

ENTREPRENEURSHIP BASED ON ESG PRINCIPLES IN THE DIGITAL ECONOMY

^aANASTASIIA MOSTOVA, ^bOKSANA BUDKO, ^cMARIANA MALCHYK, ^dANDRII IVANCHENKO, ^eNATALIA KOVALCHUK

^aVarna University of Management, Alfred Nobel University, 13A, Oborishte Str., 9000, Varna, Bulgaria

^bDniprovsky State Technical University, Dniprobudivska Str., 2, 51918, Kamianske, Ukraine

^cNational University of Water and Environmental Engineering 11, Soborna Str., 33028, Rivne, Ukraine

^dNational University Zaporizhzhia Polytechnic, 64, Zhukovskoho Str., Zaporizhzhia, Ukraine

^eUniversity of Customs and Finance, 2/4, Vladimir Vernadsky Str., 49000, Dnipro, Ukraine

email: ^anastya.25061987@gmail.com, ^bbisnesscon@ukr.net, ^dmmalchyk@nuwm.edu.ua, ^dandivazntu@gmail.com

^env_kovalchuk@gmail.com

Abstract: The article presents an attempt of systemic research on the interconnection and synergy of ESG-agenda and digital transformation in entrepreneurship landscape. Crucial necessity of ESG-principles introduction into the practice of entrepreneurial companies today is emphasized. The research considers and systematizes core benefits and challenges of IT solutions supporting introduction and maintenance of ESG practices in companies, as well as outlines current trends and prospective vectors.

Keywords: ESG principles; digital transformation; entrepreneurs; sustainable development; digital communication.

1 Introduction

Digitalization from the general trend that determines the agenda of international conferences and round tables, the development of digital transformation strategies by large enterprises, the need to introduce information systems into the business processes of enterprises of various spheres of activities and of different sizes has led to qualitative changes in socio-economic relations in corporate sector in most countries. And in this regard, digitalization and increasing scope of digital communication can currently be considered as an established factor of the environment for the formation of the sixth technological order. Confirmation of the idea that digitalization is the technological background of the new sixth technological order can be found in the works of many researchers and representatives of the expert community [9].

However, not digitalization itself, but digital maturity is the driver of digital transformation and the development of the digital economy. Digital maturity in this context can be considered as a characteristic of economic agents: individuals, firms, institutions. Then, the level of digital maturity and its dynamics determine the speed and quality of all digitalization, digital communication processes and changes in business processes caused by the use of new digital tools [35].

With digitalization comes a new dimension of potential value addition. Digitalization can occur in agriculture, industry/manufacturing and services. This involves adding value through the data value chain consisting of data collection, data processing, data analysis, and data monetization. Thus, the digital economy opens up additional avenues for potential value addition.

An integral and equivalent companion to digital transformation in the economy in recent decades is the ESG trend. In recent years, the role of sustainable development of companies based on ESG principles has been increasing. "Responsible" investing is becoming increasingly important, and a new criterion for investment attractiveness and selection of companies, in addition to financial indicators, is the issuer's adherence to ESG principles. The demand for a green economy in the world is growing, the trend of ESG entrepreneurship and responsible investing is gaining momentum, and shares of companies that take into account environmental risks and society's demand for a

comfortable environment are showing more stable growth and stability.

At the same time, it should be noted that the practice of implementing digital transformation tools in companies is more developed than the practice of implementing ESG principles: in particular, 46% of participants in an online survey in Eastern Europe declared an advanced level of implementation of digital transformation versus 14% of companies at an advanced level in the field of ESG. At the same time, only 28% of survey participants declare an advanced level of implementation of practices in both areas, while the majority of respondents with a high level of digitalization consider themselves to be at the average (36%) and entry-level (24%). The low level of ESG transformation is largely due to insufficient understanding of the ESG transformation process [10]. Companies face not only the task of adapting ESG principles to the existing corporate structure and direction of activity, but also the task of initially developing methodological approaches to the implementation of these principles.

At the same time, the maturity of digital practices creates opportunities for synergies between digital and ESG transformation, which will lead to the achievement of the most significant results in both operational efficiency and sustainable development. Respondents are aware of the key role of digital solutions in ESG transformation: 65% of respondents are convinced that it is impossible to achieve ESG transformation without the use of digital solutions - for example, in reporting, as part of supply chain management, or for adaptation to climate change. Digitalization of ESG has a number of advantages, the main one of which, according to the majority of respondents, is increasing the productivity and efficiency of many of the company's processes (80%). Also, many respondents note an increase in investment attractiveness (62%) and faster achievement of target KPIs (56%) [34].

The main barriers to the use of digital solutions within the ESG activities of companies are: lack of necessary competencies (45%); insufficient development of ESG practices (44%); lack of understanding of the need for synergies between ESG and digitalization (40%); lack of cooperation within the company on the application of digital solutions in the field of ESG (40%); insufficient development of digital practices and digital communication (11%). Among additional challenges, respondents also note: the problem of lack of competencies among external system integrators (including in the international market); low interest or complete rejection of changes on the part of colleagues; imperfection of current legislation in the field of ESG regulation; lack of single system integrators who could offer a comprehensive solution in the field of digitalization for ESG practices of companies [23].

The digital solutions needed for businesses to achieve sustainable development are currently insufficient. This hinders rapid and effective ESG transformation. Now, there is a significant demand for the development of digital solutions within the environmental direction. Climate issues (16%), waste management (15%), and biodiversity conservation (13%) are the top areas for which there is a lack of digital tools in the market. Environmental pollution prevention and resource conservation are also among the top 5 ESG aspects for which there are not enough digital tools - 11% each, respectively [24]. Additionally, experts from large businesses now note a lack of solutions across the entire perimeter of the ESG agenda for medium and small businesses [31].

Meanwhile, consideration of ESG factors appears to be extremely important for running a successful business in all business areas and corporations. Customers, employees, shareholders, creditors, rating agencies, and regulators demand consideration of these factors; corporations must analyze how their business strategies affect the socio-economic world community. Organizations that do not take ESG factors seriously

risk losing customers, employees, and possible funding; they eventually become unviable.

Even before COVID-19 upended business and society and greatly contributed to the digitalization of the world, the environmental, social, and governance (ESG) movement was gaining momentum. Far-reaching issues such as climate change and economic integration have focused the attention of investors and entrepreneurs on the importance of long-term priorities and non-financial reporting, new promising future investment ideas and markets. Then the global pandemic raised awareness of how interconnected we all are, how quickly external shocks can affect the global economy, and how critical digital technologies and IT are to the functioning of economies. Like digital technologies, ESG has the potential to change the way successful organizations plan, implement, and operate. As with digital technology, ESG is a vast topic, making it difficult for business organizations to know where to start. Thus, considering entrepreneurial activity within two vectors – ESG and digital transformation – seems to be a very urgent task.

2 Materials and Methods

The methodological basis for the study was modern scientific concepts of economic theory, management theory and organization theory, entrepreneurship theory of corporate governance, as well as works devoted to current issues of digital transformation, sustainable development, responsible investment, and change management. During the research process, a dialectical approach, methods of system analysis, comparison and grouping were used.

3 Results and Discussion

Sustainable development at the company level is an approach to business management based on creating long-term value for a broad group of stakeholders, including future generations among others, by managing economic, environmental, and social factors. Today, a business that claims a good ESG assessment must meet development standards in three categories: social, governance, and environmental. In particular, environmental principles determine to what extent a company cares about the environment and how it tries to reduce damage to the environment. For example, shoe brand Timberland partners with tire manufacturer Omni United to make shoe soles from recycled tires.

In the early 2000s, there were only 20 companies with ESG ratings in the United States. As can be seen from the graph on Figure 1 below, by 2020 their number had grown to almost 800. The average ESG rating has doubled over 20 years, which is associated with an increase in the volume, quality, and availability of data [6].

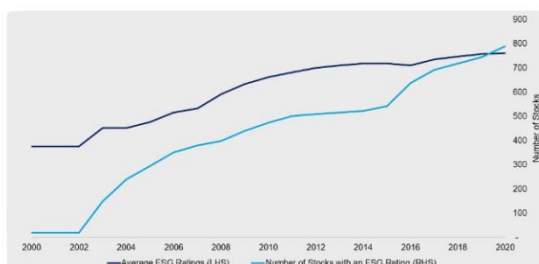


Figure 1. Dynamics of growth of the number of companies with ESG-ratings in the USA, 2000-2020 [6].

The WEF emphasized the potential of digital technologies with regard to cutting global emissions in the three sectors characterized with the highest emission by 20% by 2050 [21]. But on an organizational level, digital technology can be equally effective. Corporate use of digital technology, which is defined as the use of electronic tools, devices, systems, and resources that produce, store, or process data, has immense potential to drive an organization's ESG strategy and execution. This is why,

in the eyes of enterprises, ESG and digital technology may be viewed as two sides of the same coin. Digital technology must be integral to an organization's ESG journey, from strategy to transformation.

Another PwC survey discovered that many firms in various countries are still in 'start-up mode' when it comes to ESG strategy and execution, with just 18% of respondents reporting that their companies had people and systems in place to handle the entire range of ESG tasks. Organizations in the regions need to enhance their ESG strategy and execution at a rapid pace, and digital technology will help them do so [22].

For example, digital technologies, particularly drones and robotics, are already being employed in the Middle East as part of environmental initiatives to enhance efficiency, minimize waste, and provide a less carbon-intensive method of environmental management. ESG frameworks, in turn, may assist firms in taking a broader approach to sustainability while also highlighting the possible dangers of using new digital technologies.

Robotics and other digital technology can be utilized to support environmental initiatives such as trash reduction and carbon-intensive operations. However, they have a clear societal impact in the form of job displacement and decreased human-to-human contact. Microsoft's Chat GPT has lately highlighted similar societal problems associated with the use of artificial intelligence (in particular, in digital communication), such as the risk for prejudice and discrimination. It has also emphasized the relative immaturity of legislation in this field, which adds to the difficulty.

Along with mitigating these emerging opportunities and risks, changing how organizations use digital technology can significantly shift the dial on their environmental and social impact, such as embedding ESG metrics into technology sourcing processes (for example, considering carbon footprint when evaluating cloud technologies) and implementing electronic waste management. Digital technology may also play an important part in facilitating an organization's governance by providing technologies that promote transparency, decision-making capabilities, and compliance.

Entrepreneurs may put their ESG initiatives into action using digital technologies. As investors focus on ESG, corporations are increasingly integrating sustainability initiatives into their business operations, in particular being adhere to development of entrepreneurship based on effective marketing strategies in appropriate field. Given this new surge of demand, it's no surprise that a wide spectrum of software providers have stepped up their ESG product strategy. A recent Verdantix Benchmark review of 44 corporate ESG and sustainability software solutions revealed four major software categories serving use cases linked with operationalizing ESG and sustainability policies (see Figure 2 below). Verdantix highlighted ClearTrace, Envizi, Measurabl, Schneider Electric, and SINAI Technologies as providers suggesting complete offerings. Among the 29 environmental management software options, long-standing EHS providers with 20 or more years of expertise, such as Cority, Intelix, and Sphera, are best positioned to put the 'E' in ESG. The benchmark found just 24 digital solutions for managing social challenges, with EcoVadis and IsoMetrix offering the most extensive capabilities. Only 16 of the 44 suppliers we evaluated provided compelling digital solutions to assist execute governance reforms. Diligent, Enablon, IsoMetrix, and NAVEX Global emerged as vendors with superior capabilities [33].



Figure 2. ESG digital vendors [33]

Since the ESG approach is a new business concept focused on taking into account the needs of all stakeholders of the company, when developing a strategy it is necessary to analyze many groups of stakeholders who show interest in this issue, which is especially important in the business landscape:

- Business partners (in particular, foreign ones), at the level of corporate policy, establish requirements for the environmental friendliness of products, respect for consumer rights, ensuring safe working conditions, and so on;
- External investors are increasingly taking into account indicators of the quality of corporate governance, environmental and social performance of companies when making investment decisions. Such information is used to assess the level of sustainability of companies, the quality of non-financial risk management;
- Representatives of government agencies at various levels pay attention to the positions and practices of companies regarding participation in the development of the territories where they operate. Assessing the company's contribution to solving socio-economic and environmental problems influences the building of relationships with government officials;
- Representatives of local communities (including public organizations) are also interested in the balanced development of regions in all aspects of SD;
- Customers are interested in the quality of products, as well as the reputation of the manufacturing or servicing company. Many consumers are now beginning to pay attention to the use of management practices by companies taking into account the principles of SD. In addition, in the B2B sector, clients demand a certain level of SD from the supplier;
- Qualified specialists, graduates of educational institutions who choose a place of work may be guided by the principles of the company's sustainable development. Through the introduction of SD principles into current activities, a company can create a competitive advantage in personnel policy.

Stakeholders have a significant impact on the company's performance, as they determine the company's access to certain resources. Therefore, after identifying the interests of the main stakeholder groups, companies must select indicators to determine whether the company has achieved the targets for each stakeholder group.

Regardless of what is behind the use of practices to improve the company's sustainability level (including in frames of development of entrepreneurship based on effective marketing strategies) – whether it is concern for society and the environment, regulatory legislation, stakeholder pressure, or economic benefits - special attention should be paid to the process of integrating these practices into the company's activities [16; 17]. Although an increasing number of top managers recognize the importance of improving the level of sustainability for the long-term performance of the company, the problems that arise in the implementation of such activities deserve special attention.

The first challenge to forming a strategic SD program is setting clear and measurable goals. This problem is caused by the fact that increasing the level of SD is fundamentally different from the implementation of other organizational strategies. For example, production goals are set based on a clear connection with the organization's profit. The long-term effect of an innovation strategy is quite difficult to assess, but the intermediate result is new products or processes, and the final goal is also formulated in terms of profit. However, for the SD strategic program, the primary task is to get results of approbation of ESG principles, that is, simultaneously achieve goals in three areas: social, environmental, and economic aspects. The impact of social and environmental activities is usually characterized by a delayed effect and difficulty in accurate assessing.

The second problem that managers face in practice when trying to introduce SD principles into the company's activities is in the frames of the financial side of the company's activities. Since company management is often forced to achieve short-term financial goals (often at the expense of long-term results), the integration of SD practices depends on financing opportunities. In the case where an improvement in one of the factors is associated with an improvement in the economic aspect of the activity (for example, a reduction in energy consumption), the likelihood of the project being implemented is higher than in the case where indicators only improve in the environmental or social sphere of activity. Since most activities to improve sustainability require significant investments, managers are forced to weigh the pros and cons of actions.

Another issue that requires attention is the reaction of stakeholders. In practice, the reactions of different stakeholders to different activities may vary. This may be due to a change in the priorities of the company or society, a change in the level of cost of certain activities in the field of sustainable development of the company.

At the same time, investment decisions in entrepreneurial businesses must take into account the joint perspective of ESG integration and digital transformation to drive business decisions. Successful companies benefit greatly from pursuing ESG and DT change processes together. Those who carefully choose the right path and the most suitable IT partner or know how to manage the IT area of their business stay ahead and win [8].

The study "ESG in the Digital World: Challenges and Opportunities," which was conducted from February to April 2022, based on a survey of representatives from 61 companies, found out how digital transformation allows shaping the company's sustainable development practices and to what extent the role of digital solutions is critical to the agenda. The study identified key areas of development that will increase the synergy between digital and ESG transformation [36]:

1. Development of digital solutions for the environmental aspect of ESG activities. Despite the rapid growth of the digital ESG solutions segment, the market is still undersaturated. Respondents noted that the greatest lack of digital solutions is felt in the following ESG aspects of companies' activities: adaptation to climate change (16%); waste management (15%); biodiversity (13%). This problem can be addressed by highlighting the demand for digital tools for ESG and stimulating the development of such tools. The greatest potential in the direction of digitalization is characteristic for solutions created using technologies of advanced analytics, artificial intelligence (AI), Internet of things (IoT), blockchain, and robotics (RPA).
2. Building a management system and developing expertise. Representatives of companies note a lack of fundamental competencies among system integrators, the absence of single system integrators who could offer a comprehensive solution in the field of both digitalization and the implementation of ESG practices. For further development of ESG digitalization, an active exchange of best practices

- between integrators and conducting educational events to build a competency base are required.
3. Development of ESG practices within companies. Despite the fact that the majority of respondents note a lack of ESG competencies within companies, this problem is currently partially addressed by involving third parties (for example, IT and consulting firms) to integrate digital solutions into ESG activities.
 4. Scaling of digital solutions for ESG by major market players. The high cost of advanced digital solutions for ESG and the insufficient number of ESG experts in the market limit the possibilities of full digital transformation in this area for medium and small businesses. Representatives of large companies that actively interact with it see the solution in scaling digital tools. Market participants involved in digital and ESG business transformation are considering the possibility of unifying their own digital solutions for achieving ESG goals and distributing them on the market. This will enable reducing the direct costs of developing and implementing solutions while maintaining their effectiveness. It is expected that this trend will increase in the markets.
 5. Methodology for assessing the effects of implementing digital solutions for ESG. The lack of generally accepted methods and models for assessing the economic effect of implementing digital projects in the field of ESG leads to difficulties in attracting domestic investments for such projects. At the moment, the share of domestic investment in many countries is up to 25%.

The popularity of ESG continues to grow over time as a way to evaluate businesses in promising investment areas. On the other hand, it can be extremely useful in preventing investments in companies that pose financial risks associated with their environmental practices. This leads to the emergence of a wide range of products and services in the global IT market, which, in turn, combine digital transformation and ESG.

As responsible finance matures and develops, non-financial reporting is becoming increasingly important: investors who allocate funds based on ESG factors, as well as regulators and exchanges that adapt to rapid market changes, are interested in disclosure of data, especially quantitative ones. Namely quantitative metrics allow comparing organizations with each other (if the same calculation methods are used and the information is publicly available) and making informed decisions. Therefore, the principles and standards of responsible finance imply the disclosure of quantitative information about ESG parameters. A good example is the UN Principles for Responsible Investment, which investors covering more than \$120 trillion in investments have signed by early 2021 [18].

The content of a non-financial report is determined by the company's objectives, data available to it, best practices, the requirements of the standards in accordance with which it is prepared, and factors that are of interest to stakeholders. According to the materiality principle, reporting should reflect the largest ESG risks and also describe the system for managing them. As a rule, all reports include information about the organization's activities in such areas as environmental and climate protection, employee care, interaction with local communities, corporate governance and business ethics [29].

However, given the current pace and impact of digital transformation, a framework describing a systematic approach to inclusive disclosure of sustainability-related information, protecting stakeholders, must include the environmental, social, and economic sustainability, as well as technological evolution. This framework, described by the acronym EDGES, represents the integration of well-established ESG and financial reporting with digitalization technology [30]. The EDGES framework allows distinguishing between micro-sustainability and macro-sustainability. In this context, micro sustainability concerns the sustainability of an individual firm, which is reflected in overall profitability and digitalization. Macro sustainability is the impact a firm has on the entire ecosystem in which it operates.

The biggest problem in combining these taxonomies is the lack of universal IT tools that unite all the aspects necessary to simultaneously solve all the needs of a given business area. ESG software is typically designed to help track and report environmental, health, regulatory, social, and safety management initiatives. This software is usually intended to support corporate leaders by making it easier to aggregate data across organizations or portfolios to generate actionable insights and streamline reporting. The ESG software sector is expected to reach \$571.74 million by 2028 [8]. In overall, this market is expected to only grow in the next few years.

With the advent of new technologies and the modernization of views on sustainable development, the following concepts are increasingly observed:

- "Circular Economy" - an economic system whose goal is to minimize waste and maximize the reuse and recycling of resources; waste from one type of industry can become raw materials for another;
- "Impact Investing" - a form of investing aimed at achieving specific social or environmental goals, in addition to obtaining financial benefits;
- "BCG-economy" - a bio-circular green economic model, a new approach to economic development, focused on sustainable development and environmental protection. This model is based on three key principles: biodiversity, circularity, and green economy.

ESG principles are very relevant for startups, allowing them to obtain sound results of approbation of ESG principles: it allows reducing costs, effectively building a team, and planning business development [32]. Even if it is more costly in the current moment, it brings sound benefits in long-term strategies. An important component of the ESG principles is high social responsibility, which lies in the company's attitude towards its team, partners, and clients. At the same time, there is an important difference between a startup and a large corporation in assessing the result of ESG processes - for a startup, it is acceptable for the assessment to be subjective, that is, it is enough for the manager and the team to evaluate the result, and it does not need to be proven. That is, in this case, achieving a specific result usually has a direct effect.

Demand for ESG is forcing companies to take sustainability into account. According to the results of EY survey conducted in 2020 among institutional investors, 98% of respondents confirmed that they monitor the ESG ratings of companies with which they do business [18].

The COVID-19 pandemic has also acted as a catalyst, accelerating the integration of ESG principles into company operations, the need to recalibrate economic strategies, and the benefits of supporting the global sustainability agenda 'beyond paper'.

A PwC study forecasts that the market share of ESG funds will rise to 57% in 2025, up from 15% in 2019 [20]. If businesses do not adhere to ESG principles in their operations, they are likely to face greater risks of exclusion from the global investment pool and a negative impact on their market capitalization. Figure 3 below shows that ESG-mandated assets are projected to make up half of all professionally managed assets globally in 2024. The worldwide panorama of professionally managed ESG assets is expanding. Global investor appetite for ESG products continues to create opportunities for organic AUM expansion. Recent polls show that client demand continues to drive investment managers' consideration of sustainability investment criteria in their decision-making processes.



Figure 3. Professionally managed ESG assets globally by 2024 [7]

A very indicative “intersection point” of digital transformation and ESG is the so-called green computing. It is the study and practice of sustainable computing or IT. The goals of green computing are similar to green chemistry: reducing the use of hazardous materials, ensuring maximum energy efficiency over the life of the product, recyclability or biodegradability of non-performing products and factory waste [13]. Green computing is important for all classes of systems, from handheld systems to large-scale data centers.

In 1992, the U.S. Environmental Protection Agency launched the Energy Star program, a voluntary label designed to promote and recognize energy efficiency in monitors, climate control equipment, and other technologies. This has led to widespread adoption of sleep mode among consumer electronics. At the same time, the Swedish organization TCO Development launched a TCO certification program to promote the reduction of magnetic and electrical emissions on CRT-based computer displays; the program was subsequently expanded to include criteria for energy consumption, ergonomics, and the use of hazardous materials in construction.

Green Grid is a global consortium dedicated to improving energy efficiency in data centers and business computing ecosystems. It was founded in February 2007 by several key companies in the industry - AMD, APC, Dell, HP, IBM, Intel, Microsoft, Rackable Systems, SprayCool (acquired in 2010 by Parker), Sun Microsystems, and VMware. Since then, Green Grid has grown to hundreds of members, including end users and government organizations, all focused on improving data center infrastructure efficiency (DCIE). The Green500 list ranks supercomputers based on power efficiency (megaflops/watt), which promotes efficiency rather than absolute performance. Green Comm Challenge is an organization that promotes the development of energy conservation technologies and practices in the field of information and communications technology. The Transaction Performance Technical Council (TPC) for Energy complements existing TPC benchmarks by providing additional publications of energy performance alongside performance results. SPECpower is the first industry standard benchmark that measures power consumption versus performance for server-class computers. Other criteria that measure energy efficiency include SPECweb, SPECvirt, and VMmark [19].

Modern IT systems rely on a complex combination of people, networks, and equipment; as such, a green computing initiative should cover all of these areas. The solution may also require end-user satisfaction, management restructuring, regulatory compliance, and return on investment (ROI). There are also significant budgetary incentives for companies to take control of their own energy consumption [26].

In particular, cloud computing is also aimed at solving two main problems in the field of ICT related to green computing - energy use and resource consumption. Virtualization, dynamic resource provisioning, and tiered approaches based on green data centers enable cloud computing to significantly reduce carbon emissions and energy use. Large enterprises and small businesses can reduce their direct energy consumption and carbon emissions by 30% and 90%, respectively, by moving some cloud-based applications to the cloud.

At its core, green computing is an IT approach that aims to minimize environmental impact through efficient use of resources and optimization of technology. Thanks to analytics and data, environmental responsibility is enhanced. Green computing maximizes energy efficiency and improves data management. Green IT reduces the environmental impact of IT operations, especially in the design, production, operation, and disposal of servers. The importance of green computing is evident from Figure 4 below, presenting embodied greenhouse gas emissions of computing and electronic products.

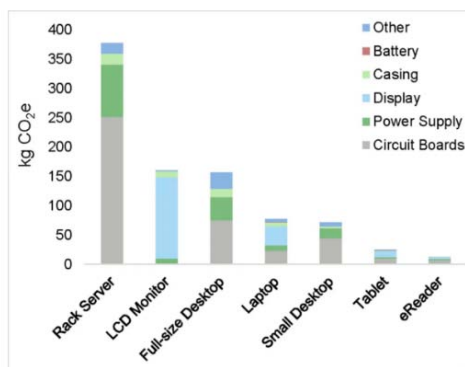


Figure 4. Embodied greenhouse gas emissions of computing and electronic products [28]

Experts note that by implementing green IT practices, a trickle-down effect develops, affecting the entire cost of corporate operations at various stages. Some businesses get an immediate return on investment from green IT initiatives, while others see a ROI in 3-6 months. These reductions do not include additional cost- and energy-saving methods like as virtualization and teleconferencing [13].

A recent report from Coherent Market Insights, “Green IT Services Market Analysis 2022-2030”, shows the growth of the green IT services market. Its volume will reach 34.83 billion US dollars, and the growth rate will be 12.4% [5]. These statistics indicate an increase in the number of environmentally friendly computing resources.

Statistics presented by Coherent Market Insights (Figure 5) show that “the green IT services market was valued at US\$ 12.46 Bn in 2021 and is forecast to reach a value of US\$ 34.83 Bn by 2030 at a CAGR of 12.4% between 2022 and 2030” [5].

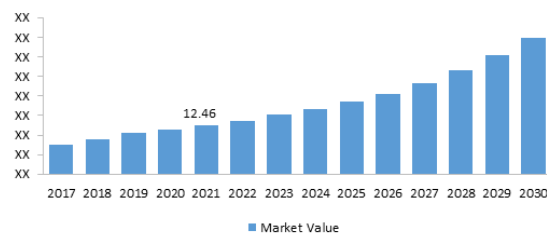


Figure 5. Green IT services market size analysis and forecast, 2017-2030 [5]

Green IT solutions are becoming a key driver of environmental, social, and governance initiatives. Moreover, the use of ESG reporting reveals information about approaches to environmentally sustainable IT solutions. A reliable IT system includes networks, hardware, and software. Thus, if a company wants to implement green technologies, it must ensure that each of them operates in a sustainable manner. They must ensure end-user satisfaction, regulatory compliance, good governance, and higher ROI.

Digital technologies are already having a significant impact on ESG implementation, being significant drivers of the results of appropriation of ESG principles. The immediate impact is

improved data collection, reporting and analysis that impact every operation and aspect of the business. Another opportunity is digital twins of companies to track the performance of digital assets, predict energy use, and minimize waste.

Data centers consume a significant amount of energy around the world. To create energy-efficient data centers, companies can implement green IT. Green energy-saving initiatives include air conditioning, heating, refrigeration, and ventilation systems, as well as IT equipment, designed to operate efficiently with minimal energy consumption. This also includes data centers and servers, which generate enormous amounts of heat during calculations. Data centers can be green in a variety of ways: energy efficiency of equipment, power supply, and cooling systems. They also provide airspace management, power generation, and waste heat recovery.

Businesses can apply green IT to recycle materials used in computing devices. These initiatives will allow preventing harmful substances such as mercury and lead ending up in landfills. In addition, replacing equipment can reduce emissions and save energy. Moreover, companies can repurpose or donate unused computers to nonprofits and charities. They can also recycle obsolete systems and consumables such as paper and batteries.

Green IT requires businesses to provide longer product life. This limits the amount of e-waste and prevents the need for their additional production. Companies can also make emphasis on using or creating products that are upgradable and modular. Thus, businesses can produce or replace small modules or parts instead of manufacturing the entire system.

Circular economy models involve servitization. In this case, companies sell products as a service. These models also imply managing the processes of completing the product life cycle for customers [1; 27].

In addition to reducing environmental and social risks, digitalization can also impact the efficiency of processes related to sustainability management. The work [15] identifies 10 main stakeholders of sustainable development (states, companies, media, etc.) and notes that the use, for example, of big data technology makes it possible to improve mutual understanding between the parties and more effectively achieve goals in the field of sustainable development. A high level of digitalization allows stakeholders to more easily and quickly obtain the necessary information about the company's activities, and thus information transparency, in turn, reduces the asymmetry of information between the parties and contributes to making more rational decisions. For example, thanks to digitalization, companies practically cannot hide inconvenient operating results, and investors motivate management to actively participate in the ESG agenda by investing in more environmentally friendly and safe assets.

The digital environment may also be one of the mediators between non-financial and financial performance of a firm. Companies with high levels of corporate sustainability receive financial benefits from this in the long term, since increasing sustainability entails a change in intangible assets, which, in turn, affects operating activities [2; 4]. One of the main components of intangible assets is the company's human capital, which is influenced by digital technologies that can change people's lifestyles. Thus, reputation and positive image as factors for the successful implementation of the principles of sustainable development also depend on the characteristics of the digital environment [3].

It is important to note that the UN' Sustainable Development Goals, in the description of which the Internet and ICT are mentioned, emphasize the positive effect and increasing role of digitalization. However, the doctrines of sustainable development do not pay significant attention to the negative side of widespread digitalization. Thus, it is necessary to consider the life cycle of data and information as a resource that requires transformation processes: storage, structuring, operation, and

disposal, each of which is characterized by parameters of impact on the socio-, bio- and technosphere. Hence, the management of these processes should be cyber-ecological, proactively eliminating the negative impact on all areas.

The Data Economy, the App Economy, and the Gig Economy have changed business practices, the structure of the labor market, patterns of consumer behavior and choice, as well as business models of creation, retention, and delivery of values. As it is known, the basis of digitalization is the process of digitization and integration of data. The growth in the volume of data occurs as a result of human activity in all areas, from personal use of a personal computer, smartphone, tablet to the implementation of digital transformation strategies by the state, large corporations, medium and small businesses. Recent years have seen tremendous growth in the capabilities and reach of information and communications technology (ICT). The Internet, in particular, has become a critical driver of social and economic change, transforming how government, business, and citizens interact and offering new ways to address development challenges. The United Nations has included universal Internet access in the global sustainable development goals, which together are aimed at reducing poverty, improving health, education and the environment, ensuring economic development and social equality [11; 12; 14; 37]. The Internet is a unique platform for innovation, creativity, economic opportunity, and social inclusion that can make a significant contribution to achieving sustainable development goals. However, the world community does not consider the Internet and the cyber environment from the point of view of causing damage to the environment, social environment, and also to man himself.

Every day, increasingly more participants in business processes prove that data has enormous value, especially if it is purposefully collected, wisely stored, and used to its fullest. All of this is becoming increasingly challenging in a rapidly changing, multi-cloud, multi-layered world. The explosive growth of data, combined with the growing need to integrate and analyze it in unprecedented volumes and at unprecedented speed, creates a complex backdrop both in cyberspace itself and in the environment, and is pressing research into the impact of process of data creation, storage, transmission, and use on social, environmental, and economic spheres.

Attention to the growth and application of data is growing from all sides - users, businesses, and regulators, but until recently there has been no consensus on the possible unintended consequences of global digitalization. Studying the influence of cyberspace on the environment and social environment requires the use of a new concept - cyberecology, as well as the development of a methodological approach to ensuring cyber-ecological nature of business in the digital environment [8]. Cyber-green business is focused on the implementation of ESG principles. A key area of the cyber-ecological approach with regard to environment is the study of the intensive use of modern information technologies, which have a negative impact on carbon dioxide emissions and electricity consumption. Within the framework of social responsibility, attention is paid to cyberecology as a new direction in the sphere of human activity.

Overall, ESG serves as a strategic corporate strategy that encourages innovation and growth. Entrepreneurs may use ESG as a framework to create goods and services that address environmental and social issues while maintaining good governance. ESG prioritizes innovation, particularly when it comes to resolving environmental problems. Entrepreneurs are encouraged to develop sustainable technology and goods to fulfill the needs of an environmentally conscious customer base. This not only helps to better environmental results, but also positions firms at the forefront of a market looking for creative and ethical solutions. Market possibilities emerge when the global environment evolves toward sustainability and ethical business practices. Entrepreneurs that follow ESG principles may discover and capitalize on these developing possibilities, obtaining a competitive advantage. Implementing ESG practices can also result in cost savings by reducing resource usage and

improving operational efficiency. At the same time, digital transformation is an integral part of today's ESG landscape in entrepreneurship, the strategic basis of the ESG development trajectory.

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Primary Paper Section: A

Secondary Paper Section: AE, AH