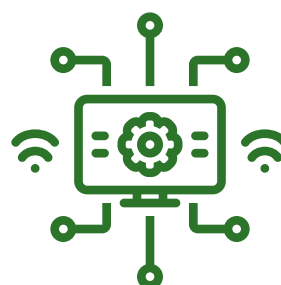
Powerwall by Tesla

It is an integrated battery system that stores solar energy to provide additional protection in the event of a grid failure. The system includes a battery, inverter, charge controller and energy management system. Powerwall is charged both from the mains and from photovoltaic panels, which allows for flexible use of renewable energy. One of the main advantages of Tesla batteries is that they allow you to store electricity in your home or company, which allows you to significantly reduce the costs associated with electricity bills. Additionally, these batteries allow the use of electricity in the event of a power grid failure, which may be especially important in the event of natural disasters or emergencies.

CEMS II e Continuous emission monitoring system

CEMS II e - is an advanced continuous emission monitoring system that is used in industry to monitor and report emissions of polluting gases in real time, enabling simultaneous measurement of up to 50 gases with various gas measurement ranges. The system offers a standard emission monitoring package consisting of 16 gases: H_2O, CO_2, CO, N_2O, NO, NO_2, SO_2, HCl, HF, NH_3, CH_4, C_2H_6, C_3H_8, C_2H_4, C_6H_{14} and CH_2O. In addition to components such as NOx, total organic carbon (TOC) can also be measured with an FTIR analyzer. If the fuel in the system changes, it may introduce new gases or concentrations. This is no problem thanks to the flexible and easy-to-use Calcmet software and FTIR technology, which enables extended measurements for more gases and ranges without any hardware changes. Continuous emissions monitoring enables operators to respond promptly to changes in concentrations. Additionally, measurement ranges can be changed (expanded or reduced) easily and quickly without any changes to the hardware.

IBM Cloud Pak

IBM Cloud Pak is an integrated set of cloud platform and container software that enables enterprises to build, run and manage applications in any cloud environment, including public, private and hybrid clouds. Cloud Pak offers flexibility and scalability, enabling organizations to rapidly deliver innovative applications as well as integrate with existing systems and infrastructure.

Source pages:

https://genergo.pl https://amodit.pl https://automatykaonline.pl https://industrial.pl/ https://www.envirly.pl https://polaridad.es

1.3. DIGITALIZATION AND CORPORATE SOCIAL RESPONSIBILITY

How digital technologies support corporate social responsibility initiatives such as employee data management and online communities.

Introduction to CSR and Digitalization

In today's dynamically changing business world, corporate social responsibility (CSR) and digitalization are two key pillars that shape modern enterprises. CSR, understood as a corporate strategy integrating voluntary business initiatives supporting social and ecological goals, is evolving under the influence of constant technological progress. On the other hand, digitalization - the process of transforming activities, processes and business models into digital ones - opens up new horizons of opportunities for companies. Combining these two areas not only enables companies to implement their CSR goals more effectively, but also contributes to the creation of innovative solutions that can benefit both society and the natural environment.

In the digital era, technologies such as big data, artificial intelligence (AI), social platforms and cloud solutions enable enterprises to analyze large data sets, engage broad audiences and manage resources efficiently. Thanks to these tools, companies can better understand and respond to the needs of their employees, customers and local communities, while minimizing the negative impact of their activities on the environment.

The integration of CSR with digitalization opens up new opportunities for companies to create social and economic value. For example, digital platforms can be used to promote corporate transparency, enabling consumers to make more informed purchasing decisions. In addition, digital tools support ecological initiatives by optimizing production processes, which translates into reduced emissions of harmful substances and lower consumption of natural resources.

In this context, combining CSR and digitalization is no longer an option, but a necessity for companies striving for sustainable development and building long-term relationships with stakeholders. Achieving these goals requires companies not only to implement new technologies, but also an organizational culture open to innovation and change, as well as a strategic approach to managing corporate social responsibility in a new, digital dimension.

https://one-more-tree.org/pl/csr-i-zaangazowanie-interesariuszy-budowanie-zaufania-w-spolecznosci-biznesowej

The role of digital technologies in CSR

In the era of digitalization, corporate social responsibility (CSR) gains a new dimension thanks to the use of advanced tools and technologies. Digitalization offers companies powerful means to manage their CSR activities more effectively, while enabling more sustainable development. Below are the key digital technologies supporting CSR and their applications.

Intelligent human resources management platforms Modern HR systems using artificial intelligence (AI) and machine learning offer enterprises tools to manage employees more effectively and fairly. Thanks to them, it is possible not only to automatically manage HR data, but also to identify talents, monitor employee satisfaction and well-being and predict their development needs. Intelligent HR platforms such as Workday or SAP SuccessFactors enable the implementation of key CSR values by promoting diversity, equality and inclusion in the workplace.

Social networks and community engagement platforms

Digital social platforms such as Facebook, LinkedIn, or specialized community management applications are becoming a key tool in building relationships with stakeholders and engaging communities in CSR activities. Companies use these channels to communicate their social and ecological initiatives, collect opinions and mobilize users to participate in charitable or ecological campaigns. These platforms also enable the implementation of CSR projects in a more interactive and engaging way for recipients.

Big Data and analytics in monitoring environmental impact

Big Data technologies and advanced analytics play a fundamental role in monitoring and optimizing the impact of enterprise activities on the environment. By analyzing big data, companies can better understand their environmental carbon footprints, resource consumption and waste generation, and then take action to reduce them. Tools such as energy management and sustainability platforms, such as Enablon and SAP Environment, Health, and Safety Management, allow you to track, analyze and report environmental data in real time.

Examples of digital tools used in CSR
- Salesforce Sustainability Cloud – a platform that enables companies to track their environmental impact and manage sustainability data.
- Microsoft Cloud for Sustainability – a set of tools that support organizations in achieving their sustainability goals through effective management of environmental data.

The implementation of digital technologies in CSR not only contributes to better management of activities related to corporate social responsibility, but also enables the creation of more sustainable and innovative solutions that support social development and environmental protection.

https://menafn.com/1106434993/Environmental-Health-And-Safety-Market-Demand-Makes-Room-For-New-Growth-Story-SAP-Enablon-ETG-Management-Consultants

CASE STUDY: INTEGRATING DIGITAL TECHNOLOGIES WITH CSR INITIATIVES

1. Google – Sustainable Energy and CO2 Emissions Management

Google, a leader in the technology industry, has been involved in sustainable development activities for years, focusing on reducing its carbon footprint and promoting green energy.
Google uses advanced technologies such as artificial intelligence (AI) and Big Data to optimize energy consumption in its data centers. The company has committed to achieving net zero CO2 emissions by 2030 by investing in renewable energy sources and carbon offsetting projects.
Through its initiatives, Google has achieved significant reductions in greenhouse gas emissions and inspired other companies to take similar actions. Google's annual reports show continuous progress in energy efficiency and increasing the share of renewable energy sources in their total consumption.

2. IKEA – Promoting a Sustainable Lifestyle

IKEA, a global leader in the furniture industry, is known for its commitment to sustainable development, offering products and solutions that support an eco-friendly lifestyle.
The company uses the IKEA Better Living app to help customers monitor and manage their home energy and water consumption. In addition, IKEA invests in renewable energy, including: by installing solar panels on the roofs of its stores and offering products that support sustainable living.

IKEA proves that by integrating digital technologies with products and services, sustainable development can be effectively promoted among a wide group of recipients. These initiatives not only help reduce the company's environmental impact, but also inspire millions of people around the world to make green choices.

https://www.ikea.com/in/en/campaigns/ikea-better-living-app-pub32fe361b

3. Patagonia – Engaging Communities in Environmental Protection

Patagonia, an American manufacturer of outdoor clothing, is known for its deep commitment to protecting the environment and promoting responsible consumption.

The company actively uses social media and digital community engagement platforms to promote its environmental initiatives, such as campaigns for wildlife conservation, sustainable production and clothing recycling.

Thanks to its activities, Patagonia has built a strong community of supporters of sustainable development and environmental protection. The company is an example of how digital technologies can effectively engage and educate the community about ecological challenges and solutions.

These case studies show how companies from various industries are successfully integrating digital technologies into their CSR initiatives. By using digital tools, companies not only achieve their goals related to sustainable development, but also inspire other entities and communities to act for environmental protection and social responsibility. Integrating digital technologies with CSR is a key element in building a future in which business supports sustainable development and community well-being.

Data Analysis and Charts: The Impact of Digitalization on CSR

Digitalization is changing the face of corporate social responsibility (CSR), enabling organizations to manage their initiatives more effectively and better engage stakeholders. We will now take a look at the latest trends and statistics that highlight the growing importance of digital technologies in the area of CSR.

Statistics on Digital Technologies in CSR

- Increasing Investment in Digital Technologies: Research shows that over 60% of organizations plan to increase their investment in digital technologies supporting CSR in the coming years. This reflects the growing belief that digitalization can make a significant contribution to achieving social and environmental goals.
- Development of CSR Platforms: There is also an increase in the number of digital platforms dedicated to CSR, which enable companies to better communicate their activities, engage communities and monitor progress. Over 40% of enterprises already use such tools, and this trend is increasing.
- Application of Big Data and AI in CSR Monitoring: More and more companies are using Big Data and artificial intelligence to monitor the impact of their CSR activities, including analysis of CO_2 emissions, energy consumption and the efficiency of supply chains. Over 35% of enterprises have integrated these technologies into their CSR strategies.

Analysis of Trends and Future of Technology in CSR

- Integration of AI and IoT in Resource Management: Artificial intelligence (AI) and the Internet of Things (IoT) are becoming key technologies to automate and optimize the management of natural resources and energy. Their use is expected to continue to increase in the coming years.

- Blockchain Development for Transparency: Blockchain offers new opportunities for companies seeking greater transparency and traceability of products. This technology can play a key role in combating unfair practices in supply chains and promoting ethical consumption.

- Personalizing CSR Experiences Using Digital Technologies: Companies are increasingly using digital tools to personalize their CSR initiatives, reaching the individual needs and expectations of their customers and employees. This, in turn, translates into greater commitment and effectiveness of activities.

Examples of Social Projects and Online Initiatives

Social projects and online initiatives using digital technologies contribute significantly to achieving corporate social responsibility (CSR) goals. Here are examples that illustrate the scope and impact of such activities:

- *Platforms to Support Sustainable Development*
- *GlobalGiving is a crowdfunding platform that enables nonprofit organizations around the world to raise funds for sustainability-related projects. This enables the implementation of projects that have a direct impact on local communities, in areas such as education, health, environmental protection and the fight against poverty.*
- *This platform facilitates connections between donors and projects that need support, increasing the effectiveness and reach of global sustainable development efforts.*

https://develtio.pl/rozwiazania/platformy-crowdfundingowe/

Educational Games and Applications

Minecraft Education Edition is a version of the popular game that has been adapted for educational purposes. It enables teachers and students to explore science, math, language and social science topics in an interactive way while promoting collaboration and creative thinking.

Educational games such as Minecraft Education Edition have a positive impact on students' involvement in the learning process, offering them fun and learning at the same time.

Initiatives to Fight Digital Exclusion

Programs such as 'EveryoneOn' in the US aim to combat digital exclusion by providing internet access, computer equipment and digital skills training to economically disadvantaged communities.

These actions are crucial to ensuring equal opportunities in access to education, work and social services, which is an important element in creating a more equitable community.

Santander Bank Polska initiatives

Santander Bank Polska supports non-governmental organizations and the development of local communities through grant programs. These include the "I live here, I change EKO here" initiative - a competition for a project contributing to the creation of ecological solutions in public space. In 2020, the Santander Bank Polska Foundation donated PLN 500,000 for the implementation of this grant program. zloty.

More at: https://esg.santander.pl/2020/raport-2020/klimat/zdrowie-inicjatywy-i-projekty/
https://esg.santander.pl/2020/raport-2020/spolecznosci/fundacja-santander-bank-polska/

Environmental Protection Initiatives

"Ocean Cleanup" is a project aimed at cleaning the oceans from accumulated plastics using advanced technologies. These activities not only contribute to the protection of marine ecosystems, but also promote environmental awareness among the global community.
Projects like Ocean Cleanup demonstrate how technologies can be used to solve global environmental problems, while having a real impact on nature conservation.

https://theoceancleanup.com/boyan-slat/

The examples presented illustrate that digital technologies are a powerful tool in the hands of organizations and enterprises striving to achieve CSR goals. From education and health to sustainability to environmental protection, digital technologies offer new opportunities for social initiatives, enabling them to achieve greater impact. These projects not only benefit the communities directly supported, but also promote positive values and behavior patterns, contributing to a better, more sustainable world.

Challenges and future directions

The integration of digital technologies with corporate social responsibility (CSR) initiatives opens up new opportunities, but at the same time poses a number of challenges for organizations. Developing future directions in this area will require consideration of both potential benefits and obstacles.

Challenges

- Technological: Ensuring data security, privacy protection and the availability of technology for all social groups are significant challenges. Keeping up with rapid technological progress requires organizations to continually invest in updating their systems.
- Organizational: Integration of digital technologies with CSR requires changes in organizational culture, decision-making processes and management models. This requires commitment and adaptation at all levels of the organization.
- Ethical: The use of technology, especially AI and big data, raises questions about the ethical aspects of data collection and use. Organizations must ensure that their activities not only bring social benefits, but are also conducted in an ethical and transparent manner.

Future Directions

- Sustainability and ecology: Digital technologies will be increasingly used to monitor and reduce the environmental impact of business activities, e.g. by optimizing resource use and reducing CO_2 emissions.
- Personalizing CSR initiatives: The use of data and predictive analytics will enable the creation of more personalized CSR programs that better meet the needs of a specific community or target group.
- Integration with technological innovations: The development of technologies such as blockchain can bring new ways of verifying and reporting CSR activities, increasing their transparency and credibility.
- The rise of partnerships: Collaboration between businesses, nonprofits, and even competitors may increase to jointly solve social problems using technology.

The integration of digital technologies with CSR is a continuous process that offers significant opportunities for improving living conditions, environmental protection and social development. However, to fully exploit these opportunities, organizations must actively manage technological, organizational and ethical challenges. Future directions point to a further deepening of the relationship between technology and CSR, with an emphasis on sustainability, personalization of activities and innovation. A key aspect will be cross-sector cooperation, which may bring new solutions to global social challenges.

https://pl.cloudity.digital/blog-post/potencjal-digitalizacji/
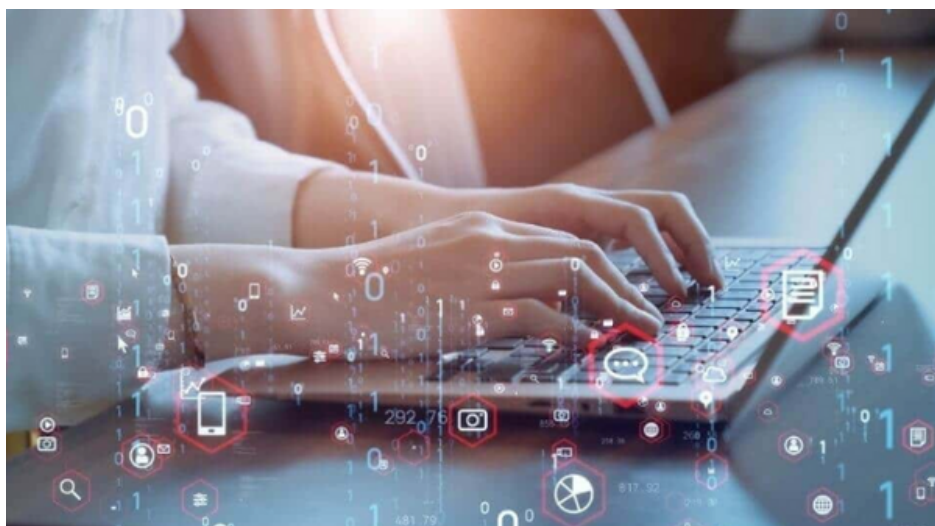
SUMMARY AND CONCLUSIONS
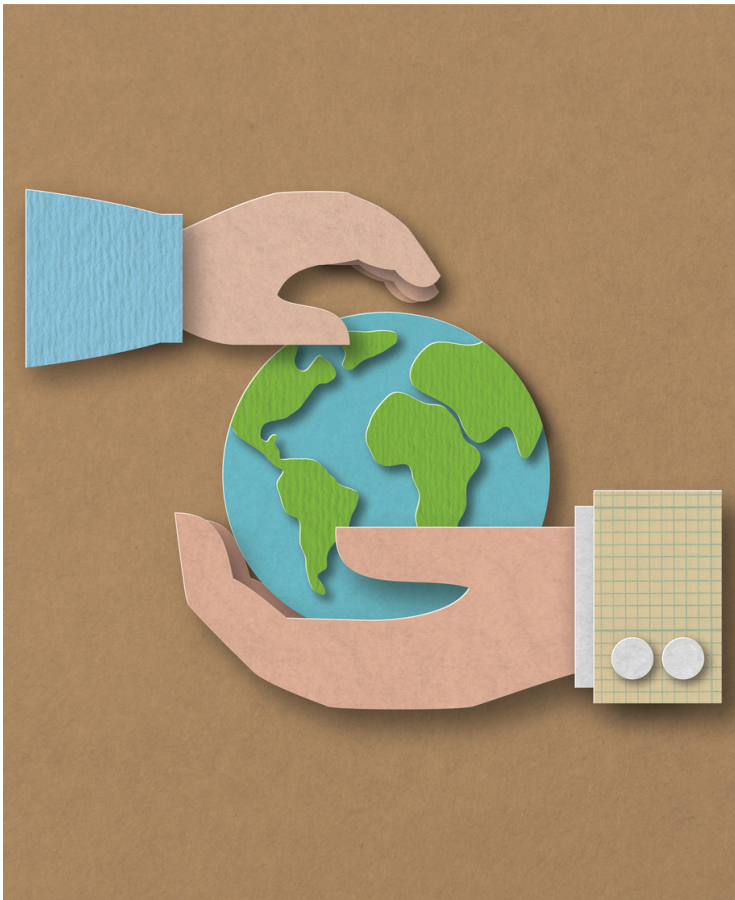
This chapter explored the complex relationship between corporate social responsibility (CSR) and digitalization, showing how digital technologies can support and advance CSR initiatives, bringing benefits to both communities and the environment. Based on a review of digital tools, analysis of case studies, and presentation of data and trends, several key conclusions can be drawn regarding the current and future impact of digitalization on CSR.

The Importance of CSR Integration and Digitalization

The integration of CSR and digitalization is becoming not only an element strengthening the competitiveness of enterprises, but also a key component of their social and environmental strategy. Digital technologies such as intelligent human resources platforms, social networks, big data and analytics enable companies to engage communities more effectively, better manage environmental impacts and innovate approaches to managing employee data. In times of global challenges such as climate change, social inequalities or the migration crisis, the ability to effectively and transparently report CSR activities is gaining in importance.

MOST IMPORTANT CONCLUSIONS

- The Role of Digital Technologies in CSR: Digital technologies offer new opportunities for companies to meet their CSR goals, from increasing employee and community engagement to monitoring and reducing negative environmental impacts.
- Case Studies: Examples of companies that have successfully integrated digital technologies with their CSR initiatives show that an innovative approach can bring tangible benefits to both the organization and the wider community.
- Challenges and Future Directions: Despite promising opportunities, the integration of digital technologies with CSR brings with it challenges such as ethical, technological and organizational issues. Future directions point to further deepening of this integration, with an emphasis on sustainability, personalization of activities and innovation.

Digitalization plays a key role in shaping the future of corporate social responsibility. The potential of digital technologies to support CSR initiatives is enormous, and their effective use can significantly contribute to sustainable development and social inclusion. However, to fully exploit these opportunities, continuous reflection on the ethical, technological and organizational aspects of integrating digitalization with CSR is necessary. Businesses that recognize these challenges and actively seek to overcome them will be at the forefront of creating a future where business serves both people and the planet.

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Google 2023 Environmental Report - Executive Summary

1.4. CYBERSECURITY IN THE CONTEXT OF ESG

In today's dynamically changing world, where sustainable development and corporate social responsibility are becoming increasingly important, the concept of ESG (Environmental, Social, Governance) has gained popularity and has become a key element of business strategies around the world. ESG, an acronym for Environmental, Social and Governance, is a framework for assessing the impact of companies' activities on the world and society and their management practices. In the context of the growing demands of regulators, investors and consumers, the integration of ESG criteria in the decision-making process of enterprises not only promotes sustainable development, but also contributes to building their long-term value and reputation.

Among the many aspects covered by ESG, cybersecurity holds a special place. As a key element of the Social and Governance components, cybersecurity plays a fundamental role in protecting the personal data of customers, employees and other stakeholders. In the era of digitalization and the growing number of cyberattacks, the ability of an enterprise to ensure information security is becoming not only a technological issue, but also a social and managerial one, having a direct impact on trust and relationships with stakeholders.

This article aims to examine the role of cybersecurity within ESG strategies, highlighting its importance for securing data and information in the context of social and managerial aspects of enterprise operations. We will analyze how cybersecurity practices fit into the broader context of social responsibility and good governance, and how they can contribute to achieving the Sustainable Development Goals. Based on real-life examples (case studies), data and charts, we will present how companies around the world integrate cybersecurity into their ESG strategies, what challenges they encounter and what benefits flow from it.

BASICS OF CYBERSECURITY IN THE CONTEXT OF ESG

Modern enterprises operate in the digital era, where information is one of the most valuable resources. In this context, cybersecurity becomes not only a technical necessity, but also a key element of the ESG strategy, having a direct impact on all its three pillars: Environmental, Social and Governance.

https://eventis.pl/artykul/czym-jest-esg-i-jak-wplywa-na-dzialalnosc-firm-i-organizacji-id147

- **Impact on the environmental pillar (Environmental)**

While the connection between cybersecurity and the environment may not be obvious, data breaches can lead to significant waste of resources. Cyber attacks on critical infrastructure such as power plants or water systems can cause not only direct material damage, but also negatively impact the natural environment. Moreover, securing data and systems requires significant energy resources, which also fits into the context of environmental management.

- **Impact on the social pillar (Social)**

Cybersecurity has a direct impact on the social pillar of ESG as it concerns the protection of personal data and privacy of users, employees and customers. Data breaches can lead to loss of trust and damage to a company's reputation, which in turn can have negative social consequences. Companies that do not adequately protect personal data violate public trust and may be perceived as socially irresponsible.
An example is the 2017 Equifax data breach, which affected the personal information of nearly 150 million people. This incident not only caused huge financial losses for the company, but also damaged its reputation and customer trust, highlighting the importance of proper cybersecurity practices for social responsibility.

- **Impact on the corporate governance pillar (Governance)**

Good cybersecurity practices are an integral part of good governance. These include not only technical security aspects, but also policies, procedures and organizational culture that support data security. Cyber risk management, regular security audits, employee training and quick response to incidents are key to maintaining a high level of management in the company.

Cybersecurity and compliance regulations, such as the General Data Protection Regulation (GDPR) in the European Union and the California Consumer Privacy Act (CCPA) in the United States, also influence ESG criteria. These regulations oblige companies to ensure an adequate level of personal data protection, which is directly related to good management and social responsibility. Failure to comply with these regulations can lead to significant financial penalties and reputational damage, highlighting the importance of cybersecurity in a governance context.

In summary, cybersecurity is fundamental to achieving ESG goals, affecting all three pillars. Protecting data and systems not only minimizes cyber risk, but also contributes to building social trust, maintaining a good reputation and ensuring legal compliance, which is essential for sustainable development and corporate responsibility.

Case Study 1: Equifax data breach and its impact on 'Social' and 'Governance' aspects

A case report

In 2017, Equifax, one of the three largest credit reporting agencies in the United States, suffered one of the largest data breaches in history. The breach affected the personal information of nearly 150 million U.S. consumers, including Social Security numbers, dates of birth and addresses. The breach resulted from the exploitation of a software vulnerability on the company's website.

The company's reaction

Equifax's response to the breach was widely criticized. The company delayed announcing the incident for six weeks after it was discovered, and its recovery efforts, including offering free identity theft protection to victims, were deemed insufficient. Additionally, it came to light that several senior managers sold company shares before the breach was disclosed.

Impacts on stakeholders

The data breach had serious consequences for customer trust and Equifax's reputation. The company was also ordered to pay more than $1.4 billion in direct costs, including consumer damages, legal costs and increased cybersecurity expenses. Additionally, the company's stock fell almost 35% in the weeks following the disclosure of the breach, illustrating the direct impact on shareholder value.

Conclusions

- The Importance of Risk Management: The Equifax data breach highlights how critical it is to properly manage cyber risk and maintain up-to-date security systems. Failure to respond quickly to known security vulnerabilities can lead to disastrous consequences.

- Impact on Trust and Reputation: The incident significantly damaged Equifax's reputation, demonstrating that data breaches can have a long-lasting impact on customer and investor perceptions of a company, as well as its market value.

- Financial and Regulatory Consequences: In addition to the direct financial losses associated with the data breach, Equifax also faced regulatory consequences, including fines and liabilities resulting from lawsuits.
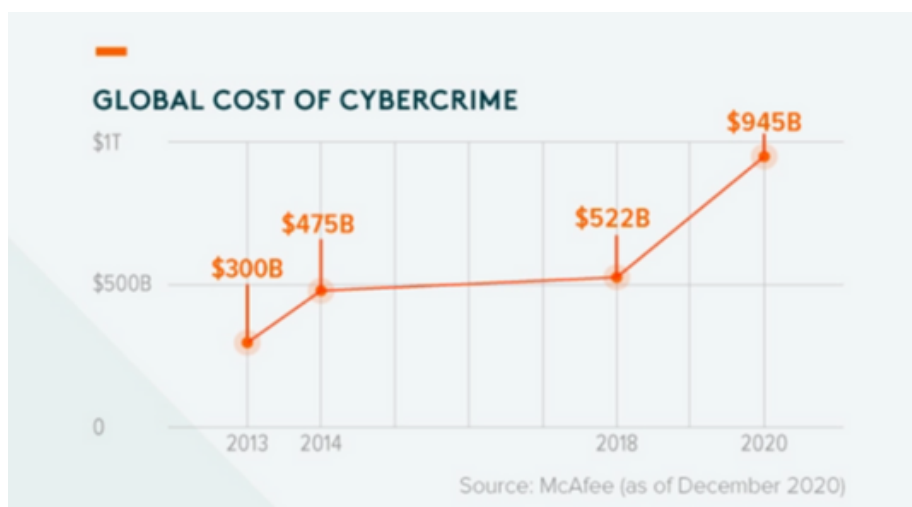
Total cost of cybercrime since 2013 https://www.visualcapitalist.com/sp/thematic-investing-3-key-trends-in-cybersecurity/

Case Study 2: Microsoft and successes in implementing cybersecurity strategies

A case report

Microsoft, as one of the world's leading technology companies, has integrated cybersecurity into its ESG strategy, which has resulted in significant benefits in terms of customer trust and loyalty. The company invests billions of dollars annually in cybersecurity, including developing advanced protection technologies, educating users and working with governments and other companies to combat cyber threats.

ESG successes and benefits

With a strong commitment to cybersecurity, Microsoft has managed to not only protect its systems and customer data, but also build a reputation as a leader in digital security. Initiatives such as the CyberPeace Institute and the AccountGuard program for protection against cyberattacks on democratic institutions emphasize the company's commitment to the social and governance aspects of ESG.

These two case studies present contrasting scenarios regarding the impact of cybersecurity on ESG aspects in enterprises, highlighting key findings from both negative and positive practice perspectives.

Categories to consider when designing your security system https://learn.microsoft.com/pl-pl/azure/architecture/guide/security/security-start-here

Conclusions

- Integrating Cybersecurity with ESG: Companies that effectively integrate cybersecurity into their ESG strategies demonstrate both social and managerial responsibility. This approach builds customer trust and loyalty, which is crucial to long-term success.
- Business and Reputation Benefits: Appropriate cybersecurity practices can lead to increased trust from customers and investors, which translates into increased market value and a positive company image.
- The Role of Proactive Management: Companies that effectively implement cybersecurity strategies demonstrate that proactive management and security investments can significantly reduce the risk of cyberattacks and their potential negative effects on ESG aspects.

General Conclusions

- Cybersecurity is Critical to ESG: Both case studies demonstrate that cybersecurity is an integral part of social responsibility and good governance as part of an ESG strategy.
- Risk Management and Accountability: Effective cyber risk management and a responsible approach to data protection are essential to maintaining stakeholder trust and minimizing negative environmental, social and governance impacts.
- Long-Term Benefits: Investments in cybersecurity and integration with ESG practices deliver long-term benefits, including improved reputation, increased customer and investor trust, and protection from the financial and regulatory consequences of data breaches.

These findings show that both negative and positive cybersecurity practices have a direct impact on achieving ESG goals, highlighting its importance as a key element of modern strategies.
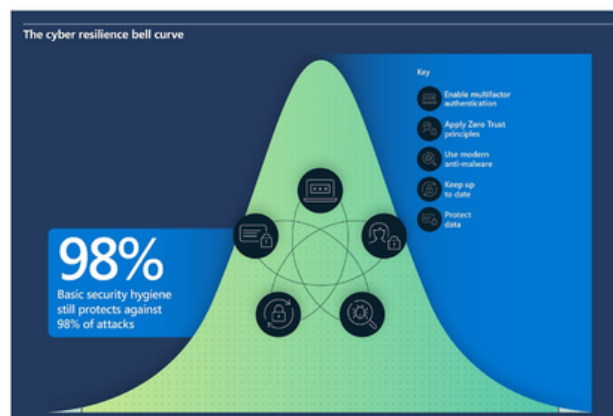
Gaussian curve of cyber resilience
https://www.microsoft.com/pl-pl/security/business/microsoft-
digital-defense-report-2022-cyber-resilience

Cybersecurity as a driver of ESG values

Cybersecurity, in the context of ESG (Environmental, Social, Governance), is no longer perceived solely as a preventive measure against digital threats. It is now understood as a strategic value driver across each of the three ESG pillars, offering benefits far beyond traditional IT security frameworks.

Environmental Impact (Environmental):

While the link between cybersecurity and the environment may not be obvious, the development of sustainable security technologies can help reduce an organization's carbon footprint. Intelligent security systems that efficiently manage data and network resources can reduce energy consumption. Companies that invest in green security technologies not only protect their digital assets, but also demonstrate their commitment to protecting the environment.

Social Dimension of Cybersecurity:

The social aspect of ESG is gaining importance thanks to cybersecurity practices. Protecting users' personal data and privacy is becoming an important aspect of corporate social responsibility. Companies that effectively protect customer and employee data build trust and loyalty, which is crucial to maintaining positive relationships with all stakeholders.

Additionally, cybersecurity education and training for employees and customers emphasize the company's commitment to ESG social aspects.

Corporate Governance and Cybersecurity:

In the governance pillar, cybersecurity reveals its role through the implementation of sound security policies and procedures, which reflect good management practices. Transparency in communication about security strategy and incident response increases the level of trust among investors and customers. Additionally, compliance with data protection regulations such as GDPR demonstrates that an organization takes risk management and legal responsibilities seriously.

Company Examples:
Companies like Microsoft and Google are demonstrating how cybersecurity investments can deliver ESG benefits. By developing advanced security technologies that protect user data and IT infrastructure while engaging in sustainability initiatives, these corporations strengthen their market position and build trust among stakeholders.

Tools and Technologies:
Advanced tools and technologies such as artificial intelligence (AI), machine learning and blockchain play a key role in supporting cybersecurity in the context of ESG. AI and machine learning can predict and prevent a cyber attack in real time, while blockchain technology offers transparency and security in digital transactions, which is important for governance and social aspects of ESG.

Summary
Cybersecurity investments, viewed through an ESG lens, not only protect against digital risk, but also contribute to enterprise value by increasing customer trust and loyalty, improving governance and demonstrating environmental responsibility. In the context of growing regulatory requirements and social expectations, cybersecurity is becoming an integral element of ESG strategies, driving long-term value for organizations.

The future and challenges

Cybersecurity and ESG (Environmental, Social, Governance) are two areas that will become increasingly intertwined in the future. On the one hand, dynamically developing digital technologies offer new opportunities for companies in the field of sustainable development and social responsibility. On the other hand, the growing dependence on technology makes cybersecurity issues increasingly important to ensure stability and trust among stakeholders.

Future Trends:

In the near future, the development of technologies such as artificial intelligence (AI), Internet of Things (IoT) and blockchain can be expected to further strengthen the relationship between cybersecurity and ESG. These technologies offer promising opportunities to optimize processes, increase energy efficiency and ensure data transparency and security, which directly impacts all three ESG pillars.

Challenges:

Integrating cybersecurity with ESG poses a number of challenges. Evolving data protection and privacy regulations, such as GDPR in Europe and CCPA in California, require companies to constantly adapt their security policies and procedures. Additionally, growing cyber threats such as ransomware and phishing attacks are a constant challenge to IT security systems. This requires companies not only to invest in advanced security technologies, but also to develop security awareness and culture among employees.

In the face of these challenges, the key lesson is that cybersecurity should not be treated as an isolated element of corporate strategy. To meet the expectations of the modern world, companies must integrate cybersecurity practices into their ESG strategies. Such synergy not only minimizes cyber risk, but also strengthens customer trust and loyalty, improves the company's reputation and supports sustainable development.

The call to action for businesses is to take a proactive stance on cybersecurity, treating it as an integral part of their social responsibility and governance. This requires continuous risk assessment, investment in modern technologies and, above all, building an organizational culture that emphasizes the importance of safety and sustainable development. This approach will not only provide protection against digital threats, but will also contribute to building long-term value for all stakeholders.

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1.5 ARTIFICIAL INTELLIGENCE AND SUSTAINABLE DEVELOPMENT - OPPORTUNITIES AND RISKS

Artificial intelligence and sustainable development - opportunities and risks

In an era of rapidly advancing technology, artificial intelligence (AI) is emerging as a key factor influencing many aspects of our lives and work. Defined as the ability of machines to perform tasks that typically require human intelligence, AI is revolutionizing industries from health to education, from manufacturing to environmental management. However, like any powerful technology, AI brings both promises and challenges, especially in the context of sustainability.

Sustainable development, defined by the United Nations (UN) as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs", is the foundation for the future of our planet. The UN Sustainable Development Goals (SDGs), established in 2015, consist of 17 goals that aim to promote well-being, protect the environment, and ensure peace and prosperity for all people.

Artificial intelligence can play a key role in achieving these goals, offering new opportunities to improve efficiency, reduce waste and manage natural resources more sustainably. Examples include AI supporting precision agriculture, optimizing energy use, and monitoring climate change. With the ability to process and analyze huge amounts of data, AI can help identify patterns and trends that are elusive to the human eye and thus support data-driven decision-making.

However, enthusiasm for the possibilities of AI must be balanced with awareness of the risks. Threats such as increased energy consumption by AI data centers, the potential for social inequalities to deepen through job automation, and issues of privacy and ethics in the design and implementation of AI systems require attention and management. For AI to effectively support sustainable development, it will be crucial to balance its capabilities with a responsible and ethical approach to its development and application.

AI can support sustainability by analyzing specific use cases and successes, as well as considering potential risks and challenges. These developments present both the promises and pitfalls of integrating AI into a sustainability strategy, offering perspective on how we can navigate this dynamic landscape in a way that maximizes benefits for our planet and its inhabitants.
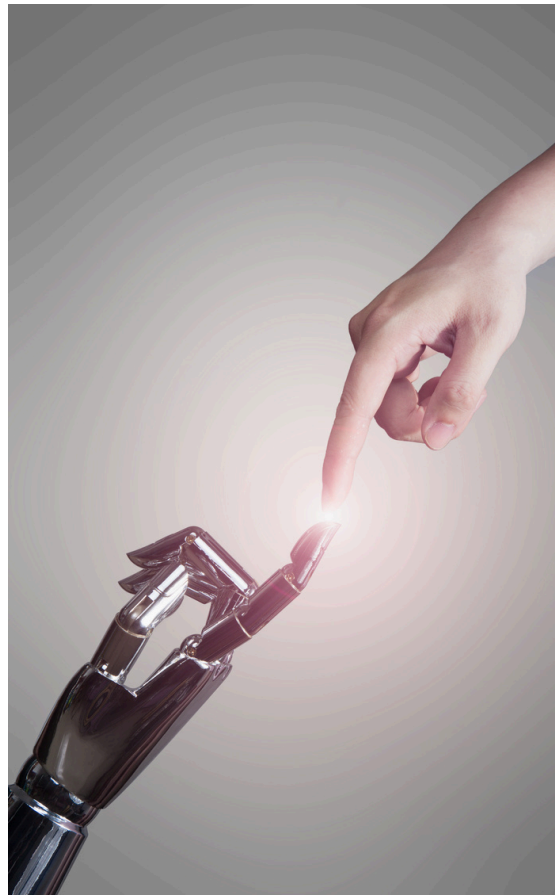
Artificial intelligence for sustainable development - opportunities

Artificial intelligence offers extraordinary opportunities to promote sustainable development through innovative solutions in many sectors. Two key areas where AI is demonstrating its potential are smart agriculture and energy management.

Case Study 1: Smart Agriculture In recent years, precision agriculture has gained importance as a way to increase productivity and sustainably manage natural resources. AI technologies are playing a key role in this transformation, offering tools for more precise crop monitoring and management.

Description of AI technologies used in precision agriculture:

- Crop monitoring with drones: Drones equipped with advanced sensors and cameras can collect data on plant health, soil moisture, and identify areas requiring intervention. AI processes this data, enabling farmers to optimize fertilization and irrigation.
- Water Usage Optimization: AI systems can analyze meteorological and soil data, predicting crop water needs and enabling precise irrigation to minimize water waste.
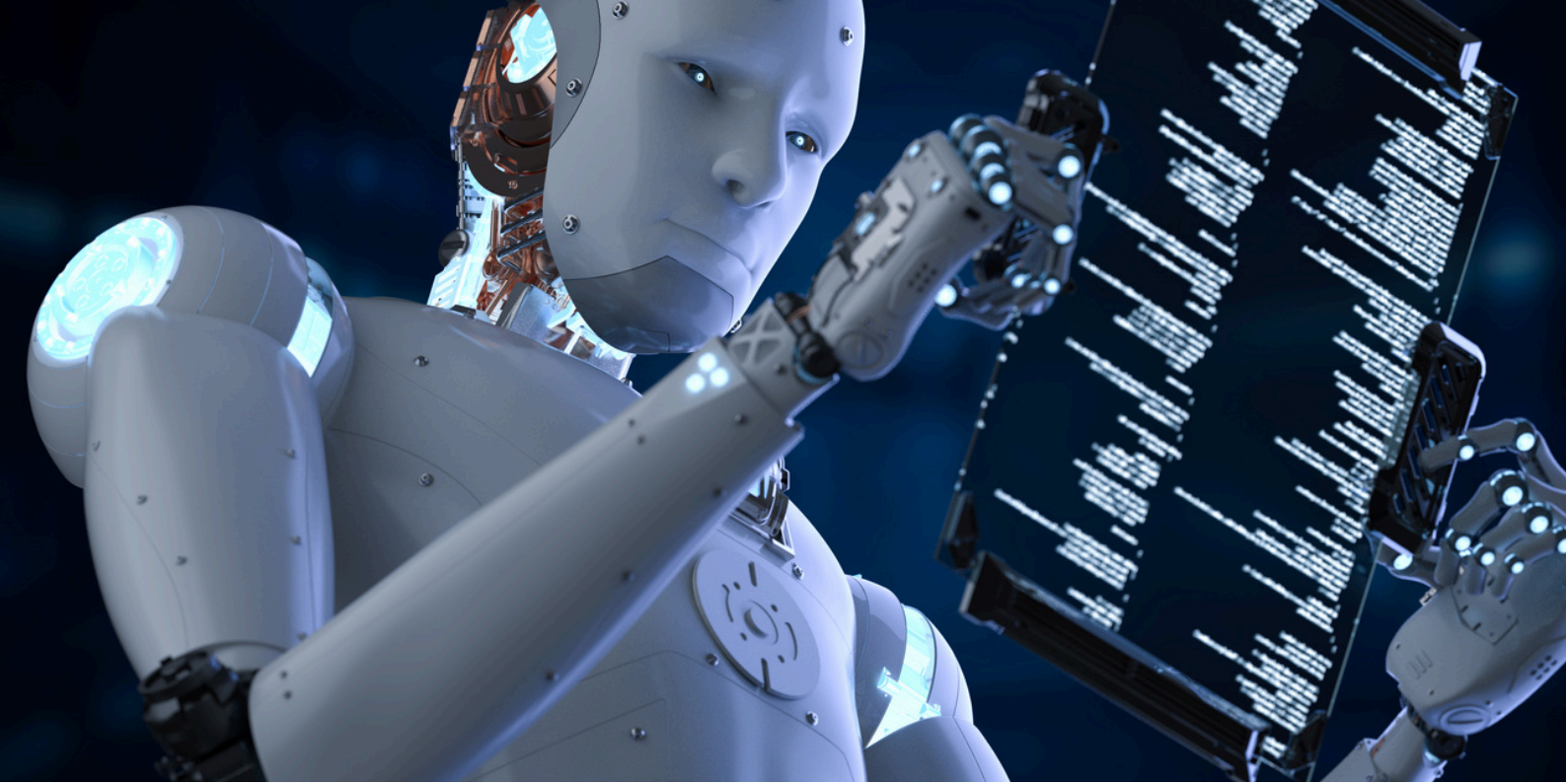
Examples of real benefits:

- Increasing the efficiency of agricultural production thanks to precise adjustment of agrotechnical treatments.
- Reducing the use of resources such as water and fertilizers, which helps to reduce the environmental impact of agriculture.

Case Study 2: Intelligent energy management

Smart energy management is another area where AI can contribute to sustainable development, especially by optimizing the use of renewable energy.

Overview of AI systems in energy network management:

- AI enables analysis and forecasting of energy production from renewable sources such as wind and solar, which helps in better energy planning and distribution.
- Smart energy networks, using AI algorithms to monitor and automatically adjust energy flows, increase the efficiency and reliability of energy supplies while reducing losses.

Real life example:

- In Denmark, smart energy grids use AI to integrate wind energy, a significant step towards a sustainable and self-sufficient energy system.

https://aioai.pl/zastosowanie-sztucznej-inteligencji-w-energetyce/

These examples demonstrate how artificial intelligence can be used to promote sustainable development through innovative solutions in agriculture and energy management. By reducing the consumption of natural resources and optimizing production, AI contributes to creating a more sustainable future.

Artificial intelligence and sustainable development - risks

The development and implementation of artificial intelligence carry not only promises of increased efficiency and sustainability, but also certain risks that may undermine these goals. Two significant challenges are the increase in energy consumption of AI data centers and the impact of automation on the labor market.

Risk 1: Increased energy consumption of AI data centers

One of the key challenges associated with the growing use of artificial intelligence is the significant demand for electricity by data centers. Training advanced AI models requires huge computing power, which leads to an increase in energy consumption.

Discussion on the growing energy demand of AI infrastructure:

- Training and running AI models can generate significant carbon emissions, especially if the energy used to power data centers comes from non-renewable sources.
- This problem is becoming more and more important as AI becomes more common in various sectors of the economy.

https://businessinsider.com.pl/technologie/nowe-technologie/ai-ma-jedna-duza-wade-zuzywa-tyle-pradu-co-cala-holandia/b2hkd51

Risk 2: Automation and the labor market

Automation, powered by artificial intelligence, has a potentially profound impact on the labor market. While it can increase efficiency and productivity, it also raises concerns about social inequality and job losses.

Analysis of the impact of automation on the labor market and social inequalities:

- Automation may lead to the replacement of workers in many sectors, increasing the risk of unemployment and widening income inequality.
- Sectors where tasks are routine and easily amenable to automation, such as manufacturing or some services, are particularly vulnerable.

Real life example:

- The introduction of AI systems in the service sector, e.g. in customer service using virtual assistants, may lead to a reduction in the number of jobs for customer service employees.

These risks require a conscious approach and responsible implementation of AI technology to ensure that its development contributes to sustainable development without aggravating existing social and environmental problems. It is important that AI implementation strategies are supported by public policies and private initiatives aimed at minimizing negative effects, such as increases in carbon dioxide emissions and social inequalities.

How to manage risks and maximize benefits?

Given the risks associated with the development of artificial intelligence (AI), it becomes crucial to find effective strategies to manage these challenges. For AI to fully contribute to sustainable development, a responsible approach is necessary, including regulation, ethics, education, and supporting initiatives at both global and local levels.

AI risk management strategies

- Regulation: Establishing a clear legal framework that governs the development and implementation of AI technology is key to minimizing risks. These regulations may concern data protection, transparency of algorithms, and ensuring the security and fairness of AI systems.
- Ethics in AI: Promoting ethical principles in the design and implementation of AI helps ensure that the technology is used in a way that respects human rights and contributes to the common good. Organizations and companies should develop and implement AI codes of ethics.
- Education and retraining of workers: Investments in education and training are essential for workers to adapt to a changing labor market in which automation is playing an increasingly important role. Reskilling and continuous skills development programs can help mitigate the negative effects of automation.

Global and local initiatives promoting responsible use of AI

- Global initiatives: International organizations such as the UN and the European Union are taking action to promote the ethical and responsible use of AI. Examples include establishing international standards for AI ethics and supporting research on the impact of AI on sustainable development.
- Local initiatives: At the local level, national governments, academic institutions and enterprises can support research projects, the development of innovative solutions and AI education. Examples include funding AI research centers that focus on solutions that promote sustainable development, and organizing public information and training campaigns.

To maximize the benefits and minimize the risks associated with AI, a multidimensional approach that combines regulations, ethics, education and cooperation between different sectors and at different levels is crucial. This approach allows not only to manage risks, but also to use the full potential of AI in promoting sustainable development.

The future of AI and sustainability

The future of integrating artificial intelligence (AI) with sustainability principles appears to be at a crossroads, where these paths could lead to both breakthrough innovations and new challenges. Future scenarios depend on how societies, businesses and governments approach regulation, ethics and investment in technologies supporting sustainable development. Key aspects of this future include the role of international cooperation and technological innovation.

Future scenarios

- Sustainable Automation: In this scenario, AI is used to maximize efficiency in production, natural resource and energy management, while minimizing waste and greenhouse gas emissions. AI technologies such as smart agricultural irrigation systems and energy grid optimization are becoming commonplace, contributing to achieving sustainable development goals.
- Integrated City Solutions: Smart cities use AI to manage transport, energy consumption, waste management and urban infrastructure, leading to a significant reduction in carbon footprint and improved quality of life for residents.
- Inclusion and Social Justice: AI helps address social inequalities by providing personalized education, health and economic solutions, ensuring greater access to these services for marginalized communities.

The role of international cooperation and technological innovation

- International Collaboration: A key success factor will be international collaboration in AI and sustainability research. Establishing global standards and best practices for ethical and sustainable AI can accelerate the development and adoption of innovations around the world.
- Technological Innovation: Advances in AI, along with other technologies such as blockchain and the Internet of Things (IoT), offer new opportunities for sustainable development. Examples include improved climate change monitoring systems, natural resource management, and the development of sustainable energy systems.

The future of AI and sustainability will depend on humanity's ability to harness this powerful technology in ways that support the Sustainable Development Goals while mitigating risks and promoting social justice. In this context, innovation, regulation and international cooperation will play a key role in shaping a world where AI is a force for positive change.

Case study - Microsoft's "AI for Earth" project

Microsoft's "AI for Earth" project is one of the leading efforts combining the potential of artificial intelligence (AI) with sustainable development goals. This initiative aims to support organizations and scientific units in using AI to solve the key ecological challenges of our times. "AI for Earth" focuses on four main areas: climate, biodiversity, agriculture and water.

Goals and implementation

AI for Earth aims to accelerate environmental innovation by providing technological, financial and educational resources. Microsoft supports projects that use AI to analyze large sets of environmental data, predict ecological changes, optimize resource use and improve efficiency in environmental protection activities.

Examples of AI applications

- Biodiversity protection: Projects focus on monitoring the state of animal and plant populations, identifying threats to ecosystems and optimizing protection strategies. AI helps analyze images from forest cameras, automatically recognize species and monitor their numerical changes.
- Agriculture: "AI for Earth" supports the development of precision agriculture, which uses satellite data, sensors and predictive models to optimize crops, manage water resources and minimize the impact of agriculture on the environment. Thanks to AI, farmers can increase yields while reducing the use of water, fertilizers and pesticides.
- Water resources management: AI technologies enable better prediction of droughts and floods, optimization of irrigation systems and monitoring of water quality. Projects in this area focus on ensuring access to clean water and effective management of water resources.
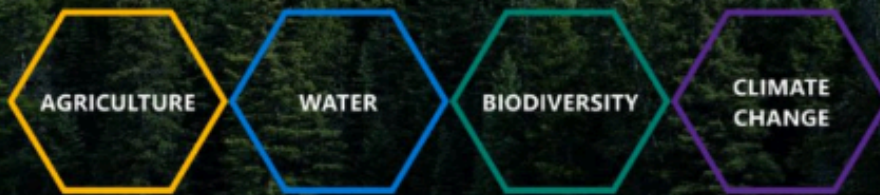
Microsoft's "AI for Earth" project demonstrates how AI technology can be used to achieve tangible, positive change in sustainability and environmental protection. By combining technological innovations with ecological initiatives, "AI for Earth" becomes a model for future projects for the planet.

Summary and Conclusions

The interaction between artificial intelligence (AI) and sustainability is complex, highlighting both promising opportunities and significant challenges. AI offers innovative tools to solve key environmental and social problems, from smart agriculture and natural resource management to improving energy efficiency and supporting biodiversity. However, at the same time we must face the risk of increased energy consumption by AI data centers, the impact of automation on the labor market and the potential deepening of social inequalities.

Key points

- Opportunities: AI has the potential to contribute to achieving the Sustainable Development Goals by increasing resource efficiency, optimizing food production and supporting environmental protection efforts.
- Risks: The growing energy demand of AI infrastructure, the impact of automation on the labor market and the potential deepening of social inequalities require conscious management and regulation.

To maximize the benefits of AI in the context of sustainable development and minimize the associated risks, collaboration at many levels will be key. You should promote:

- Ethical regulations and standards: Creating and implementing international standards for the ethical use of AI.
- Education and retraining: Invest in education and training so that workers can adapt to a changing labor market while increasing environmental awareness.
- Technology Innovation: Encouraging AI research and development that focuses on environmentally friendly solutions and energy efficiency.
- International cooperation: Strengthening global dialogue and cooperation between governments, the private sector, non-governmental organizations and academia to jointly pursue sustainable development.

The conclusions are clear: AI offers significant opportunities for sustainable development, but it requires equally significant responsibility. Through collaboration, innovation and regulation, we can use AI to build a more sustainable future for all. This synergy between technology and sustainability opens new paths for progress that can lead us towards a fairer and greener world.
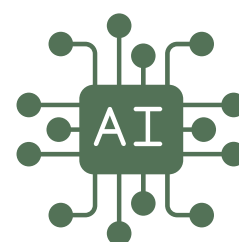
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1.6 COMPETENCY TEST

Competence Test: ESG - Environment, Society, Governance

Question 1: During what period did ESG history focus primarily on apartheid in South Africa?

a) 1960s and 1970s b) 1980s c) 1990s d) 2000s

Question 2: Which of the following is not one of the three main areas that an ESG strategy covers?

a) E - Environment b) S - Society c) G - Global Economy d) G - Governance

Question 3: What does the social area (S) cover under the ESG strategy?

a) Ecological goals b) Employee management c) Waste management d) Business ethics

Question 4: When did the European Union introduce the Corporate Sustainability Reporting Directive (CSRD)?

a) 2010 b) 2015 c) 2021 d) 2026

Competence Test: ESG - Environment, Society, Governance

Question 5: What are the main goals of the ESG strategy?

a) Increasing company profits b) Building lasting relationships with stakeholders, risk management, sustainable development c) Minimizing company expenses d) Increasing competitiveness at the expense of other companies

Question 6: What does the acronym CSR mean in the context of the history of ESG?

a) Corporate Sustainability Reporting b) Corporate Social Responsibility c) Corporate Strategic Resourcing d) Corporate Stakeholder Relations

Question 7: What does the CSRD impose on companies in the European Union?

a) Obligation to conduct ESG training for employees b) Obligation to publish annual ESG reports c) Obligation to invest in environmentally friendly technologies d) Obligation to create marketing campaigns promoting ESG

Question 8: Why are ESG reports important for companies?

a) Because they bring immediate financial benefits to companies b) Because they allow companies to identify and manage risks, build lasting relationships with stakeholders and contribute to sustainable development c) Because they are a legal requirement d) Because they allow companies to hide undesirable activities

Question 9: What are the advantages of using digital technologies in the context of ESG?

a) Improving transparency and monitoring of activities related to sustainable development.

b) Increased greenhouse gas emissions.

c) Limiting access to information about the company's activities.

d) No impact on waste management.

Competence Test: ESG - Environment, Society, Governance

Question 10: How does blockchain technology support ESG principles in the food sector?

a) By making it difficult to monitor the supply chain.

b) By improving transparency and traceability of products.

c) By keeping information about the composition of products secret.

d) By restricting access to production data.

Question 11: What is the SASB Severity Map?

a) A tool for hiding important information about the company's activities.

b) Greenhouse gas emissions monitoring tool.

c) A tool to identify key ESG issues for a given industry.

d) A tool for manipulating the capital market.

Question 12: What are the benefits of using an MES (Manufacturing Execution System) in the context of sustainable production?

a) Improving production efficiency at the expense of increasing energy consumption.

b) Increase in production waste.

c) Improving the tracking and management of production processes in a sustainable manner.

d) No impact on sustainable development.

Question 13: What digital tools can be used to effectively manage human resources as part of CSR initiatives?

a) HR systems using artificial intelligence (AI) and machine learning b) Energy management platforms c) Educational games and applications d) Programs to combat digital exclusion

Question 14: Which of the following companies are effectively using digital technologies to promote sustainability?

a) Google b) IKEA c) Patagonia d) All of the above

Competence Test: ESG - Environment, Society, Governance

Question 15: What are the benefits of integrating digital technologies with CSR initiatives?

a) Increasing CO2 emissions b) Reducing the environmental impact c) Reducing employee involvement d) Reducing the transparency of corporate activities

Question 16: What are the future directions for the integration of digital technologies with CSR?

a) Personalization of CSR initiatives b) Increasing social inequalities c) Limiting technological innovation d) Declining role of cross-sector partnerships

Question 17: What is the role of artificial intelligence (AI) in the context of sustainable development according to the United Nations (UN)?

a) AI does not play a significant role in sustainable development.

b) AI may contribute to increasing social inequality.

c) AI can be a key enabler of the Sustainable Development Goals.

Question 18: In what areas can artificial intelligence be particularly useful in promoting sustainable development, according to the case descriptions in the text?

a) Only in the medical sector.

b) In precision agriculture and energy management.

c) In the industrial sector only.

Question 19: What are the benefits of using artificial intelligence for precision agriculture, as described in the first AI use case?

a) Increasing the consumption of natural resources.

b) Reduction in agricultural production efficiency.

c) Precise adjustment of agrotechnical treatments.

Competence Test: ESG - Environment, Society, Governance

Question 20: What risks associated with the development of artificial intelligence have been identified in the context of sustainability, as described in the text?

a) Reduction of electricity demand by AI data centers.

b) Deepening social inequalities through work automation.

c) Only positive effects on sustainable development.

Question 21: What actions can be taken at the regulatory level to manage the risks associated with the use of artificial intelligence in the context of sustainable development?

a) No need for regulation as AI carries no risks.

b) Establishing a clear legal framework governing the development and implementation of AI technologies.

c) Suspension of all regulations regarding AI.

Question 22: Why is employee education and retraining important in the context of introducing artificial intelligence in various economic sectors, as suggested in the text?

a) Because AI leads to increased unemployment.

b) To ensure that workers adapt to a changing labor market in which automation is playing an increasingly important role.

c) Education is not important in the context of artificial intelligence.

Answers:

1. b) 1980s
2. c) Economy
3. b) Employee management
4. c) 2021 year
5. b) Building lasting relationships with stakeholders, risk management, sustainable development
6. b) Corporate Social Responsibility
7. b) Obligation to publish annual ESG reports
8. b) Because they enable companies to identify and manage risks, build lasting relationships with stakeholders and contribute to sustainable development
9. What are the advantages of using digital technologies in the context of ESG? Answer: a) Improving transparency and monitoring of activities related to sustainable development.
10. b) By improving transparency and traceability of products.
11. c) A tool for identifying key ESG issues for a given industry. What are the benefits of using the MES (Manufacturing Execution System) in the context of sustainable production?
12. c) Improving the tracking and management of production processes in a sustainable manner.
13. A) HR systems using artificial intelligence (AI) and machine learning
14. D) All of the above
15. B) Reduction of environmental impact
16. A) Personalizing CSR initiatives
17. a) AI can be a key enabler in supporting the Sustainable Development Goals.
18. b) In precision agriculture and energy management.
19. c) Precise adjustment of agrotechnical treatments.
20. b) Deepening social inequalities through work automation.
21. b) Establishing a clear legal framework governing the development and implementation of AI technologies.
22. b) To ensure that workers adapt to a changing labor market in which automation is playing an increasingly important role.

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