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## The State and Prospects for the Development of a Systemic Approach to Manage Environmental Resources in the Context of Ecological Safety

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Submitted 25/08/21, 1st revision 14/09/21, 2nd revision 13/10/21, accepted 15/11/21

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**Abstract:**

**Purpose:** The aim of the paper was to diagnose the state and prospects for the development of a systemic approach to manage environmental resources in the context of the ecological safety sector by studying the ability of environmental management systems to help the organizations to be prepared to fulfill requirements included in international agreements.

**Findings:** As a result of the research, it was proven that environmental management systems are helpful tools to help organizations to rebuilt their attitude to natural environment. High growing popularity of ISO 14001 process, 17,350 certificates grow per year, and other alternative processes are available to ensure that the organizations have included important environmental issues in their management systems.

**Practical Implications:** As it is shown in the article the environmental management systems based on ISO 14001 and other alternatives are good fundamentals to include the environmental issues into the organizations' strategies and be prepared for the forthcoming environmental challenge requirements and regulations that ensure to achieve environmental safety.

**Originality/Value:** Environmental management is still a current and important trend in research, as pro-environmental activities contribute to increase the efficiency and improve the safety of the organization. The article shows the value of environmental issues in the forthcoming reality and possibility of using environmental management systems to adjust their strategies accordingly.

**Keywords:** Environmental management, pro-environmental activities, organizational effectiveness, organization safety.

**JEL codes:** M10, M14, M20.

**Paper type:** Original Article.

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## **1. Introduction**

Nowadays, it is becoming more and more obvious that the planet's resources should be managed in a way that will enable them to be used by future generations. Various types of treaties and international agreements support this. However, it is the entities of both the first, second and third sector that will consequently be responsible for the implementation of the provisions of these agreements and treaties, such as the 2030 agenda. The implementation of systemic thinking based on management standards developed for several decades, including the environmental management system in accordance with ISO 14001 and other environmental management systems, may be helpful in the process of meeting these obligations. The implementation of these systems helps institutions not only to meet the existing requirements, but may encourage proactive search for solutions that will not only reduce the impact of their activities on the environment, but also achieve the position of "win win", where the development of these institutions will be compatible with the improvement of the condition of the natural environment and improving the state of ecological safety. Such a mechanism that allows to achieve this state is the mechanism of continuous improvement, preceded by self-assessment.

This article presents activities aimed at ensuring sustainable development, taking into account the efficient management of natural resources and the environment, outlines the commitment framework included in the 2030 agenda. It shows how the requirements of ISO 14001 standards help to fulfil obligations contained in international treaties and agreements, and shows the development of popularity of implementing systems based on the ISO 14001 standard in the world.

## **2. Literature Review**

### **2.1 Conservation and Management of Natural Resources to Ensure Sustainable Development**

The natural environment is perceived as that which was "created by nature without human intervention, but can be transformed by it. In legal terms, the (natural) environment is "all natural elements, including those transformed as a result of human activity, in particular earth's surface, minerals, water, air, landscape, climate and other elements of biological diversity, as well as the interactions between these elements" (Act of April 27, 2001, Environmental Protection Law, art. 3, p. 8/216).

It is extremely important to understand and describe the relationships between the natural environment and the economy. Its element play an important role in the production process of products as a source of energy, means and objects of work, as well as a recipient of production and consumption waste. The relationships between the elements of the environment and the very changes of these elements are complicated. Man is part of the environment, and at the same time introduces

quantitative and qualitative changes in it. The scope of human interference in the natural environment depends mainly on technical and economic possibilities (Bernaciak and Gaczek 2002).

Among the functions performed by the natural environment, two groups can be distinguished, economic and non-economic. The non-economic functions include, first of all, biological functions, i.e., functions satisfying all biological and physiological human needs. The environment plays an important role in the implementation of economic processes by fulfilling the following functions (Kryk, 2001; Bernaciak and Gaczek, 2002; Penc, 2005) :

- it is a source of obtaining raw materials and energy used in production and consumption processes;
- provides geographical space for the needs of primary production (agriculture, mining), secondary production (processing industry) and services (recreation, tourism) – there is competition within this function, because the designation of a given area for production activities may limit its suitability for living or leisure;
- creates a biological infrastructure, the components of which are all environmental components that condition the forms of life on Earth;
- ensures the creation of ecological and technical infrastructure, dominated by components of the natural environment as a set of conditions accompanying production and determining its proper course;
- assimilates, neutralizes and absorbs by-products of human economic activity in the form of waste, water and air pollution.

Individual functions of the natural environment are in competition with each other. This is most apparent between biological and economic functions. Excessive damage to the environment during the exploitation of mineral resources and in the process of their processing may significantly reduce the performance of biological functions. Clearly, competition exists between the function of providing space for waste storage and its natural biodegradation, as well as the supply of raw materials, and the provision of space for settlement and leisure conditions (Hadryjańska, 2015).

Natural resources are an element of the environment used by man. The concept of natural resources is subject to evolution, and so at the beginning of the 20<sup>th</sup> century they included those components of the environment that were then necessary for the development of civilization, i.e. water, wood, iron, coal, as well as agricultural products. Over time, this definition included new components, such as: clean air, geographical space, ecosystem, and climate.

Nowadays, it is most often stated that natural resources are mineral resources, natural forces and environmental values that arise independently of human activity and determine the quality of human life (geographical space, landscape beauty,

microclimate), and which can be realistically or potentially used at a given level of technology in social production to satisfy the material and spiritual needs of the human community (Czaja, Fiedor, and Jakubczyk, 1993, Dobrzańska, Dobrzański, and Kielczewski, 2008).

Due to their often limited and exhaustible nature, natural resources should be subject to rational management (Bernaciak and Gaczek 2002):

- limited amount of available resources necessary for the continuation of the economic growth process (limited non-renewable mineral resources),
- limited nature of the components of the environment, contributing to its quality, i.e. enabling it to fulfil the biological functions of the natural environment (e.g. the degree of air pollution),
- limited ecological conditions, understood as the constantly deteriorating quality of individual components of the environment, affecting the course and effectiveness of the management process and social development.

Currently, the best way to ensure the rational use of resources is to implement the concept of sustainable development, i.e., development that ensures economic growth while achieving social and environmental goals. Directly from the definition of sustainable development, there are three main features, i.e. sustainability, durability and self-sustainability. The concept of sustainable development, assuming a dialogue for decades between citizens of the same state and different countries, emphasizes the need to meet the needs of people without reducing the chances of future generations. The definition formulated in this way includes two basic concepts, i.e., the concept of needs, in particular those that are first-order needs (food, clothing, housing) and the concept of limitations due to technologies that affect the ability to meet current and future needs (Ionescu, 2011).

The most complete definition of sustainable development is that given by D. Pierce and R.K. Turner (Wąsikiewicz-Rusnak, 2003), which seems to meet the sceptics of this idea: “Sustainable development is about maximizing the net benefits of economic development, while protecting and ensuring the reproduction of the usefulness and quality of natural resources in the long term. Economic development must then mean not only an increase in per capita income, but also the improvement of other elements of social welfare. It must also include the necessary structural changes in the economy and in society as a whole”.

The first concepts of sustainable development began to appear at the UN conferences in Stockholm in 1972, when the primacy of ecological requirements was determined, which must not be disturbed by the growth of civilization and the development of the economy (Kośmicki, 2010). Ultimately, the principle of sustainable development was formulated at the “Earth Summit” in Rio de Janeiro in 1992. It inextricably links the preservation of natural resources for future generations with the need to increase the quality of life, and thus with economic development. At

the UN conference in 1983, the Brundtland Report defined sustainable development in a way that integrates the economy and ecology into one system (Hadryjańska, 2005). It is this report that most often dates back to the dissemination of the idea of sustainable development, which was adopted as the overriding goal of economic policy, social development and environmental protection. It is related to actions aimed at mitigating the negative effects of climate warning, which is particularly important for developing countries, which face many challenges related to changes in economic and social life. Within these conditions, caused by a changing climate, the transfer of low-emission technologies can best ensure the adaptation, and even finding new paths of sustainable development, for developing countries (Karakosta and Askounis, 2010).

The organization, using environmental resources and interfering with the natural environment in the form of pollutant emissions, while wanting to implement the concept of sustainable development, must include environmental goals in its strategy. Such management ensures long-term integration of the economic goals of the enterprise with environmental goals and the optimal combination of market and economic measures, orders and prohibitions as tools of environmental policy applied by the state. As a consequence, it also ensures a balance between the economic system of the enterprise and the ecological system of the environment and forces their ecological modernization (Penc, 2003). Building a pro-ecological strategy of a company requires that at every stage a new concept of environmental management be taken into account.

Therefore, it is necessary to look at the resources and the environment of the enterprise through the prism of ecological aspects (Kowal, Kucińska-Landwójtowicz, and Misiólek, 2013). In order to meet the requirements and expectations of the environment in the field of environmental protection, the enterprise should incorporate into its management system appropriate planning, organization and control procedures defining its relationship with the natural environment, i.e. it should shape the approach to environmental protection just like it develops other strategies.

A company that takes into account the needs of the environment should take them into account from the very beginning of the planning process, i.e. formulating strategic intentions. It is important to express the concept of socio-ecological responsibility already in them. An expression of the values shared by the company is its mission, which should include environmental protection issues.

When creating a bundle of strategic goals for an enterprise, remember to include goals resulting from sustainable development in it. The objectives of this group include objectives related to the improvement of quality (including the ecological features of products and services), objectives related to the introduction of pro-ecological technologies, and finally the protection of the natural environment (Szmal, 2001).

## **2.2 The 2030 Agenda and Ecological Security**

One of the most important areas implemented using the concept of sustainable development is ecological security, which is defined as the desired state of the natural environment, free from threats to the balance of ecosystems and the biosphere (Ciszek, 2012). Ecological security can also be understood as “a permanent and continuous process aimed at achieving the desired ecological state, securing a peaceful and healthy existence of all elements of the ecosystem, using various means consistent with the principles of internal coexistence of the state and international communities.” (Wawrzusiszyn, 2015).

Ecological security is mainly related to access to natural resources and a clean natural environment, as well as to the preservation of biodiversity and adaptation to climate change. Ecological safety can be viewed in terms of eliminating threats to the natural environment and preventing the emergence of such threats. This context of understanding ecological safety fits very well with the idea of sustainable development, which, as it should be emphasized, is a constitutional norm of the Republic of Poland. It assumes that the socio-economic development of the country should be harmonized with the natural environment (Ciszek, 2012).

Ecological safety is inextricably linked with ecological threats, i.e. the process of destroying the natural environment, which is progressing all over the world. Ecological threat is a natural phenomenon or process that may affect the deterioration of a person's life situation as a result of disrupting the satisfaction of needs from the most elementary ones, such as life, health, to the needs of a higher order, e.g. contact with beauty, regardless of the will of the injured person or social group. Ecological threats are related to the growing population of the natural environment, which affects not only individual countries, but also regions, and even the entire global system (Wawrzusiszyn, 2015).

Ecological threats include all factors that reduce the safety of citizens in the use of environmental components, i.e., air, water, soil, minerals, flora, fauna, landscape, topography and climate. The overriding issue in ensuring ecological safety is the properly conducted protection of the natural environment, within which the following are protected: air, water, earth's surface, minerals, animals and plants. You can also distinguish factors against which we protect the environment. These are: noise, electromagnetic field, chemicals, waste and other pollutants, extraordinary threats (Gajdzik and Wyciślik 2008).

The disturbance of ecological safety is connected with the devastation of the natural environment, which has been recognized as a global problem of our times. Nowadays, the most disturbing ecological threats include air pollution, which largely determines the quality of people's life, often leading to diseases, and the associated global climate change, resulting to a large extent from excessive greenhouse gas

emissions, which is caused by the constantly growing industrial production (Raczkowski, 2012; Kośmicki, 2009; Serzysko, 2014).

Equally important for the loss of ecological security is the reduction of biodiversity, which affects the functioning of entire ecosystems. Ecological disasters are important, as they appear in a completely unforeseen manner and cause long-term nuisance to the natural environment (Wawrzusiszyn, 2015). Water pollution is also a threat to ecological safety, as well as the lack of access to clean water, which has no substitutes, and is an indispensable good for life and shaping production process (Księżpolski, 2011). Worrying is the fact of the increasing amount of post-consumer and post-production waste, which is still a threat despite the conducted waste management (Hadryjańska, 2015).

One of the biggest ecological threats, however, is the overexploitation of non-renewable natural resources. A global threat to every economy is the fact of the rapid depletion of minerals, which are the main energy resource (Kłosiński, 2006). Ecological safety can be ensured when the environmental policy is comprehensively pursued to reduce soil, air and water pollution, to complete the process of reducing biodiversity, to increase the availability of drinking water, and to reduce the over-exploitation of non-renewable natural resources. An indispensable tool for the implementation of all these actions is the 2030 Agenda, i.e. the UN resolution signed by 193 member states of adoption on September 25, 2015. Its full name is “We are transforming our world: the 2030 Agenda for Sustainable Development”. It defines a new development model until 2030, including 17 Sustainable Development Goals (SDGs) and specific 169 related tasks that reflect the three dimensions of sustainable development – economic, social and environmental (file:///C:/Users/user/Downloads/Monitorowanie\_CZR\_w\_PL.pdf).

The new vision of development outlined in the Agenda focuses on five great transformational changes identified as 5P principle (People, Planet, Prosperity, Peace, Partnership):

- People – not overlooking anyone, i.e., reaching excluded groups, creating conditions and opportunities for the enjoyment of universal human rights and economic achievements for all people, ensuring equal access to economic resources, basic services, land, natural resources, technology and finance.
- Planet – creating solid foundations for sustainable development by integrating social, economic and environmental aspects of development, building a development model that will foster economic growth and greater social inclusion, and rationally use the resources of the natural environment, thus achieving a better quality of life and solving the problem of poverty.
- Prosperity – transforming economies conducive to creating jobs and ensuring inclusive development, including switching to sustainable consumption and production models, using new technologies and business

- potential, ensuring access to good education, health care, clean water, electricity, transport, telecommunications, facilitating business activities, investment, trade, intensifying the sustainable development of cities.
- Peace – building peace and effective, fair, open and responsible institutions guaranteeing strengthening the role of law, social inclusions and co-decision, strengthening the role and responsibility of institutions that should support the rule of law, property rights, freedom of speech and media, political freedom, access to justice, non-discrimination against anyone.
  - Partnership – a new global partnership based on solidarity, cooperation, accountability and transparency of actions taken, this applies to partnerships between governments as well as local and regional administrations, academia, business and all interested parties and groups (<https://www.gov.pl/web/rozwoj-praca-technologie/agenda-2030>).

Of the 17 goals of the 2030 Agenda, 5 goals directly relate to environmental protection and their implementation contributes to increasing ecological safety in Poland. One of them is goal 6 on the need for clean water and good sanitation. This goal is very important as in 2015 3 out of 10 people did not have access to safely managed drinking water supplies and 6 out of 10 people did not have access to safely managed sanitation services. In addition, 2.3 billion people this year still did not have access to basic sanitation services, and 892 million people continued to have their physiological needs in the open air. In Poland, two priorities have been adopted within this objective. One of them is increasing the available water resources, improving their ecological status and chemical quality.

Two indicators are used for its monitoring, the capacity of small water retention facilities and the percentage of the population supplied from the water supply system with water does not meet the requirements. Both indicators improved in 2010-2019. The creation of legal and financial mechanisms favouring the rational use of water resources and the implementation of water-saving technologies, as well as the construction and modernization of wastewater treatment plants is the last priority of objective 6. One of its indicators is the percentage of the population using wastewater treatment plants, which shows a growing tendency. The second indicator is the percentage of industrial and municipal sewage treated biologically, chemically and with increased removal of biogens in the total sewage requiring treatment.

The improvement of access to sanitary facilities is influenced by the expansion of the water and sewage network, including the intensification of wastewater treatment, which determines the quality and purity of water. It is of key importance for the environment to replace methods consisting only in mechanical removal of pollutants with more effective technologies, e.g. subjecting them to secondary cleaning. In Poland, as in most EU countries, the percentage of the population using sewage treatment plants with at least secondary waste disposal (i.e., generally biological with secondary settlement or another process reducing organic material). Currently, 74% of the inhabitants of Poland (compared to 65% at the beginning of the decade).



In the EU countries with the highest level of use of this type of treatment plant (including the Netherlands, Austria, Germany and Luxembourg), the percentage of the population served by them exceeds 95% (<https://raportsdg.stat.gov.pl/2020/cel6.html>).

Another goal of the 2030 Agenda related to the protection of environmental components is goal 12 on responsible consumption and production. Increasing the efficiency of resource use and changing the approach to resources by departing from their linear management, as well as changing consumption patterns (development of the circular economy) is the first priority of this goal. In Poland, 702 million tons of raw materials are consumed annually for economic purposes (9% more than at the beginning of the decade), while the material footprint is 640 million tons (8% more, respectively).

Poland is one of the six EU economies where the actual consumption of materials (domestic material consumption) is higher than the material footprint (by 70 million tons), which means that the materials obtained by the country also met the consumption needs of other countries. A similar situation occurs in Romania, Bulgaria, Sweden, Ireland and Estonia. The second priority, on the other hand, concerns the development of organic farming. Its indicator, i.e. the share of certified organic agricultural area in organic farms in the total agricultural area of agricultural holdings has improved in the last decade (<https://raportsdg.stat.gov.pl/2020/cel12.html>).

Objective 13 concerns the implementation of measures to counteract climate change and its effects. The priorities here are the effective reduction of CO<sub>2</sub> concentration in the atmosphere and the introduction of innovative technologies for the use of available energy sources, including the development of geothermal energy. Annually, 11 tons of greenhouse gases related into the atmosphere by the economy are per 1 inhabitant of the country. This is slightly more than the EU average, where it is 9 tons, lower than at the beginning of the decade (10 tons). With the reduction of emissions in most member states, Poland moved to the 7<sup>th</sup> place among the largest greenhouse gas emitters per capita in the EU from the 11<sup>th</sup> position in 2010. Reducing the amount of greenhouse gases released into the atmosphere is favoured by, among others, switching to low-carbon energy sources, in particular renewables. One of the indicators of this priority is the share of energy from renewable sources in gross final energy consumption. It most often showed a growing tendency and in 2010 it amounted to 9.3%, and in 2019 – 12.16% (in the EU this share increased from 13% to 18%) (<https://raportsdg.stat.gov.pl/2020/cel13.html>).

Goal 14 is related to the need to protect the oceans and seas. To monitor this target, an indicator is used that describes the percentage of fish stocks within the sustainable levels in the Baltic Sea. In 2010-2019, this percentage varied between 40 and 60%. The priority is also to increase the share of the maritime economy sector in GDP and increase employment in the maritime economy. Its index, i.e., the dynamics of

average employment in the maritime economy, to 2019 increased by almost 90% compared to 2010. To achieve goal 14, the protection of biodiversity is important. In Poland, 175 Key Areas of Biological Diversity have been identified, covering an area of 61.000 km<sup>2</sup>, of which 45 are in the maritime areas. Almost 90% of the key marine area is protected. This percentage increased significantly with Poland's accession to EU (in 2003 it was 29%) and with the inclusion of some areas in the Natura 2000 program (<https://raportsdg.stat.gov.pl/2020/cel14.html>).

Objective 15 concerns the protection of terrestrial ecosystems, sustainable forest management, and combating desertification. In order to control the degree of implementation of this goal, the indicator of the share of devastated and degraded land requiring reclamation in the total area is determined, which is about 0.2% and has not changed much over the last 10 years. Another indicator is the share of forest land in the land area, which in this period was about 30%. Under the priority "modernization and expansion of sewage treatment plants and sewage systems, as well as air protection (elimination of pollution emission sources or reduction of their impact) and soil protection", national PM<sub>2.5</sub> average exposure indicator is determined. This indicator in Poland improved – in 2010 it was 28 µg/m<sup>3</sup>, and in 2019 - 21 µg/m<sup>3</sup>. The percentage of the population using sewage treatment plants also improved – from 64 to 74% (<https://raportsdg.stat.gov.pl/2020/cel15.html>).

The implementation of the sustainable development goals of the 2030 Agenda shows favourable changes in the state of the natural environment in Poland. The complexity of the indicators of these objectives gives grounds for drawing conclusions about the improvement of ecological safety in Poland, despite the fact that the indicators do not cover all aspects related to environmental management.

### **2.3 Environmental Management System According to Standard ISO 14001**

Commitment to the environment has become an important variable in today's competitive strategies of organizations. The implementation of the environmental management system is one of the initiatives implemented under the concept of "Led business" (a global tendency among organizations to invest in development that supports the achievement of business goals) (Graff, 1997; Anton, Deltas, and Khanna 2004).

The implementation of the environmental management system in the organization is part of the implementation of the principles of the sustainability concept, which consists in striving to achieve a balance between environmental, social and economic goals (Wysokińska-Senkus 2013). Most researchers of environmental management systems indicate the visible positive effects of implementing and maintaining an environmental management system according to the requirements of ISO 14001 at the level of environmental efficiency (Wysokińska-Senkus, 2008; 2013; Dahlström and Skea 2002; Florida and Davidson, 2001; King and Lenox, 2002; Poksinska and Dahlgard, 2003; Potoski and Prakash, 2005; Ambec and

Lanoie, 2008; King, Lenox, and Terlaak, 2005). Currently, we can distinguish the most important ISO 14000 standards:

- PN-EN ISO 14001:2015 Environmental management systems. Requirements and guidelines for use.
- PN-EN ISO 14004:2016-04 Environmental management systems. General guidelines for implementation.
- PN-EN ISO 14002-1:2021-03 – English version – Environmental management systems. Guidelines for the use of ISO 14001 to include environmental aspects and conditions in the thematic area of the environment. Part 1: General provisions.
- PN-EN ISO 14005:2019-08 - English version. Environmental management systems. Guidelines for a flexible approach to phased implementation.
- PN-EN ISO 14006:2020-08 - English version. Environmental management systems. Guidelines for the implementation of eco-design.
- PN-EN ISO 14007:2021-02 - English version Environmental management. Guidelines for determining environmental costs and benefits.
- PN-EN ISO 14008:2021-02 - English version. Monetary valuation of environmental impacts and related environmental aspects.
- PN-EN ISO 14020:2003 Environmental labels and declarations. General rules
- PN-EN ISO 14021:2016-06 - English version. Environmental labels and declarations. Own environmental claims (Type II environmental labelling)
- PN-EN ISO 14024:2018-05 - English version. Environmental labels and declarations – Type I environmental labelling – Policies and procedures
- PN-EN ISO 14025:2010 - Environmental labels and declarations – Type III environmental declarations – Rules and procedures
- PN-EN ISO 14026:2019-01 - English version. Environmental labels and declarations. Principles, requirements and guidelines for communicating the environmental footprint.
- PN-EN ISO 14031:2014-01 Environmental management – Assessment of environmental performance – Guidelines
- PN-EN ISO 14034:2019-01 Environmental management – Verification of environmental technologies (ETV)
- PN-EN ISO 14040:2009/A1:2021-03 - English version. Environmental management – Life cycle assessment – Principles and structure
- PN-EN ISO 14044:2009/A1:2018-05 Environmental management – Life cycle assessment - Requirements and guidelines
- PN-EN ISO 14050:2021-02 - English version. Environmental management – Terminology
- PN-EN ISO 14063:2020-10 Environmental management – Environmental communication – Guidelines and examples.

Organizations implement and certify environmental management systems for compliance with the PN-EN ISO 14001 standard. This standard includes

requirements for an environmental management system that enable the organization to design and implement environmental policies and objectives.

The Environmental Management System is part of an organization's overall management system, used to develop and implement an environmental policy and manage its environmental aspects. A management system is a collection of interrelated elements used to establish policies and objectives and to achieve these objectives. The management system includes organizational structure, planning, responsibilities, practices, procedures, processes and resources (ISO 14001).

The basis of the approach which is the foundation of the environmental management system is the Plan–Do–Check–Act (PDCA) concept (Dahlgaard, Kristensen, and Kanji, 2000). Environmental management systems are very popular. Most often, organizations implement the system based on the requirements of the ISO 14001 standard, however, it should be noted that there are currently about 30 alternative systems in the world in terms of environmental management.

In order for organizations to have an implemented and effective environmental management system, they should develop an environmental policy containing the goals and directions of the organization in the field of environmental aspects of activity, which should be formally expressed by the top management of the organization.

Environmental aspects according to ISO 14001 are elements of activities or products or services of an organization that interact or can interact with the environment. The organization should focus on identifying those aspects that are significant in terms of environmental impact. The determinant of the effective implementation and operation of the environmental management system in the organization is the involvement of the top management, which should play an active role both at the stage of system implementation and its improvement. Activities related to the monitoring and assessment of the effects of the organization's activities in terms of environmental activities are also very important. In this regard, the organization should define the subject of monitoring, adopted methods, criteria against which the organization will assess the effects of its activities, develop appropriate indicators, determine the frequency of measurements and their evaluation.

The ISO 14001 standard, based on which organizations certifying the environmental management system and receiving the certificate confirming the implementation of the system, consists of 10 chapters. It contains a set of requirements that should be implemented by the organization.

The first three chapters of the standard deal with its scope, normative references and the main terms and definitions related to the implementation of an environmental management system. Chapter 4 deals with the context of the organization and contains information facilitating its understanding, analysis of the context,

determination of the needs and expectations of the organization's stakeholders, as well as the scope of the management system.

Chapter 5, entitled "Leadership", contains the requirements for the involvement of the top management of the organization in the implementation of the environmental management system and its improvement. In addition, this chapter contains information and requirements in the field of: environmental policy as well as responsibility and authority in the organization.

Chapter 6 is dedicated to the planning process, it defines actions to address risks and opportunities, as well as environmental objectives and planned actions leading to the achievement of environmental objectives.

Chapter 7 deals with the resource, competence, awareness and communication requirements that significantly support the implementation and operation of the environmental management system. In addition, the requirements for the necessary documents that are recommended to properly implement the environmental management system are also given here.

Chapter 8 contains requirements for planning and overseeing operational activities as well as activities related to preparedness and response by the organization to emergency situations.

Chapter 9 contains the requirements for the assessment of the effects of the organization's activities in the field of monitoring, measurement, analysis and evaluation of the organization's activities, as well as internal audits and management review.

The last chapter 10 contains the requirements for the continuous improvement of the environmental management system, the method of dealing with non-conformities and the resulting corrective actions (ISO 14001).

In addition to the ISO 14001 system, there are also a number of systems that, analogically to this system, are to help the organization improve their environmental management. Among them, the following should be listed EMAS (Eco-Management and Audit Scheme) – the eco-management and audit system is a community environmental management system, the requirements of which are specified in the Regulation of the European Parliament and of the Council (EC) no. 1221/2009 of November 25, 2009. 1.2.3. Environnement, Bayerisches Umweltsiegel, BS 8555/IEMA Acorn Scheme, e+5, EcoCompass, Ecodynamic enterprise, Eco-Lighthouse, ECOPROFIT, EcoStart, EcoStep, Ecoscan, Program Environmental Diploma Göteborg, Green Dragon Environmental Standard, Green Key, Green Office, Green Network (Key2Green), Grüner Gockel, Altea AB company, Qualitätsverbund umweltbewusster Handwerksbetriebe, Svanen, Responsible Care, Clean Production Action, Green Public Procurement, Sustainability Index İMKB.

### 3. Research Methodology and Results

The aim of this study was to present the role of natural resource management in ensuring sustainable development, the essence of ecological safety, and to identify key activities related to environmental protection carried out in organizations on the example of the implementation of good practice standards of the ISO 14000 standards. Research questions:

- What is the role of natural resource management in ensuring sustainable development?
- What is the essence of ecological safety?
- What is the state of implementation and development prospects for environmental management systems in the world, what changes have occurred in the period from 1999 to 2020?

The first two goals were achieved in the first part of this study, while the certificate database can be used to define the implementation status and development prospects for environmental management systems in the world. Observing the development of certification of environmental management systems in the world, one can notice a constant increase in the number of certificates granted for compliance with the requirements of the international environmental management standard according to ISO 14001.

According to the data contained in the ISO Survey 2020 report, in 2020 as many as 568,798 organizations in the world had a certificate of compliance with the requirements of the international ISO 14001 standard, in 2011 this number was at the level of 267,449, which means an over 50% increase compared to 2020. In the period from 2001 to 2011, the number of certificates of the environmental management system increased more than 7 times. From 2001 to 2020, a continuous increase in the number of certificates can be observed. In 2020, compared to the previous year, an increase of 12% can be observed, mainly due to the significant increase in the number of certificates in China.

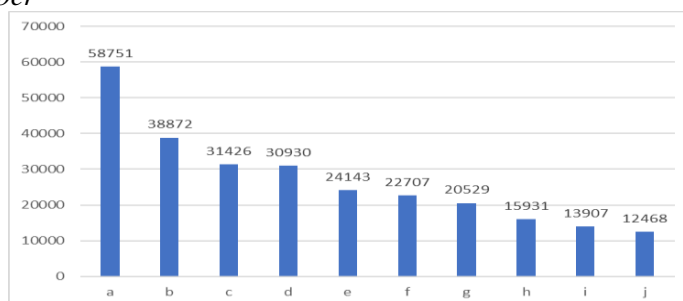
**Table 1.** Leaders in the number of certificates confirming compliance with the requirements of the ISO 14001 standard in the world in 2020

	Country	certificates
1	China	168 454
2	Japan	72 210
3	France	54 203
4	Italy	29 695
5	Spain	26 283
6	United Kingdom of Great Britain and Northern Ireland	22 295
7	Germany	18 919
8	India	10 699
9	Sweden	9 527
10	United States of America	7 764
11	Denmark	6 854

12	Australia	6 755
13	Brazil	6 430
14	Romania	6 300
15	Switzerland	6 270
16	Finland	5 802
17	Korea (Republic of)	5 646
18	Poland	4 984

**Source:** Own study, 2021, based on The International Organization for Standardization – ISO Survey Of Certifications, 2020.

**Figure 1.** Number of ISO 14001 certificates in the world - industries - 10 with the highest number



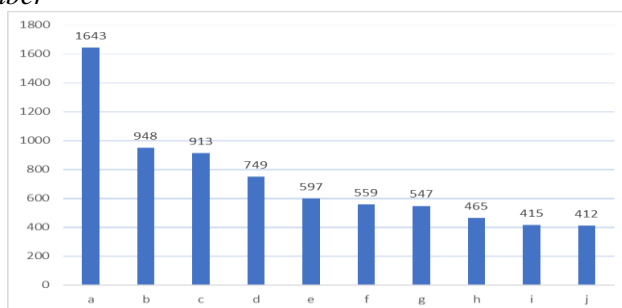
**Note:** a – Construction; b - Wholesale & retail trade, repairs of motor vehicles, motorcycles & personal & household goods; c - Electrical and optical equipment, d - Basic metal & fabricated metal products; e - Engineering services; f - Other Services, g - Machinery and equipment; h - Rubber and plastic products; i - Information technology; j - Chemicals, chemical products & fibres.

**Source:** Own study, 2021, based on The International Organization for Standardization – ISO Survey Of Certifications 2019, 2020.

As for the industries in which the most certificates for compliance with the ISO 14001 environmental management standard were issued, these were the sectors: a – Construction; b - Wholesale & retail trade, repairs of motor vehicles, motorcycles & personal & household goods; c - Electrical and optical equipment, d - Basic metal & fabricated metal products; e - Engineering services; f - Other Services, g - Machinery and equipment; h - Rubber and plastic products; i - Information technology; j - Chemicals, chemical products & fibres. Among these sectors there are those that are most responsible for the emission of harmful substances to the environment or excessively exploiting them (Figure 1).

The analysis of the number of certificates issued in Poland, broken down by sectors, leads to a similar conclusion. In the case of Poland, these were the following sectors: a - Basic metal & fabricated metal products; b - Health and social work; c - Wholesale & retail trade, repairs of motor vehicles, motorcycles & personal & household goods; d - Machinery and equipment; e - Rubber and plastic products; f - Electrical and optical equipment; g – Construction; h - Other Services; i – Education; j - Transport, storage and communication (Figure 2).

**Figure 2.** Number of ISO 14001 certificates in Poland in 2020 - industries - 10 with the highest number

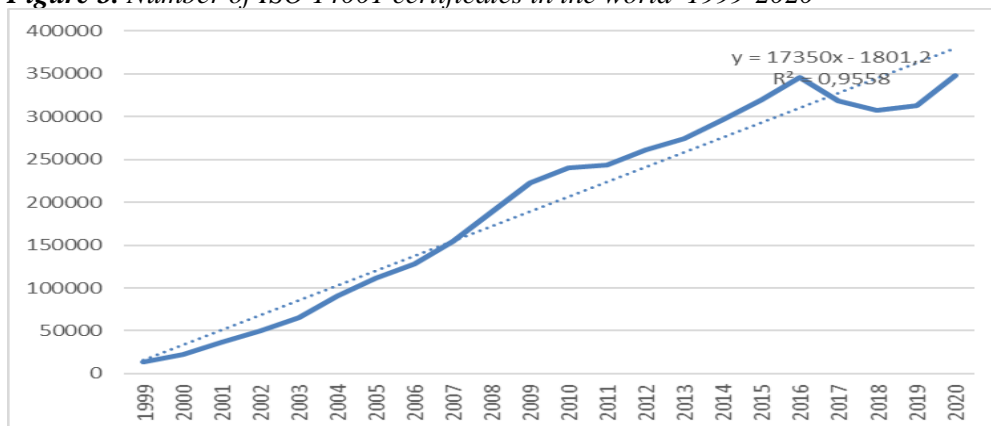


**Note:** a - Basic metal & fabricated metal products; b - Health and social work; c - Wholesale & retail trade, repairs of motor vehicles, motorcycles & personal & household goods; d - Machinery and equipment; e - Rubber and plastic products; f - Electrical and optical equipment; g - Construction; h - Other Services; i - Education; j - Transport, storage and communication.

**Source:** Own study, 2021, based on The International Organization for Standardization – ISO Survey Of Certifications, 2020.

The analysis of the dynamics of the increase in the number of certificates for compliance with the ISO 14001 environmental management standard in the world also leads to interesting conclusions. It can be seen that from 1999 to 2020 this number increased by an average of 17,350 certificates per year. This was mainly due to the requirements of markets and contractors who required their partners to have just such a certificate. It can be assumed that taking into account the environmental management systems mentioned in the previous part of this study, the number of entities that actively manage the environment and certify themselves may be even several times higher. In 2017, a decrease in the number of issued certificates was observed, but ISO explained this with a change in the method of counting issued certificates by certification bodies (Figure 3).

**Figure 3.** Number of ISO 14001 certificates in the world 1999-2020



**Source:** Own study.



#### **4. Conclusion**

The 2030 Agenda and other regulations and international agreements force organizations to implement environmental issues to a greater extent in their strategies. It is proposed here that environmental management systems in accordance with ISO 14001, the EMAS regulation or other alternatives to them are an effective tool to prepare for the new challenges of the future.

In addition to the preparation for future challenges, other benefits of implementing environmental management systems can be identified such as: introducing cleaner, more efficient processes, increase in productivity and lower operating costs, mainly by reducing the amount of waste generating savings, improving the profitability and competitiveness of a product or service, enabling market expansion, improving the image of the company and its management system, improving relations with stakeholders. All these benefits contribute to the achievement of environmental safety.

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